

# Study of academic services using the CoBIT framework and IT-infrastructure library

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## Abstract

A college that was developed with form and structure of the new, requires a lot of support, including information technology support in achieving new goals. Academic Services as an essential service at a community college should also play a role in achieving these goals. Good management of IT can further accelerate the achievement of organizational goals, for that IT should be on notice and well managed. In connection with IT governance, need to use a good standard to look at existing IT management. as one tool in the measurement of IT governance can be used to view IT governance there. Domain Delivery and Support (DS) and Monitor and Evaluate (ME) is just done at the moment, because the organization was forming a new structure and form. Data collection begins with knowing the vision, mission and goals of the new organization, then proceed to analyze the processes that have the domain DS and ME to determine the level of maturity of these processes. In addition to the process of data analysis was also performed using the data collection questionnaire to determine the current level of maturity (current maturity) and the expected level of maturity (expected maturity).

**Keywords:** *IT Governance; CoBIT; IT-IL; IT Process; Maturity; Interest.*

## 1. Introduction

Timely, accurate and relevant academic services to the needs of the users, is a very important thing to note in support of the smooth implementation of the activities of an educational institution. Quality service, functionality, ease of use, reduced service delivery time is one of the supporting factors to create user loyalty, improve the effectiveness and efficiency of resource usage. This will indirectly be an added value and provide competitive advantage for the institution.

In producing quality academic services in higher education, the application of information technology (IT) is a necessity that is absolutely necessary. In general, the implementation of IT will be accompanied by a consequence of high cost needs, both in terms of hardware procurement, software development, implementation and maintenance of the system as a whole. This is done in the hope of achieving a specifically defined IT strategy plan and overall institutional business plans and strategies.

Institutional objectives will be achieved if IT planning and strategy is implemented in harmony with the organization's defined business planning and strategy. The implementation of IT in harmony with the institution's objectives can only be generated if supported by a good IT Governance system from the planning and implementation stage of evaluation. IT governance is an integral part of organizational management, including leadership and organizational structures and processes that ensure that IT organizations support the organization's overall strategy and objectives. The implementation of IT governance is expected to provide many benefits, including:

- 1) Reduce risk
- 2) Aligning IT with business goals

- 3) Strengthen IT as the main business unit
- 4) Business operations are more transparent
- 5) Increasing effectiveness and efficiency.

To achieve the institutional goals required a planning and implementation of information technology that aligned with the business plan and organization strategy that has been defined.

The implementation of IT in harmony with the objectives of the institution will be achieved if supported by a good governance system (IT Governance) starting from the planning, implementation, service and evaluation phase.

To be able to make recommendations on good and proper IT governance, it is necessary to prioritize potential areas of high priority, related to the services generated and the level of maturity of IT governance in Buddhi Dharma University by using one of the information system audit methods of the COBIT framework, whether it is in accordance with the vision, mission and strategy of the institution so as to achieve the business goals of the organization.

## 2. Related works/literature review

Information System Auditing is the process of collecting and evaluating evidence to determine whether a computer systems safeguards assets, maintains data integrity, achieves organizational goals effectively, and consumes resources efficiently [1]. Understanding the outline is the process of collecting and evaluating the evidence to determine whether a computerized application system has established and implements an adequate internal control system, all assets are well protected / not abused and ensured data integrity, reliability and effectiveness and efficiency of information system implementation computer-based.

IT governance is a structure and process that are interconnected and direct and control the company in achieving the company's goals through added value and balancing the risks and benefits of information technology and its processes [2] [3]

Control Objectives for Information and Related Technology is a set of practical guidance documentation for IT governance that can help auditors, management and users to bridge the gap between business risk, control needs and technical issues [4]. COBIT guidelines allow companies to implement IT management effectively and basically can be applied throughout the organization. In particular, the COBIT management guideline component contains a framework response to management needs for IT measurement and control by providing tools to assess and measure a company's IT capabilities for 34 COBIT IT processes. These tools are:

- 1) Performance measurement elements (measurement of results and performance that directs the entire IT process).
- 2) Critical Success Factors (CSF) which are provided in a concise, practical, non-technical manner from each IT process.
- 3) A maturity model to assist in benchmarking and decision making for capacity building.

