

Open Journal System Security Capability Level Assessment Using Cobit 5 Framework At Abdurrad University

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OPEN JOURNAL SYSTEM SECURITY CAPABILITY LEVEL ASSESSMENT USING COBIT 5 FRAMEWORK AT ABDURRAB UNIVERSITY

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Abstract

Data security is very important in the digital era, this makes it an important issue for companies, organizations and educational institutions. Such as the Open Journal System (OJS) security which is useful for managing online journals. Abdurrab University has utilized the Open Journal System (OJS) to manage published journals. However, the management of the Open Journal System (OJS) security has not been managed properly, such as Abdurrab's Open Journal System (OJS) which has been hacked, there is still a lack of documentation and system security procedures and has never been assessed the level of capability of the information system so that it is not known exactly the level of security management of the Open Journal System (OJS) at Abdurrab University. This study aims to assess the capability level of Abdurrab University's Open Journal System (OJS) using the COBIT 5 domain DSS05 framework and Process Assessment Model (PAM) to assess system capabilities and guide IT management and provide effective and efficient recommendations. The results of the study obtained a questionnaire calculation value of 2.40 with Process Attribute Level domain DSS05 PA 2.1 Performance Management and PA 2.2 Work Product Management until an achievement score of 63.33% was obtained which was included in the Largely Achieved category with achievements at level 2 (Managed Process). The conclusion of this study is that the level of security capabilities of the Open Journal System (OJS) of Abdurrab University needs to be increased to level 3 (Established Process) because it has not been fully met, so that this research can be used as a reference for improvement by Abdurrab University.

Keywords: *Capability Level, COBIT 5, DSS05, Open Journal System (OJS), Security.*

PENILAIAN TINGKAT KAPABILITAS KEAMANAN OPEN JOURNAL SYSTEM MENGUNAKAN FRAMEWORK COBIT 5 PADA UNIVERSITAS ABDURRAB

Abstrak

Keamanan data sangat penting di era digital, hal ini menjadikannya isu penting bagi perusahaan, organisasi maupun lembaga pendidikan. Seperti keamanan Open Journal System (OJS) yang berguna untuk mengelola jurnal online. Universitas Abdurrab sudah memanfaatkan Open Journal System (OJS) untuk mengelola jurnal-jurnal yang telah di terbitkan. Akan tetapi, pengelolaan keamanan Open Journal System (OJS) belum di kelola dengan baik, seperti Open Journal System (OJS) Abdurrab yang pernah terkena hack, masih minimnya dokumentasi dan prosedur keamanan sistem serta belum pernah dilakukan penilaian tingkat kapabilitas sistem informasi sehingga tidak diketahui secara pasti tingkat pengelolaan keamanan Open Journal System (OJS) pada Universitas Abdurrab. Penelitian ini bertujuan untuk menilai tingkat kapabilitas Open Journal System (OJS) Universitas Abdurrab memakai kerangka kerja COBIT 5 domain DSS05 dan Process Assessment Model (PAM) untuk menilai kapabilitas sistem dan memandu pengelolaan TI serta memberikan rekomendasi yang efektif dan efisien. Hasil penelitian diperoleh nilai perhitungan kuesioner 2.40 dengan Process Attribute Level domain DSS05 PA 2.1 Performance Management dan PA 2.2 Work Product Management hingga diperoleh skor pencapaian sebesar 63,33% yang termasuk kedalam kategori Largely Achieved dengan pencapaian pada level 2 (Managed Process). Kesimpulan dari penelitian ini tingkat kapabilitas keamanan Open Journal System (OJS) Universitas Abdurrab perlu di tingkatkan ke level 3 (Established Process) karena belum sepenuhnya terpenuhi, sehingga penelitian ini bisa dijadikan acuan perbaikan oleh pihak Universitas Abdurrab.

