

# Information System Audit Using Framework Control Objectives for Information and Related Technology (COBIT) on Values Processing Application for Online Student at Senior High School 14 of Bandar Lampung (SMA Negeri 14 Bandar Lampung)

Siti Zakiah

*Informatics & Business Institute Darmajaya, Bandar Lampung, Indonesia*

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## Abstract

Senior High School 14 of Bandar Lampung is one of the Secondary Education that applies the use of information technology into the academic information system. The Secondary Education strategy plan in the development of information systems has not gone through the information system audit process so that the planning of the information system is not in line with the needs of the expected business process. To overcome this, it is necessary to have an academic information system audit to see the maturity level so as to produce an audit report that can be used as a recommendation in planning an academic information system in the future. An information system audit was conducted using the COBIT 4.1 framework on the DS11 domain. Data collection techniques through observation, interviews and questionnaires. The questionnaire used is a maturity level questionnaire while the maturity level questionnaire is used to measure the level of maturity of the information system for the current condition (as is) and the expected condition (to be). The results of the study concluded that the detailed control objective performance obtained from the expected maturity level (to be) questionnaire in the DS11 process as a whole was at level 4 or managed and measurable. Recommendations for planning solutions towards the expected level of maturity are carried out by defining remedial actions on the attributes of AC, PSP, TA, SE, RA and GSM

*Keywords:* Cobit 4.1; Domain DS 11; Management Maturity Level

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## 1. Introduction

The role of information technology and information systems for the world of education is very important, this causes the role of information technology to be in line with the investments that have been spent, so careful planning and optimal implementation are needed (Azizah, 2017).

SMA Negeri 14 Bandar Lampung has applied an online student grade processing system. Which is a web-based student grade processing application available for teachers to fill in student grades, attendance so that the process of processing student grades is faster and data is stored in the database. There are several user users, namely the Subject Teacher section, BK Teacher, and Administrator.

One of the widely used methods of managing information technology is IT governance contained in COBIT (Control Objectives for Information and Related Technology) (Isaca, 2011). COBIT can be said to be an information technology framework published by ISACA (Information System Audit and Control Association). COBIT serves to bring together all business control needs and engineering issues. In addition, COBIT is also designed to be a tool that can solve problems in IT governance in understanding and managing risks and benefits related to school information resources (Cobit, 2012).

One way that can be applied to realize good IT Governance is to conduct an information system audit. Information system audit is a process of testing information technology infrastructure to find out whether the

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\* Corresponding author.

E-mail address: [sitizakiah1977@gmail.com](mailto:sitizakiah1977@gmail.com)

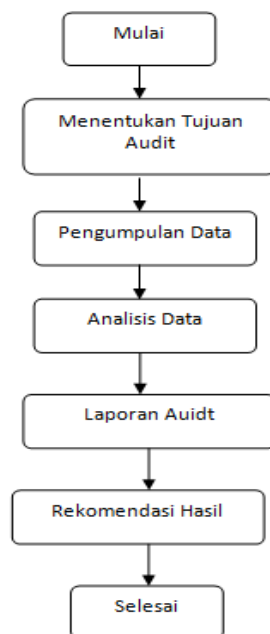
system that is being used and running can guarantee the security of assets owned, data integrity, and operational effectiveness in achieving predetermined goals.

Based on the background, the identification of the problem is the absence of an information system audit to assess the maturity level so that schools do not have good recommendations for planning and designing academic information systems in the future to improve services to system users.

## 2. Research Method

The research methods that will be carried out in this study include two parts of the research, namely conducting an evaluation to see the extent of the level of the accuracy of the information system Processing online student scores at SMA Negeri 14 Bandar Lampung and providing an analysis of improvements to improve the information system in accordance with the process that occurred at SMA Negeri 14 Bandar Lampung.

The flow of discussion in this study refers to the stages of the SI Audit process, namely. The steps of this study can be seen more clearly in figure 1 of the Research Discussion Flow (Suharsimi, 2006).



**Figure 1.** Research Discussion Flow (in Indonesia)

In this study, observations were made on the use of information systems at SMAN NEGERI 14. Researchers will observe firsthand the business processes in data management in the Information System for Processing online student grades at SMA Negeri 14.

## 3. Results and Discussion

### 3.1. Results

#### 3.1.1. Maturity Level Audit Results

Questionnaire analysis was conducted to assess maturity level performance by distributing questionnaires to 20 respondents. The selected respondents were education and leaders of Secondary Education. The questionnaire distributed was then recapitulated using Microsoft Excel.

#### 3.1.2. Maturity Level Representation

The questionnaire, which was distributed to 20 respondents, was then recapitulated using Microsoft Excel.

