

Information System Governance in Higher Education Foundation using COBIT 5 Framework



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Abstract: This study aims to produce a recommendation for improvement of information system governance that aims to improve its maturity and capability. In this case the process of assessing the level of maturity and capability is carried out at the Higher Education Foundation. Data collection instruments were conducted using direct observation in the company, conducting interviews with selected stakeholders, distributing questionnaires for which respondents had been assigned referring to COBIT 5 framework, as well as conducting a literature study on existing research. The methodology used in this study is the COBIT 5 framework by starting to identify problems and business objectives of the company, with reference to the COBIT process that has been identified and mapped according to analysis needs. Then measure the capability of the ongoing process using a questionnaire whose question provisions have been provided in the Process Assessment Model COBIT 5, thus helping the research process in assessing governance. Then the target level of capability that the company wants is determined. So the gap analysis process is carried out to find out how far the improvement needs to be done by the company to reach the target. The results obtained from this study are an assessment of the level of capability of corporate information system governance and the target level of capability to be achieved based on the chosen COBIT Process. Analysis of the gap between the current governance conditions and the company's targets is made as a recommendation for improving service activities and corporate information system governance.

Keywords : COBIT 5, Higher Education, SI Governance, Framework

I. INTRODUCTION

The system of a well-managed Information Technology is one of the important resources for a company or organization [1]. The role of Information Systems (SI) and Information Technology (IT) is one of the elements that makes every

company must implement information technology in accordance with business processes and corporate goals [2], in this case including the business of education in it being very competitive in today's era. Information technology (IT) has become important in supporting the growth and sustainability of all types of organizations. All of this technology to support the research, teaching, and administration process requires an effective IT governance framework [3]. Based on this, many educational institutions have tried to improve their quality, especially with the application of SI and IT. In order to achieve competitive advantage and provide solutions in helping data and information processing in organizations, Information Technology and Information Systems become an important element for an organization or company to survive [4]. Utilization of Information Technology and Information Systems currently provides many solutions and benefits as a form of achieving the vision and mission of an organization or company. In the operational activities of an organization or campus that is related to information systems (SI), it is of course required the right Information Technology and Information System to have clear processes and procedures.

A campus information system will certainly produce academic information and academic reports related to lectures, lecturers and students [5]. The information system also covers the process of admitting new students until students enter the graduation stage. Therefore, if a campus's information technology is managed well it will be a good Information Technology resource in providing educational services according to organizational goals. One way to do this is to provide an adequate information system [6]. In its daily activities the company is quite dependent on the use of Information Technology and Information Systems using a variety of web-based applications or different systems specifically designed to perform the activities required. There are a number of things that are taken into consideration, so the process of measuring information system governance is needed, including:

1. The benefits of IT investment that have been made are less than optimal for the company.
2. Measurement of SI governance and capability levels so that improvements and decision-making analysis can be carried out. This is to help companies achieve optimal SI governance and support Foundation tertiary institution to be one of the best tertiary institutions in West Kalimantan.

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3. Increasing competition between tertiary institutions requires the tertiary institution to continue developing among its competitors.

The research process is carried out in order to find out how effective the current information system is, so that recommendations can be given for the existing information system to be more optimal. There are various ways or methods in implementing IT governance, one of which is to use a framework or framework [7].

In this research, the reference material that will be used is the framework of COBIT 5 because it has a broad and comprehensive scope among other standards and frameworks [8]. COBIT is a standard that contains best practices of Information Technology governance policies developed by the Information Technology Governance The Institute (ITGI) and is part of the Information Systems Audit and Control Association (ISACA) which has been successfully implemented by organizational developers, tested internationally, and published for adoption by other organizations [9]. The reason for choosing the COBIT 5 framework is because by using the work guidance in COBIT 5, in addition to providing an evaluation of IS / IT governance, it can also determine the maturity level of IS / IT governance. By using the COBIT 5 framework, of course you can provide input in the form of recommendations that are used to make improvements to its management in the future. One of the issues that can be discussed using COBIT is mapping the needs of stakeholders into enterprise goals which can later be used for mapping the COBIT 5 process.

II. LITERATURE REVIEW

2.1 Information System

Information systems are supported by technology that continues to develop over time and has become part of the business of an organization or college because it can facilitate work and information exchange by utilizing the existing system [10]. The condition that often occurs in the field is the Information System at the college which is still made separately according to the needs of the user (user). This triggers many obstacles when the system is operated simultaneously to process data and information, one of which is the risk of data redundancy or even loss of data and information. Therefore we need a better management of IS (IS Governance) [11].