Kata kunci: *COBIT 5, DSS05, Open Journal System (OJS), Security, Tingkat Kapabilitas.*

1. INTRODUCTION

Higher Education Institutions, especially universities in various countries, have recognized the growing importance of aspects of Information technology (IT) governance. The effective and efficient use of information technology (IT) in higher education to support research, teaching and administration requires proper IT governance[1]. The management of information technology in the process of information management is management, which is an important resource for a university or organization[2]. IT governance is also about managing decision-making rights and a responsible framework to drive the achievement of expectations in the use of SI/IT[3]. Security governance is an important topic in IT management [4]. IT management in the process of poor information management causes several problems such as information security vulnerabilities that cause threats such as information loss, destruction, theft and interception of important information of agencies or organizations[5]. Continuous improvement steps in IT governance, especially in the process of managing data, must be able to reduce the risk of such threats [6].

Abdurrah University is one of the private universities in Pekanbaru. Abdurrah University is abbreviated as UNIVRAB which is located on Jl. Riau Ujung No. 73 Pekanbaru. Abdurrah University in carrying out its business processes uses several information technologies to provide convenience in carrying out its activities, one of which is the Open Journal System (OJS) which is useful for managing online journals at Abdurrah University. Since 2016 Abdurrah University has developed the management of an electronic journal with OJS. The Open Journal System (OJS) of Abdurrah University has 12 types of journals stored in it from various faculties and study programs. At Abdurrah University, the part that manages the Open Journal System (OJS) is part of the Institute for Research and Community Service (LPPM).

OJS or Open Journal System, is an open source product from PKP (Public Knowledge Project) which is used specifically to manage online journals. Because this software is open source under the General Public License (GPL), anyone can use this software to learn, explore, and modify. The app is highly compatible with Google and Google Scholar search engines, so Google will index more articles published in online journals using OJS[7]. OJS is also designed to reduce time and effort for writing and management tasks[8].

Based on the results of observations and interviews with the Head of the Computer and Information Systems Center and the Staff of the Network Section, Abdurrah University is currently using IT to improve the effectiveness and efficiency of implementing goals, but the results of the interview

are the Head of the Computer and Information Systems Center and the Network Section Staff explained some problems related to the Open Journal System (OJS) of Abdurrah University, is because in 2021 the Open Journal System (OJS) has been hit by a hack with the potential to experience fraud which will harm the university. The next problem is the undocumented system security monitoring report, incomplete formal procedures in system security, absence of written documents showing all functional activities of access rights granted to each user and the Website Open Journal System (OJS) of Abdurrah University has never been assessed the capability of the information system so that it is not known in a definitely the level of security management of the Open Journal System at Abdurrah University.

The selection of the COBIT 5 framework was used in this study, as it provides a comprehensive framework to help organizations achieve asset management and IT-based governance goals[9][10]. Simply put, COBIT helps organizations get the most value out of IT by balancing between realizing benefits and maximizing risk and resource utilization[11]

Then one of the domains used in the COBIT 5 framework in relation to the above is DSS (Deliver, Service, Support)[12]. DSS domains are concerned with the efficient provision and support of necessary services, including service provision, security and continuity management, user service support, facilities management, substance and activity data[13]. By centrating on the DSS05 (Manage Security Service) subdomain which refers to minimizing the business impact of information security vulnerabilities[14]. In assessing the maturity level of a system, COBIT 5 offers a Process Assessment Model (PAM) to assess the maturity level of the system. PAM is a model that serves as a reference document to assess the effectiveness of an organization's IT process capabilities[15].

Similar research has been conducted by D.V.Gusman, F.H.Prasetyo, K.Adi[16], the results of this research resulted in capability values of 3.4 (as is) and 4.1 (to be) then the implemented process is achieved, in the DSS05 domain gets an achievement of 92% on the 3.1 process definition attribute has been reached in full, so that the assessment can proceed to the next stage, namely (PA) 3.2 Process Deployment. Furthermore, research from Ummul Fitriah and Ihsan Verdian [17], the results showed that the DSS05 (Manage Security Services) process skill level reached level 1 "Largely Achieved" (57.8%), knowing the level of e-learning ability, improvement recommendations were made based on the acquisition of each given value.