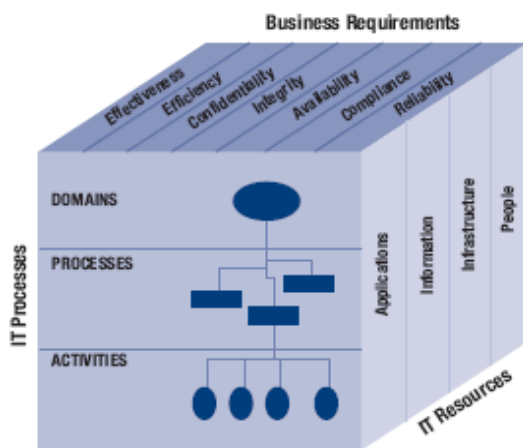


Fig. 1: Cobit Cube.

In the implementation of IT management there are two types of control models and COBIT tries to bridge the gap of both models.

- 1) IT control model (IT control model)

In order for the company to gain profit it is necessary to note and understand the limitations of IT and the risks faced at all levels of management in order to achieve an effective direction and appropriate control.

- 2) Business control model (business control model)

Organizations must restructure the company's operational activities and use IT to improve competitiveness with other organizations.

The COBIT framework consists of a high level of control on the outcome objectives and overall classification structure. The theoretical basis for classification is the 3 levels of IT regulatory efforts involving the management of IT resources. Starting from the bottom is the activity and task required to achieve measurable results. Then the process is to describe 1 layer above a series of tasks or activities associated with change (control). At the highest level, processes are naturally grouped together into domains. This grouping is often defined as a responsibility in the organizational structure and in line with the cycle of management or life cycle used in the IT process, as in Figure 2 below:



Fig. 2: It Process Level.

Basically the COBIT framework consists of 3 control objectives, namely activities and tasks, processes, and domains. Activities and tasks are routine activities that have a life cycle concept, while tasks are activities that are carried out separately. Next, this activity and tasks collection is grouped into an IT process that has the same IT management problems grouped into domains [5]. COBIT consists of 34 high-level control objectives, one for each IT process and grouped into 4 domains.

IT-IL or Information Technology Infrastructure Library, is a set of concepts and techniques for infrastructure management, development, Information Technology (IT). IT-IL is published in a series of books which each discuss a topic on IT management [6] [7] [8] [9] [10].

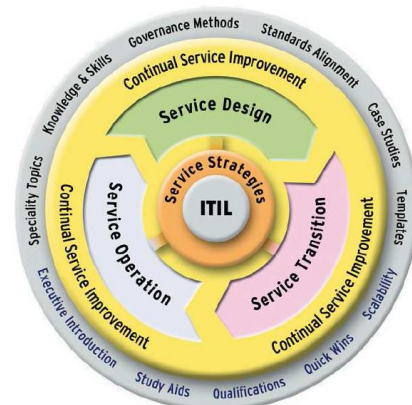


Fig. 3: Cycle It-IL V3.

As we know COBIT or Control OBJECTive of Information and related Technology is a guideline for IT management including input, process, output, and process control divided into 4 objectives and 34 key areas. Each of these objectives are: Planing & Organization (PO), Acquisition & Implementation (AI), Delivery & Support (DS) and Monitoring.

A step of IT-IL is a management framework for IT services that is divided into processes and functions. Two areas/modules in IT-IL, ie Service Support and Delivery then become CORE in IT-IL version 2, which we then familiar with IT Service Management (ITSM).

It has been mentioned previously that CobiT is a navigator in the direction of developing IT governance within organizations, while IT-IL as a vehicle to achieve these development goals.

There are organizations that conduct IT audits first and then get to know the concept of IT-IL. There are organizations implementing IT-IL and then auditing their IT governance with CobiT standards. But there are also those who have understood both of them first and included them in their organization's IT strategic plan.

Understanding the need for alignment between CobiT and IT-IL, IT Governance Institute (ITGI) and Office of Government Commerce (OGC) conduct joint research. One result of this

research is the mapping between each Control Objective in Cobit 4.1 with the topic in IT-IL version 3.

### 3. Method

Instrument used in this research is a questionnaire. Questionnaires in calculating the level of importance in this study using ordinal scale measurement model likert. Sizes in this model include ordinal size and nominal size. Ordinal size is a given number in which the number contains an understanding of the level. Nominal size is used to sort objects from the lowest to highest levels. This measure does not give an absolute value to the object, but only gives the order of levels from the lowest to the highest level only (table 1). Absolute value is the value of maturity level according to CoBIT maturity level guidelines (table 2).