Based on the results of the recapitulation, it can be seen that 45% of respondents gave answer "3" to statements oriented towards the present (as is) while 53.17% of respondents answered "5" for future-oriented statements (to be).

While the trend pattern can be clearly seen in figure 2, where the highest position of the as curve is closer to answer "3" and the highest position of the curve on to be lies in answer "5"

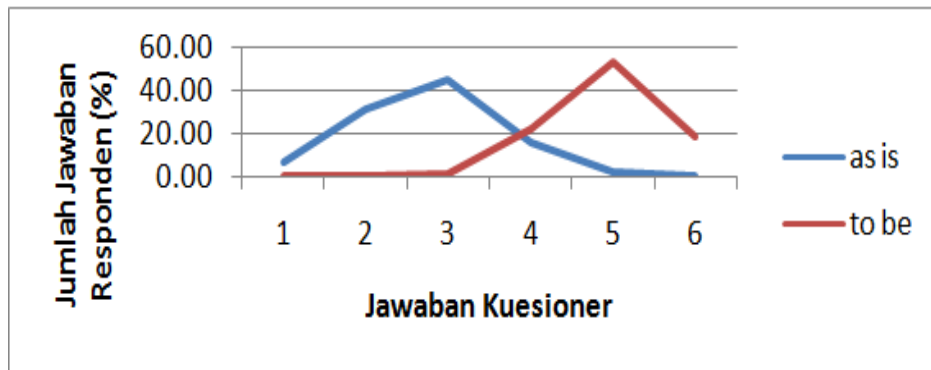


Figure 2. Maturity Level Questionnaire Answer Distribution Curve (in Indonesia)

To describe more clearly the results of the analysis and study of the maturity level in each attribute, the results can refer to the *Cobit* maturity model, for each questionnaire answer choice can be mapped into mature values as shown in the table 1.

Table 1. Mapping the Results of the Maturity Level Questionnaire

No	Answer	Maturity Value	Maturity Level
1	0	0,00	Non-Existent
2	1	1,00	Initial/Ad Hoc
3	2	2,00	Repeatable but Intuitive
4	3	3,00	Defined Process
5	4	4,00	Managed and Measurable
6	5	5,00	Optimized

Each attribute has the same contribution or weight value against the maturity level of the DS11 process. So, for both the status as is and to be maturity level can be seen in table 2.

Table 2. The value and maturity level of the DS11 process

No	Attribute	Maturity value		Maturity level	
		As is	To be	As is	To be
1	AND	2.30	3.55	2	4
2	PSP	1.70	4.40	2	4
3	HE	1.50	4.20	2	4
4	HERSELF	1.60	3.40	2	3
5	GO OUT	2.70	4.40	3	4
6	GSM	0.70	3.55	1	4
<b>Average</b>		1.75	3.92	2	4

The maturity and maturity level values are weighted multiplied by the answers and all existing answers are added up and then averaged for each attribute.

The maturity value is not round (decimal number) because the value is presented in the process of achieving towards a certain maturity level. While the maturity level is more indicative of the stages or classes achieved in the maturity process, which are expressed in integers.

Based on table 2, it can be seen that the maturity level referred to in table 1 is the current maturity level (as is) in the overall DS11 process is at level 2 or repeatable but intuitive. While the expected maturity level (to be) in the DS11 process, overall is at level 4 or managed and measurable.

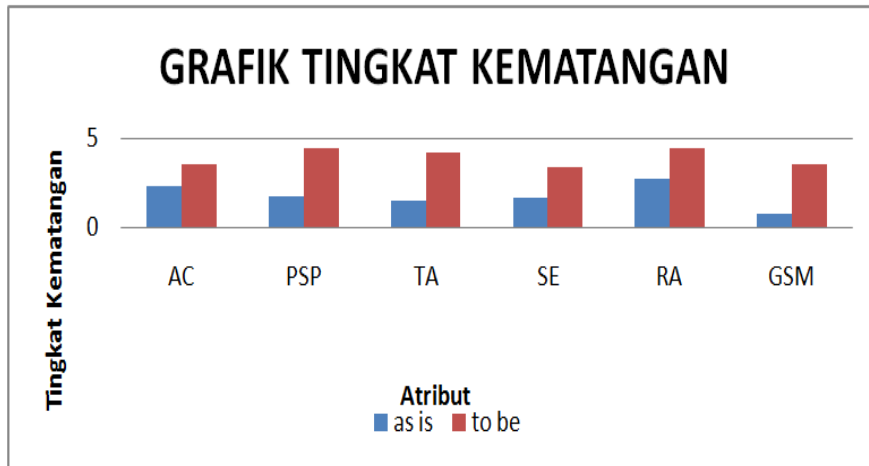


Figure 3. Maturity Level Graph as is and to be of Maturity Attribute (in Indonesia)

In the figure 3, we can illustrate the maturity level that is currently (*as is*), expected (*to be*) and efforts to close the gaps that exist in the academic information system.