Therefore, researchers are interested in conducting research to assess the level of capability of the Abdurrah University Open Journal System (OJS) using the COBIT 5 Manage Security Service Framework (DSS05) to be able to determine the

management of the Open Journal System (OJS) security of Abdurrah University.

2. RESEARCH METHODS

The stage of the research method carried out by the researcher can be seen in the following figure.

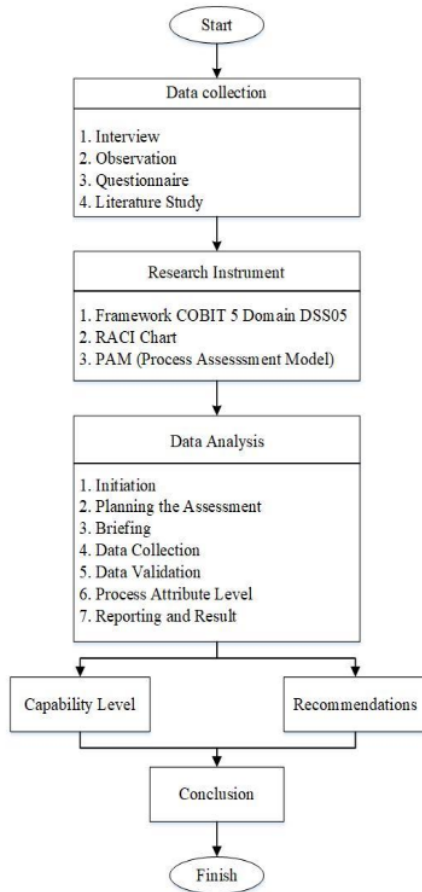


Figure 1. Research Methods

In this study, researchers had two types of data. Primary and secondary data, Primary data is data derived directly from the original source, such as data from interviews, observations, and questionnaires[18]. While secondary data is available data or data obtained from literature research, so it is only necessary to search according to the needs and methods taken in the research so that it does not go out of context, while the data is produced from literature studies, books or previous research[19].

The framework used in this study is COBIT 5 with the DSS05 (Manage Security Service) domain. Then to assess the maturity level of a system using the Process Assessment Model (PAM) for the assessment. In this study, a data collection method

was used in the form of a questionnaire containing written questions distributed to Abdurrah University respondents based on the RACI Chart. RACI Chart (Responsible, Accountable, Consulted, Informed) is a component of the Responsibility Assignment Matrix (RAM) which means mapping between resources and activities of each method.[20]

The method used in data analysis is Assessment Process Activities, which are the steps of the capability level assessment process for organizations [21].

1. Initiation

The first step is Initiation on the assessment process activities in the COBIT 5 process assessment model. Where the identification results are interpreted from the collected data.

2. Planning the Assessment

The second step is Planning the Assessment by conducting an assessment plan to obtain the results of the capability level assessment. By mapping the RACI COBIT 5 table according to the needs of the activities to be assessed with some staff from Abdurrah University.

3. Briefing

The third step is a Briefing to understand the inputs, processes and outputs of the organizational units being evaluated, that is, establishing the schedule of Abdurrah University, obstacles when carrying out assessments, roles and responsibilities, resource needs, and others.

4. Data Collection

The fourth step is Data Collection, to collect information about the results found at Abdurrah University with the aim of obtaining evidence of the evaluation process of the activities carried out.

5. Data Validation

The fifth step is Data Validation, the purpose of Data Validation is to find out the results of questionnaire calculations to get a Capability Level assessment.

The assessment of the results of the questionnaire that has been distributed and filled in by respondents according to actual conditions and facts will be calculated using a formula, here is a formula to calculate the average percentage that has been filled in from each answer.

$$C = \frac{H}{R} \times 100\% \tag{1}$$

Information:

C: Capability level questioner response recapitulation in percentage format for each response 0, 1, 2, 3, 4, or 5 for each activity.