Information Technology is expected to play a role in improving the performance of an organization or college with the use of a focused on integrated system that can work accurately, quickly, and completely. Automated work processes will facilitate access to organizational or university information, so that the processes that occur will be more efficient, measurable, and efficient [12]. Information systems need to be specifically designed for a university in order to meet the needs of organizations for computerized education services, in order to meet the needs of integrated information, improve performance, service quality and improve organizational competitiveness [13]. Data management in the form of student grades, list of courses, teaching staff (lecturers), and administration of departments or study programs that are still managed manually will be better if it is managed using a computerized academic information system.

2.2 Information Technology Governance

Understanding IT governance [14] namely: IT governance is defined as the responsibility of the executive and board of directors and consists of leadership, organizational structure and processes that ensure the company's IT supports and broadens the organization's objectives and strategies. IT governance covers an area consisting of five focus areas of IT governance, two of which: value delivery and risk management are outcomes, while the other three are drivers (strategic alignment), resource management and performance measurement. The IT program will consist of policies, standards and procedures [15]. The following picture shows the focus of the Information Technology governance area:

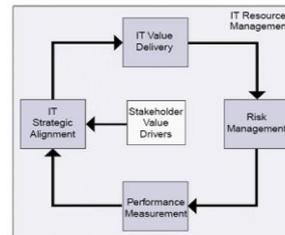


Figure 1 Five focus areas on IT Governance

Based on Figure 1 above, the five focus areas of IT governance that are the main focus can be described as follows [16]:

a. IT Strategic Alignment

Issues that are focused on this area are generally related to how an organization's vision and mission will be achieved in line with the business of the organization.

b. IT Value Delivery

The problem in the second area is related to how to optimize the addition of value to IT that is useful for achieving the organization's vision and mission.

c. Risk Management

Issues that are focused on the third area relate to how to identify risks that might occur and how to overcome the impact of those risks.

d. Performance Measurement

The problems in the fourth area relate to how to measure and oversee the IT performance of the organization's business and adjust the use of IT to the organization's business needs.

e. IT Resource Management

Resource management deals with optimal investment in IT, appropriate management, and other important matters relating to the optimization of knowledge and infrastructure.

2.3 COBIT (Control Objectives for Information and Related Technology)

COBIT was developed to provide a framework in designing an information system or information technology that suits the needs of the organization by taking into account other factors that may have an effect. COBIT was developed by the IT Governance Institute (ITGI), ITGI is part of the Information System Audit and Control Association (ISACA) [17]. COBIT was originally released in 1996 and experienced many changes and developments over time, followed by a second edition in 1998.

In 2000 COBIT 3.0 was released, followed by COBIT 4.0 in 2007, and COBIT 5 was an edition published in 2012 [18] In COBIT 5, the existing framework is provided to help companies or organizations achieve their goals by creating optimal value from IT by maintaining the achievement of benefits and use of resources, and optimizing the level of risk [19].

III. METHOD

3.1 Research Procedure

In this study the process refers to the COBIT framework 5. The work steps or procedures to be carried out by researchers on the management of the Information Systems in outline as illustrated below:

a. Research Background

Before this research was conducted, the authors searched for various references regarding COBIT 5 in order to understand the function of the existing framework. After that, determining the topic and research object. Literature studies such as journals and preexisting research help form thinking concepts in reference to predetermined topics. The process of direct observation to the company to carried out in order to be able to further identify existing problems to be used as research.

b. Observation and Data Collection

To meet the need for data in the research process, it is necessary to determine the method of data collection. The data collection must be correct, accurate and can be accounted for so that the results of data processing and analysis are more precise. Data needed in this research process are primary data and secondary data obtained from several sources. Data collection techniques that will be taken are:

1. **Observation**
Observation technique is carried out by conducting a direct system review, regulations and procedures implemented by the company will also be reviewed. With observation techniques researchers will see the existing deficiencies.
2. **Interview**
The question and answer process with related parties in the current system is expected to produce information and opinions on a matter that is considered to be a problem in the existing system.
3. **Questionnaire**
Determination of respondents for the questionnaire refers to COBIT 5, the parties who are considered capable of explaining the current condition of the management of the information system.
4. **Secondary Data**
Secondary data which includes organizational structure, information systems that are currently running, and other data related to research. The current condition of the Organization Foundation information system is in the form of a stand-alone system in each of its functions.

c. Data Analysis and Processing

After going through the process of collecting data from several sources, the next is an overview of the process of data processing starting from the determination of the COBIT domain so that it can perform data analysis and measurement

to gap analysis. The stages of data processing and analysis refer to the COBIT 5 framework, including[8]:

1. **Enterprise and Stakeholder Needs Identification**
At this stage, the identification of stakeholder needs related to the business goals of the company by analyzing the vision and mission that has been determined by the company. The identification process was also supported by the results of interviews with several stakeholders.
2. **Mapping the Company's Business Goals to Enterprise Goals**
The overall business goals of the company will be mapped into enterprise goals by developing the company's goals using the Balanced Scorecard (BSC) which represents the company's overall goals.
3. **Mapping Enterprise Goals to IT-Related Goals**
The goals of companies that receive IT support will be represented by goals related to IT / IT-Related Goals.
4. **Mapping IT-Related Goals to COBIT 5 processes**
IT-Related Goals uses several enablers which include the process in COBIT 5. The information contained in each enabler process is mapped to support the goals related to IT / IT Related Goals.
5. **Mapping the Academic Information System Maturity Level**
6. **Measurement of capability levels of existing processes is based on mapping of problems.** The method used to measure the capability level is the PAM (Process Assessment Model) conducted by conducting interviews with 6 respondents as the most competent parties and questionnaires to 33 respondents. The interview and questionnaire process is carried out so that information on the capability level of each process is expected from each respondent.

Table 1 Number of Respondents

Respondent	Number of people
Chairman / Director	4
Deputy Chairman / Deputy Director	8
LPM	3
LPPM	1
BAAK/BAU (Secretariat)	8
Head of Study Program	6
IT Center	1
Head of Computer Lab	2
Total	33

7. **Summary of Capability Level Measurement Results**
The measurement results will be summarized into a table that has been adjusted to the COBIT 5: Self Assessment Guide by presenting information on the capability level per process along with the percentages and criteria that have been achieved.
8. **Calculation of Capability Level Value**
The Capability Level calculation process is done by adding up the contributions of each level. The results of the summation are Capability Level values that describe the condition of each domain in which the measurement process uses the COBIT 5 framework. Capability Level calculation uses the following formula:

$$Capability\ Level = \frac{(0 * y_0) + (1 * y_1) + \dots + (5 * y_5)}{z}$$

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Keterangan :

$y_n (y_0...y_5)$ = jumlah proses yang berada dilevel n
 z = jumlah proses COBIT yang dievaluasi

9. Gap Analysis

Gap analysis is done by comparing the results of the calculation of the current SI governance capability level with the expected capability level of SI management. The analysis process is done by looking again at the deficiencies in the SI process and its causes.

3.2 Data Analysis Techniques

Each work process that is assessed will get 4 levels of assessment (ISACA, 2012), including the following:

1. Not Achieved, if the assessment results are between 0-15%
2. Partially Achieved, if the assessment results are between 15 - 50%
3. Large Achieved, if the assessment results are between 50 - 85%
4. Fully Achieved, if the assessment results are between 85 - 100%

The results of the evaluation of field fact finding regarding the conditions of governance of information systems in the form of factual conditions and recommendations provided in the form of solutions that refer to COBIT 5 standards.

3.3 Recommendations and Suggestions

Giving recommendations and suggestions for future improvement is carried out in accordance with the results of the gap analysis that has been carried out. An overview of the processes that need to be carried out and the processes that need to be made to overcome the problems that occur so far in the organization will be obtained.

IV. RESULT AND DISCUSSION

4.1 Identify Enterprise and Stakeholder Needs

At this stage, the identification of stakeholder needs related to the business goals of the company by analyzing the vision and mission that has been determined by the company. Business objectives identified as follows:

1. Carry out Tri Dharma of higher education.
2. Increasing the number of students each year.
3. Produce professional workforce in their fields.
4. Has integrated technology and information systems
5. Optimizing Academic Information Systems

4.2 Mapping Business Goals Against Enterprise Goals

The process of mapping the company's business goals will be presented in table 2 and mapped to Enterprise Goals using BSC or Balanced Scorecard Dimension in COBIT 5 can be seen in Figure below:

Table 2 Company Business Objectives

NO	Company Business Objectives
1	Carry out Tri Dharma College
2	Increasing the number of students each year
3	Producing Professional Workers in their fields
4	Having integrated Information Technology and Systems
5	Optimizing Academic Information Systems

From company business objectives, next step is mapping the objectives to enterprise goals

Figure 2 Mapping Enterprise Goals

A summary of the results of Enterprise Goals mapping referring to COBIT 5 will be displayed in the following table below:

Table 3 Enterprise Goals Mapping Results

NO	Company Business Objectives	Enterprise Goals	BSC
1	Carry out Tri Dharma College	Business Service Continuity and Availability	Customer
		Optimisation of Business process Functionality	Internal
2	Increasing the number of students each year	Portfolio of Competitive Products and Services	Financial
		Customer Oriented Service Culture	Customer
3	Producing Professional Workers in their fields	Operational and Staff Productivity	Internal
		Skilled and Motivated People	Learning & Growth
		Product and Business Innovation Culture	
4	Having integrated Information Technology and Systems	Customer Oriented Services Culture	Customer
		Business Services Continuity and Availability	
5	Optimizing Academic Information Systems	Customer Oriented Services Culture	Customer
		Optimisation of Business Process Functionality	Internal

4.3 Mapping Enterprise Goals Against IT-Related Goals

The next process is the mapping of Enterprise Goals to IT Goals referring to the COBIT 5 framework by mapping each Enterprise Goals using the mapping table provided by COBIT 5. The mapping results are shown in figure 3 below:

Figure 3 Mapping IT Goals based on Enterprise Goals

Each IT Goals selected that are related to several Enterprise Goals then it will be identified once only in table 4 below:

Table 4 Identified IT-Related Goals

NO	COBIT 5 IT-Related Goals
1	Alignment of IT and business strategy
4	Managed IT-related business risk
5	Realised benefits from IT-enabled investments and services portfolio
7	Delivery of IT services in line with business requirements
8	Adequate use of applications, information and technology solutions
9	IT agility
10	Security of information, processing infrastructure and applications
12	Enablement and support of business processes by integrating applications and technology into business processes
14	Availability of reliable and useful information for decision making
16	Competent and motivated business and IT personel
17	Knowledge, expertise and initiatives for business innovation

4.4 Mapping of IT-Related Goals to COBIT 5 Process

Next is the process of mapping IT-Related Goals to COBIT 5 Process using the mapping table that is already available. Each IT Goals selected have been adjusted to the limits that have been determined in the previous stage. The following is the result of the mapping which is divided into 2 separate figures :

Figure 4 Mapping COBIT 5 Process EDM, APO

Figure 5 Mapping COBIT 5 Process BAI, DSS, MEA

After mapping COBIT 5 processes then the result of IT-related goals can be found in the following table :

Table 5 Mapping Results of IT-Related Goals Against COBIT 5 Process

NO	IT-Related Goals	COBIT 5 Process
1	Alignment of IT and business strategy	EDM01, EDM02, APO01, APO02, APO03, APO05, APO07, APO08, BAI01, BAI02
4	Managed IT-related business risk	EDM03, APO10, APO12, APO13, BAI06, DSS01, DSS02, DSS03, DSS04, DSS05, DSS06, MEA01, MEA02, MEA03
5	Realised benefits from IT-enabled investments and services portfolio	EDM02, APO04, APO05, APO06, APO11, BAI01,
7	Delivery of IT services in line with business requirements	EDM01, EDM02, EDM05, APO02, APO08, APO09, APO10, APO11, BAI02, BAI03, BAI04, BAI06, DSS01, DSS02, DSS03, DSS04, DSS06, MEA01
8	Adequate use of applications, information and technology solutions	APO04, BAI05, BAI07
9	IT agility	EDM04, APO01, APO03, APO04, APO10, BAI08
10	Security of information, processing infrastructure and applications	EDM03, APO12, APO13, BAI06, DSS05
12	Enablement and support of business processes by integrating applications and technology into business processes	APO08, BAI02, BAI07
14	Availability of reliable and useful information for decision making	APO09, APO13, BAI04, BAI10, DSS03, DSS04
16	Competent and motivated business and IT personel	EDM04, APO01, APO07
17	Knowledge, expertise and initiatives for business innovation	EDM02, APO01, APO02, APO04, APO07, APO08, BAI05, BAI08

4.5 Mapping of Problems with COBIT 5 Process

The selected of COBIT 5 Processes will be adjusted to the need to examine the COBIT process related to data regarding problems encountered were obtained through interviews with several stakeholders and field observations. The following are some of the problem points:

1. Communication between IT managers and business needs to be improved because the value of IT Investment is often in doubt and requires policies from stakeholders.
2. IT and SI resources have not been used optimally for campus needs.
3. Lack of staff for the IT Center, especially professionals in their field.
4. The project completion or system development process is not yet as expected due to sudden requests.
5. The stakeholders in this case the foundation and leadership do not want to be directly involved to become business sponsors for the IT department.
6. Decisions in the IT field have not yet been made planning and are sudden if needed.