### 3.1.3. Setting a Maturity Level Achievement Strategy

The determination of a maturity achievement strategy is required with the following considerations:

- The maturity stage is a natural process in the process of improvement, and is a learning process where each stage of maturity must be passed.
- Synergy can be carried out optimally when there is a balance of maturity levels in the overall attributes.
- Improvements are made in stages according to the priority scale. Attributes with a lower maturity value, get a higher priority for improvement.
- With a gradual improvement process in accordance with priorities, the learning process towards the maturation of the DS11 process in the institution can take place effectively.

Taking into account the foregoing, it is necessary to establish a strategy for achieving the improvement of the DS11 process, by creating the necessary goals in the following ways:

- The attribute with maturity level as is1, gets the top priority for corrective steps to be made, reaching at maturity level 2 first then continuing maturity 3. Some of the attributes in question in succession according to priority are GSM and SE.
- The attribute with maturity level as is1, gets the second priority for corrective steps to be made, reaching at maturity level 2 first then continuing maturity 3 and 4. Those attributes are TA and PSP
- The attribute with maturity level as is2, gets the third priority to perform the corrective step, reaching at maturity level 3. The attribute in question in a row according to priority is AC
- Attribute with maturity level as is2, gets the fourth priority for corrective steps to be made, reaching maturity level 2 first then continuing maturity 3 and 4. Some of the attributes in question in a row according to priority are RA.

### 3.2. Discussion

#### 3.2.1. Planning

Planning is carried out to improve the academic information system in the data management domain (DS11) by comparing the current conditions with the conditions expected by the school.

#### 3.2.2. Proposed Remedial Action Planning

Planning of proposed remedial actions is obtained from the results of the analysis stage to be the main consideration in defining the design, to be able to provide a proposal for corrective actions, the following are several important things, namely there is an analysis of the maturity level that has been obtained the current (as is) and expected maturity levels (to be) as well as the determination of strategies for achieving the required maturity, which is seen as effective in the framework of the expected maturation process (Razak, 2017).

#### 3.2.3. Planning of Proposed Performance Level Indicators and Targets

Planning of proposed indicators and performance level targets is grouped into 3 groups (Sadjiarto, 2000), namely:

(1) Achievement of maturity level 3

In this group the process of ripening attributes moves to grow from maturity level 2 towards maturity level 3. In this maturity process involves the SE attribute

(2) Achievement of maturity level 4

In this group the process of ripening moving attributes grows from maturity level 1 to maturity level 2, maturity level 2 to maturity level 3, maturity level 3 to maturity level 4. In this maturity process involves the attributes AC, PSP, TA, RA and GSM.

### 3.3. Recommended Solutions

#### 3.3.1. Proposed Remedial Action Solution Recommendations

Recommendations for proposed remedial actions that can be carried out based on the achievement of the maturity level of each attribute.

#### 3.3.2. Recommended Solution Indicators and Performance Level Targets

Recommendations for the solution of indicators and targets of the performance level are carried out as a follow-up to the proposed corrective action. This is done to measure the level of achievement and evaluate the improvement activities of data management that are expected in the future.

Assessment or measurement is carried out both in the implementation process and the achievement of improvements. The assessment is related to the data management process seen in figure 4.5 is the assessment of Key Performance Indicators (KPIs) and Key Goal Indicators (KGI), where KGI can be described again in the Process Key Goal Indicator (PKGI) and IT Key Goal Indicator (ITKGI) (Pratiwi, 2009).

Activity objectives (Activities goals) are successes for the achievement of information technology goals (Pitrawati & Agus, 2018). The purpose of the activity can be viewed as a critical success factor (CSF) of the DS11 process which includes activities:

- a. Perform data backup and test restoration.
- b. Manage onsite and offsite data storage.
- c. Securely erase data and equipment.

Key Performance Indicator (KPI) to be able to assess or measure how well the above activities have been carried out (Budiarto, 2017), the KPI assessment indicators are:

- a. Frequency against testing backup media.
- b. Average time for data restoration.

The results of the KPI measurement assessment will support the success of process goals (Mukharromah et al., 2017), namely:

- a. Maintain the completeness, accuracy, validity, accessibility of the stored data.
- b. Securing data during deletion.
- c. Manage storage media effectively.

PKGI is used to assess the success of process objectives with the following indicators:

- a. Percentage of successful data restoration.
- b. The number of incidents where sensitive data can be recalled after the media is deleted.
- c. The amount of down time or data integrity incidents caused by insufficient storage capacity.