H: Number of Capability Levels questionnaire answers on each level 0, 1, 2, 3, 4, or 5 answer choice in each activity.

JR: Number of Respondents or Speakers.

The following mapping of questionnaire answer values can be seen in table 1.

Table 1. Questionnaire Answer Value Mapping

Value Range	Answer	Capability Value	Capability Level
0-0,50	0	0,00	0 (<i>Incomplete Process</i>)
0,51-1,50	1	1,00	1 (<i>Performed Process</i>)
1,51-2,50	2	2,00	2 (<i>Managed Process</i>)
2,51-3,50	3	3,00	3 (<i>Established Process</i>)
3,51-4,50	4	4,00	4 (<i>Predictable Process</i>)
4,51- 5,00	5	5,00	5 (<i>Optimising Process</i>)

Table 1 shows guidelines for mapping the value of questionnaire answers in this study.

6. Process Attribute Level

The sixth step is the Attribute Level process, which is to define the attribute level of each indicator, the purpose of which is to represent the Capability Level results from the results of the previous questionnaire calculations.

The formula for calculating the value and level of ability is as follows.

$$NK = (LP \times Nk)0 + (LP \times Nk)1 + (LP \times Nk)2 + (LP \times Nk)3 + (LP \times Nk)4 + (LP \times Nk)5 / 100 \quad (2)$$

Information:

NK: The Value of Maturity in IT processes.

LP: Level percentage (percentage rate for each response distribution in the capability level questionnaire).

Nk: Maturity values are listed in the response mapping, values, and maturity levels table.

The following Rating Scale can be seen in the following Table.

Table 2. Rating Scale

Scale	Description	Achieved
N	Not Achieved	0-15%
P	Partially Achieved	>15%-50%
L	Largely Achieved	>50%-85%
F	Fully Achieved	>85%-100%

Table 2 shows the rating scale to describe the level of ability achieved at each level.

Capability levels are divided into levels, the following capability level divisions can be seen in table 3.

Table 3. Capability Level

Level	Information
0 (Incomplete Process)	The process does not run or does not run its target process. At this level there is little or no evidence of systematic achievement of the goals of the process.
1 (Performed Process)	The process is carried out to achieve the goals of the process.
2 (Managed Process)	The process proceeds in a planned and monitored manner, with the results of work determined, controlled and maintained accordingly.
3 (Established Process)	Processes are implemented as predefined processes that can achieve results.

4 (Predictable Process)	The process works within the limits set to achieve the results of the process.
5 (Optimising Process)	Processes are constantly being improved to achieve the planned and relevant business goals of the moment.

Table 3 shows each level at the capability level in the COBIT 5 Framework.

7. Reporting the Result

The seventh step is Reporting the Result, reporting the results of the assessment and making recommendations to Abdurrah University. In IT governance practice, COBIT 5 has a number of requirements that must be met.

3. RESULTS AND DISCUSSION

3.1. Initiation

Abdurrah University is one of the private universities in Pekanbaru. As a quality institution, Abdurrah University has implemented a web-based Open Journal System (OJS). Open Journal System (OJS) has been used since 2016 until now. The Journal Information System (OJS) is managed by the Institute for Research and Community Service (LPPM) Abdurrah University. So far the Open Journal System (OJS) of Abdurrah University has 12 types of journals stored in the system. Based on the results of an interview with the Head of the Computer and Information Systems Center Section and the Network Section Staff explained several problems related to the Open Journal System (OJS) of Abdurrah University, because the Open Journal System (OJS) has been hit by a hack with the potential to experience fraud which will harm the university. The next problem is that there has been no documented system security monitoring report so that related parties do not know the development of Open Journal System (OJS) security management, incomplete formal procedures in system security, absence of written documents showing all functional activities of access rights granted to each user and the Open Journal System (OJS) Website of Abdurrah University has never been assessed the capabilities of the information system so it is not known exactly the level of security management of the Open Journal System at Abdurrah University. Thus, it is necessary to evaluate and assess IT governance to find out the weaknesses that exist and the actions that must be taken to minimize these weaknesses.