**Table 1: Ordinal Value**

Value	Information
1	Very Not Good
2	Not Good
3	Fair
4	Good
5	Very Good

**Table 2: Absolute Maturity Value**

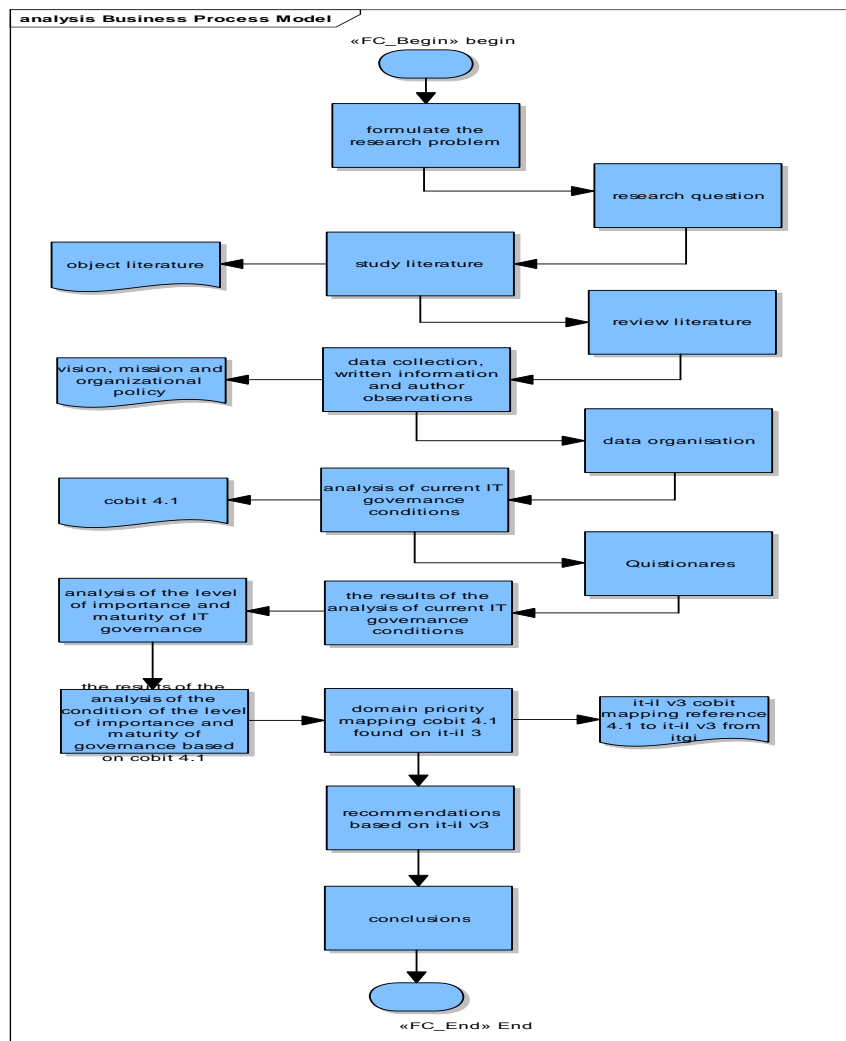
Value	Information
0	There is no
1	Initialization
2	Can be repeated
3	Applied
4	Organized

### 5 Optimized

Quantitative analysis techniques use Microsoft Excel spreadsheets to process, answer and explain the formulation of the problem of the level of importance and the level of maturity (information level) of information technology governance conducted at Buddhi Dharma University.

The research tool that we use in helping the research process is using questionnaires taken based on the literature in COBIT version 4.1, on the DS and ME domains for each Control Objective. The reasons underlying the use of the research tool are as follows: Questionnaire is one research tool that can be used for survey research approaches.