The results of the PKGI assessment will support success in achieving information technology goals, namely:

- a. Optimizing the use of information.
- b. Ensure critical and confidential information from unauthorized parties.
- c. Ensuring information technology compliance with laws and regulations.

ITKGI is used to assess success in information technology objectives (Yuningsih, 2018), namely:

- a. Occurrence of inability to recover critical data for the process of the institution's activities.
- b. Customer satisfaction with data availability.
- c. Incidents of non-compliance with the law resulting from depository management problems.

### *3.4. Performance Level Indicators and Targets*

#### *3.4.1. Frequency against media backup testing*

In principle, the more often you test media backups, the more certain it will provide certainty that the media can be read and data integrity criteria can be met but to determine the minimum standard for testing a media backup is carried out periodically as much as 2 times a month, this is because considering several (Harahap & Harahap, 2021), among others:

- a. Certainty of meeting the target of successful data backup process
- b. The level of risk to the existence of data stored in the backup media.
- c. Certainty of the correctness of the backup data to be used by stakeholders
- d. The ability of information technology resources to test backup media.
- e. The achievement of information technology service standards related to the level of operational reliability of services to support the process of data management activities.

#### *3.4.2. Average time for data restoration*

In principle, the faster the restoration process is carried out, the data recovery process due to a disaster or disruption can be carried out quickly as well (Lamun, n.d.). So that it does not interfere significantly with academic information system services because it is still within the threshold of acceptable tolerance.

The technical restoration process in the framework of the overall recovery process includes:

- a. The time of searching and browsing backup media which is carried out in the onsite storage location or even for some reason requires using backup media in the offsite location.
- b. The time required for the restoration process itself is affected by the data capacity in the backup medium that needs to be restored hardware capabilities and backup operator skills in carrying out its role.

Determination of performance level targets about the average time for data restoration for a maximum of 2 hours taking into account the following points:

- a. Service standards regarding data service activities are that risk events (disruptions / disasters) are sought not to have an impact on disrupting, emergency, endangering, and even stopping data service operations.
- b. The risk event is also sought not to have an impact on activities for data management services.

#### *3.4.3. Percentage of successful data restoration*

Determination of performance level targets on the percentage of data restoration of at least 90% with the following considerations (Verasvera, 2016):

- a. The need to meet data service standards where risk events in the form of disruptions or disasters that occur do not interfere with the operation of data services or institutional activities.
- b. Periodic testing of the restoration process is carried out as a step to ensure the success of the restoration process.
- c. There are possible risks that threaten the existence of data stored in backup media.

#### 3.4.4. Number of sensitive data incidents can be accessed after media is deleted

The target performance level on the number of incidents of sensitive data being accessed after the media is deleted is 0, taking into account the following (Watrianthos et al., 2021)

- a. Security treatment of data that is deleted has been carried out by marking the status of data that is carried out by deleting, destroying media, overwriting or degaussing.
- b. The probability of the risk that the deletion has been accessed by an unauthorized party is very small.

#### 3.4.5. Amount of downtime caused by insufficient storage capacity

The determination of the performance level target against such indicators is 0 or is expected will not occur with considering the following (Susanto & Wijarnako, 2004):

- a. The storage capacity owned by the institution is considered to have been able to meet the needs, which is carried out onsite and offsite.
- b. The need for institutions to be able to ensure the continuity of data services to support institutional activities (zero incident).

By following up on the results of improvement recommendations and desired achievement indicators, the governance model is realized in the form of proposed institutional policies in data management and the main procedures in managing data needed for more practical and descriptive implementation instructions to be implemented in the field.

## 4. Conclusion

From the results of the research that has been carried out, the following conclusions can be drawn:

- 1) Audit of the value processing information system carried out at SMA Negeri 14 Bandar Lampung using Framework Cobit 4.1 on the DS11 domain (data management) to assess the level of maturity level through questionnaires, resulting in recommendations for proposed corrective actions and indicators of performance level targets
- 2) Assessment of level maturity obtained from questionnaires to represent maturity levels and determine maturity achievement strategies
- 3) The results of the maturity level audit in the academic information system using the cobit 4.1 framework are as follows:
  - a. The result of recapitulation maturity level shows that 45% of respondents gave a "3" answer to a statement that is oriented towards the present (as is) while 53.17% of respondents answered "5" for a future-oriented statement (to be).
  - b. The result of the maturity level assessment which refers to the maturity level in Cobit 4.1 is the current maturity level (as is) in the overall DS11 process is at level 2 or repeatable but intuitive. While the expected maturity level (to be) in the DS11 process, overall is at level 4 or managed and measurable.

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