3.2. Planning the Assessment

The sampling technique produced on the respondents' findings is based on a sample determination method that considers appropriate problems and is based on certain details, where the management key in the application of each COBIT 5 technique, namely the RACI Chart (Responsible, Accountable, Consulted, Informed) is the responsible benchmark in this study. The following is an

overview of DSS05 respondents based on the RACI Chart:

Table 4. DSS05 Respondent Determination

Key Management Practice	Vice Rector 3	Head of Computer and Information Systems Section	LPPM	Network Staff	System Admin
DSS05.01 Protect against malware	C	A	R	R	I
DSS05.02 Manage network and connectivity security	C	A	I	R	I
DSS05.03 Manage endpoint security	C	A	I	R	I
DSS05.04 Manage user identity and logical access	C	A	R	R	I
DSS05.05 Manage physical access to IT assets	C	A	I	R	I
DSS05.06 Manage sensitive documents and output devices	A			R	
DSS05.07 Monitor the infrastructure for security-related events	C	A	C	R	I

Table 4 describes the determination of respondents by adjusting the division of the RACI Chart.

Table 5. RACI Chart DSS05 Mapping

RACI Chart	Organizational Structure of Abdurrah University
Chief Information Officer	Vice Rector 3
Chief Information Security Officer Business Process Owners	Head of Computer and Information Systems Section LPPM
Head IT Operations Service Manager	Network Staff System Admin

Table 5 describes the mapping of the organizational structure of Abdurrah University into the RACI Chart DSS05.

3.3. Briefing

The briefing phase is the third phase of the evaluation process activity in the COBIT 5 Process Evaluation Model. This phase aims to describe the research process conducted at Abdurrah University.

3.4. Data Collection

Data collection is the collection of data, decorating, identifying, collecting information about output requirements in the DSS05 process related to the Manage Security Service. Until the observation

produces results on the findings at Abdurrah University, obtaining the fact of the value of evaluating an activity that has been carried out. Next is to identify the needs of each DSS05 (Manage Security Service) flow so that it must be met by Abdurrah University.

3.5. Data Validation

The validation data obtained from the research of the questionnaire count results that have been shared with the resource persons using an answer range of 0 to 5 where each point has criteria based on the method. Previously, respondents had been determined consisting of: Vice Rector 3, Head of Computer and Information Systems Section, LPPM, Network Staff, and System Admin, then the assessment is known from the results of the answers to each questionnaire from the details of the questions that have been made, the following are the achievements that exist at this time at Abdurrah University.

Table 6. DSS05 Questionnaire Calculation Results

No	Sub Process	Value	Level
1	DSS05.01	2.24	2
2	DSS05.02	2.52	3
3	DSS05.03	2.25	2
4	DSS05.04	2.52	3
5	DSS05.05	2.4	2
6	DSS05.06	2.33	2
7	DSS05.07	2.55	3
Average		2.40	2

In table 6 there are achievements of DSS05.01 results at level 2, DSS05.02 at level 3, DSS05.03 at level 2, DSS05.04 at level 3, DSS05.05 at level 2, DSS05.06 at level 2, and DSS05.07 at level 3.

The results of the DSS05 (Manage Security Service) questionnaire calculation are known that the sub-process with the least value is in the DSS05.01 sub-process about protecting against malware with a capability value of 2,24 and capability level 2. While the sub-process with the highest value is in the DSS05.07 sub-process about the infrastructure for security related events with a capability value of 2.55 and capability level 3. So that it can help Abdurrah University know in which sub-process is the weakest in the management of the Open Journal System (OJS) security and must be improved.

It can be concluded from the calculation of table 6 explaining that the average value of the DSS05 questionnaire calculation results of 2.40 is at level 2 (Managed Process). This can be seen at Abdurrah University with the implementation of governance as a series of processes, habits, policies, rules and organizations greatly affect the direction, management, and control of information technology security of Abdurrah University. So that the management of Information Technology security, especially the Open Journal System, has not been

fully realized with the goals and expectations of Abdurrah University.