- 1) Respondent population used in this research is have authority to IT that exist in Buddhi Dharma University
- 2) Questionnaire distribution is done directly to the respondent by providing guidelines for filling out the questionnaire, so that the results of the research are expected to be more accurate and describe the overall population situation.
- 3) Gather direct respondents to give explanation of filling, foreign terms and appropriate input that can be understood by each reponden
- 4) The analysis for maturity is done by comparing the current maturity level with the intended maturity level. The level of maturity targeted is the level of expectations / expectation from the manager of academic services Buddhi Dharma University
- 5) The gap between current and targeted results is an indicator in the formulation of recommended governance improvement using the best practice IT-IL v3.



**Fig. 4: Research Steps.**

## 4. Results

The level of interest analysis needs to be done to find out how important the process from the CoBIT domain to the academic service application is expected by the management and the ranks of the management information system.

Data collection in the form of management and management opinions Academic Services Buddhi Dharma University for the existing IT Management process within the CoBIT framework for the DS domain (Delivery and Support) is done through the I-Level of Interest questionnaire. Based on the I-interest questionnaire, the importance of process management is done by calculating the average number of interest rates of activity in each process. The result of recapitulation of importance level in each process can be seen in table 3

**Table 3:** Recapitulation of Interest Rate Questionnaire

Domain Process DS CoBIT	Level of Interest
DS1 Setting and Managing Service Levels	92%
DS3 Set Up Performance And Capacity	80%
DS4 Ensuring the Continuity of Services	86%
DS5 Ensuring System Security	91%
DS6 Identify And Allocate Fees	60%
DS7 Educate And Train Users	80%
DS8 Manage service desk and Incident	80%
DS9 Manage Configurations	84%
DS10 Managing Issues	70%
DS11 Manage Data	88%
DS12 Managing the Physical Environment	70%
DS13 Manage Operations	85%

Analysis of the maturity level of Buddhi Dharma University academic service is done by spreading the 2nd questionnaire- Level of Maturity

**Table 4:** Current Maturity Level

Domain Process DS CoBIT	Level of Maturity
DS1 Setting and Managing Service Levels	2.80
DS3 Set Up Performance And Capacity	2.67
DS4 Ensuring the Continuity of Services	2.29
DS5 Ensuring System Security	1.85
DS6 Identify And Allocate Fees	2.00
DS7 Educate And Train Users	3.00
DS8 Manage service desk and Incident	2.33
DS9 Manage Configurations	2.60
DS10 Managing Issues	2.00
DS11 Manage Data	3.00
DS12 Managing the Physical Environment	2.50
DS13 Manage Operations	2.75

The analysis carried out produced several important things, namely:

- 1) Importance of each DS domain process;
- 2) System maturity level that runs on each DS domain process.

Based on the level of maturity and the level of interests found then the priority of management is divided into 4 (four) categories as in table 5 below.

**Table 5:** Category of Process Management of University Buddhi Dharma Academic Services

	I	IV
↑ 80% Level of Interest	DS4	DS1
	DS5	DS9
		DS11
	II	III
	DS3	DS7
	DS10	
	DS8	DS12
	DS13	
	Level of Maturity	2.5 ----->

## 5. Discussion

### 5.1. Control of network aspects

Network operation requires supervision and maintenance and prevention of unauthorized access. Control of the network is done on physical and non-physical equipment. The things that can be done for control of this network are among others:

- 1) Determine the network topology and transmission media that are suitable for the conditions in the Buddhi Dharma University environment so that network performance can run well;
- 2) Standardized both static and dynamic (TCP / IP) addressing (DHCP) addressing, domain name (DNS) system used for all computer networks in Buddhi Dharma University
- 3) Perform maintenance of network equipment such as hubs, switches, routers, servers and so on
- 4) Use network software that is appropriate for securing academic information systems.
- 5) Provide training or education for IT personnel who are responsible for network control.

### 5.2. Control over aspects of data access

Actions that can be taken to control data access need to be done as follows:

- 1) Equalization of data specifications, so that existing data can be used by all units and all existing systems.
- 2) Set up and implement user authorization in accessing existing data. Making regular backup data so that it can secure existing data if something happens that can damage the data.

### 5.3. Control of disaster management aspects

Actions that can be taken in controlling disaster management need to be done as follows:

- 1) Perform data backups and backups programs regularly.
- 2) Perform a Disaster Recovery Plan and choose a location far from the campus location.
- 3) Every room that has a computer is provided with a fire extinguisher.
- 4) Create a server room that can protect from hazards and natural disasters.