3.6. Process Attribute Level

The following are the achievements in the description in the process attribute level above, namely PA 2.1 Performance Management and PA 2.2 Work Product Management until an achievement score of 63.33% is obtained which is included in the Largely Achieved category or in line with the achievements of Abdurrah University meets the

requirements to reach Level 2 Managed Process. PA 3.1 Process Definition and PA 3.2 Process Deployment, the achievement result of which is 36.66% is included in the category of Partially Achieved or partially achieved, but cannot go to the value to level 3, because the mandatory requirements that must be done and fulfilled at level 2 are to achieve Fully Achieved or fully achieved, due to the non-fulfillment of the mandatory requirements that must be completed, then Abdurrah University generally reaches level 2 (Managed Process).

Table 7. DSS05 Level Achievement Results

Process Name	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
DSS05		PA 1.1	PA 2.1	PA 2.2	PA 3.1	PA 3.2
Rating by		100%	66.67%	60%	40%	33.33%
Criteria		F	L	L	P	P
Capability		1	2	2	3	3
Level Achieved		Achievement			Target	

Legend: N (Not Achieved,0-15%), P (Partially Achieved, > 15-50%), L (Largely Achieved,>50-80%), F (Fully Achieved,>80-100%)

3.7. Reporting the Result

Based on the assessment carried out, the achievement value was 63.33%, which means that the DSS05 process is currently at level 2. The following table describes the findings and recommendations of DSS05.

Table 8. DSS05 Findings and Recommendations

Findings	Recommendations
The formal implementation of the procedure has not been fully implemented as well as the responsibility to prevent malicious software.	The Field of Computers and Information Systems is recommended to implement procedures and create training material documents on malware or system security.
Penetration to identify information system security has not been noticed.	Perform penetration testing on every connectivity path and software used to prevent data loss.
The computer device hasn't fully set a password	Create policies about device locks and perform regular checks on each computer device.
There needs to be documentation by the management staff appointed by the leadership, both identity and access rights as well as changes to access rights.	Make reports on all accounts and rights related to information.
No maximum supervision of visitors (not using id card) has not been carried out while in the server room.	Conduct regular monitoring of visitors and create forms for each visitor who comes.
The process of inventorying documents and receiving and using IT equipment has not been maximized.	Regularly monitor and adjust inventory of IT documents and equipment.

Lack of documentation on incident characteristics determination records and risk management arrangements related to Information Technology security.	Create documents on incident characteristic records and risk management plans related to Information Technology security
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4. DISCUSSION

The results of the questionnaire calculation for each respondent on the DSS05 domain received a value of 2.40, with an attribute level obtained an achievement score of 63.33% which is included in the Largely Achieved category with the achievement of level 2 Managed Process meaning that the management of the Open Journal System (OJS) security takes place in a planned and monitored manner, with work results determined, controlled and maintained in accordance with policies. To get the next level of achievement, it is necessary to upgrade level 2 to Fully Achieved so that you can advance to the next level.

5. CONCLUSIONS

According to the process of analyzing and assessing the level of information technology governance capabilities, at Abdurrah University based on DSS05 (Manage Security Service) it can be concluded that in the DSS05 domain, the results of questionnaire calculations for each respondent reached level 2 (Managed Process) whose assessment results were 2.40.

In the process attribute level, the achievement score of PA 2.1 Performance Management and PA 2.2 Work Product Management of 63.33% is included in the Largely Achieved category, while PA 3.1 Process Definition and PA 3.2 Process Deployment are included in the Partially Achieved category with

the achievement result of 36.66%. Thus, to move to the next level, stakeholders and those involved in the organization must understand and realize the guidelines for capability levels of Work Products or Generic Work Products (WPs) and (GWPs) level 2 which are currently not fully achieved.

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