### 5.4. Control of building and hardware infrastructure

IT governance requires control over hardware. Some things that must be done to control the building infrastructure and hardware, this is carried out to ensure the continuity of services, are as follows:

- 1) Supervision of physical location
- Some of the things that can be used to supervise the physical location are as follows:
- 1) For certain spaces (such as server rooms, data rooms), other than authorized officers are prohibited from entering.
  - 2) Every employee must use an ID Card as an employee ID.
  - 3) Every student who wants to use a computer laboratory outside the lecture schedule must use ID (student card).
  - 4) Security officers are required to control every room every hour
  - 5) Security system using a card, for example a magnetic card equipped with a PIN combination.
  - 6) Every visiting guest is required to fill in the guest book and use the identification.
  - 7) Computer room using CCTV camera.
  - 2) Settings for physical location

Some of the things that can be used to set the physical location are as follows:

- 1) Placing the location of server space that is not passing by students or employees;
- 2) Placing the location of the computer lab room centered on one building;
- 3) Computer equipment should be kept away from electrical equipment that has a large electrical power, because it will cause computer equipment to become damaged quickly;
- 4) Computer equipment should be kept away from water sources that cause leakage (eg AC layout);
- 5) Arrange and tidy up the position of electrical cables and network cables and label each cable to make it easier to control.
- 3) Operational control of hardware

Some of the things that can be used to set the physical location are as follows:

- 1) Making work procedures in operational control of hardware, such as reports of damage to computer equipment up to handling;
- 2) Performed routine maintenance of hardware;
- 3) Inventory of existing hardware periodically.
- 4) Improve the expertise of IT personnel by providing training or education so that the maintenance of hardware becomes better, and hardware becomes longer in service life.

### 5.5. Control over aspects of the software

Control over software (software) here includes applications, operating systems, and utility software used. This control is intended to ensure that software selection is carried out appropriately and in accordance with the needs that can support the organization's goals.

Actions that can be exercised for the control of this software are among others:

- 1) Planning the use and purchase of the necessary software
- 2) Uniform software used so that maintenance becomes cheaper and easier.
- 3) The software installation process is only done by IT personnel
- 4) Installed software is tailored to the needs of the system and differentiated between system managers, in this case including the academic and user.
- 5) A sufficient manual is provided for the operation of the software in use.
- 6) Ensure availability of backups of any system and software used, including drivers and other plug-in software
- 7) To reduce the budget spent used software that can be used for free.
- 8) Software utilities, especially antivirus software are confirmed to be updated all the time with adequate antivirus software.
- 9) Provide training or education for IT personnel who are responsible for software control.

### 5.6. Implications of research on managerial aspects

The positive thing that the management gained from knowing the priority of recommendations that had to be implemented was in terms of the allocation of costs, time and human resources, in the implementation of these recommendations. Where based on the results of the analysis obtained the DS4 domain process - Ensuring the Continuity of Service and DS5 - Ensuring system security is a process that must be prioritized first compared to other domain processes.

### 5.7. Research implications on advanced research aspects

This process can be used as a tool to manage the governance process. A more detailed definition can be made into rules, guidelines

and procedures for violations guaranteed by the management of the academic and management information systems of the institutions involved.

This proposed governance must be reviewed periodically to be developed in accordance with technological progress.

The advanced research aspects expected by the author by conducting this research are as a reference in conducting a study.

## 6. Conclusions

A summary of thesis work is as follows:

- 1) In the course of this thesis the priority area / level required to manage the Buddhi Dharma University Academic Services is including DS4 (service) and DS5 (System Security) processes.
- 2) Academic Services Buddhi Dharma University has implemented all IT activities on the DS domain. These activities are necessary to maintain the quality of Buddhi Dharma University academic services. Level of maturity (maturity level) owned on each DS is different. Perform a process that applies at the level of maturity level 2, which is as much as 75%. This indicates that such activities have been implemented, but have not yet been established in written and documented procedures. The rest of the process is at the maturity level of 3% as much as 17%, namely DS1 and DS11 which shows that the activities on the process done well. While the DS6 process has a maturity level of 1.6 indicating that the activity on the process has been recognized and realized, but has not been applied.
- 3) The resulting IT governance is the various policies that need to be done in each DS4 and DS5 process in accordance with IT-IL v3 best practice guidelines

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