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Referring to some of the problems that have been detailed previously, existing problems can be mapped to Pain Points for COBIT 5 Process, shown in Figure 3 below:

Pain Point	COBIT 5 Processes
1 Business frustration with failed initiatives, rising IT costs and a perception of low business value	EDM02, APO01, APO02, APO05, APO07, BAI01, BAI02
2 Significant incidents related to IT-related business risk such as data loss or project failure	EDM03, APO09, APO12, DSS domain
3 Outsourcing service delivery problems such as agreed-on service levels consistently not being met	EDM04, APO09, APO10
4 Failure to meet regulatory or contractual requirements	EDM03, MEA03
5 Limiting the enterprise's innovation capabilities and business agility	EDM04, APO02, APO04
6 Regular audit findings about poor IT performance or reported IT quality-of-service problems	MEA02
7 Hidden and rogue IT spending	EDM02, APO05, APO06
8 Duplication or overlap between initiatives, or resource wastage	EDM02, EDM04, APO05, BAI01
9 Inefficient IT resources, staff with inadequate skills or staff burn-out/ dissatisfaction	EDM04, APO07
10 IT-enabled changes frequently failing to meet business needs and delivered late or over budget	APO02, APO05, BAI01
11 Multiple and complex IT assurance efforts	MEA02
12 Board members or senior managers who are reluctant to engage with IT, or a lack of committed and satisfied business sponsors for IT	EDM01, EDM02, APO01, APO02
13 Complex IT operating models	EDM01, APO01, APO02, MEA01

Figure 6 Mapping Pain Points to the COBIT 5 Process

After mapping Pain Points to the COBIT 5 Process, the selected process will be focus on the assessment at company as the selected processes grouped according to each domain:

Table 6 COBIT 5 Selected Processes

Domain	Process	Keterangan
EDM	EDM01	Ensure Governance Framework Setting and Maintenance
	EDM02	Ensure Benefit Delivery
	EDM04	Ensure Resources Optimization
APO	APO01	Manage the IT Management Framework
	APO02	Manage Strategy
	APO04	Manage Innovation
	APO05	Manage Portfolio
	APO07	Manage Human Resources
BAI	BAI01	Manage Programmes and Projects
	BAI02	Manage Requirements Definition

4.6 Self Assessment Guide COBIT 5

The process of designing questions is based on the criteria that exist in the PRB (Process Reference Model) that is in the PAM (Process Assessment Model) COBIT 5. Level assessment indicators start from 1-5, level 1 indicators are taken from the objectives of each process contained in the PRM. Whereas indicators for level 2 to level 5 assessment are the same generic results for each process.

4.7 Capability Level Assessment Refers to COBIT 5

The assessment of capability level for each process in COBIT 5 has been tested in stages with reference to the fulfillment of the requirements that must be met at each level, namely from level 1 to level 5.

Based on the results of the assessment at each level between another process that is enough to reach the category of Largely Achieved (L) with a range of values between 50-85%, or Fully Achieved (F) with a range of values between 85-100% to be able to state that the process has obtained a capability level. For processes that obtain a capability level (F), Fully Achieved can continue the capability assessment process at the next level. In measuring Capability Level the author has assigned respondents to answer a list of capability level assessment questions with 2 Exist (100) and Not Exist (0) answer options.

a. EDM01 Ensure Governance Framework Setting and Maintenance

EDM01 process is still included in the Partially Achieved category with a result of 40.40%. Capability Level in the EDM01 process includes Level 1 because

the percentage is less than the Fully Achieved category with a percentage of more than 85%, so the assessment process stops at Level 1.

Table 7 EDM01 Capability Level Assessment

Governance Practice	Outputs	Exist	Score
EDM01.01 Evaluate the governance system	Enterprise governance guiding principles	51,52%	33,33%
	Decision-making model	15,15%	
EDM01.02 Direct the governance system	Authority levels	39,39%	54,55%
	Enterprise governance communication	69,70%	
EDM01.03 Monitor the governance system	Reward system approach	0%	33,33%
	Feedback on governance effectiveness and performance	66,67%	
Average Score			40,40%

The following below is a Process Assessment Model (PAM) table:

Table 8 Process Assessment Model EDM01

Purpose	Provide a consistent approach integrated and aligned with the enterprise governance approach. To ensure that IT-related decision are made in line with the enterprise's strategies and objectives, ensure that IT-related processes are overseen effectively and transparently, compliance with legal and regulatory requirements are confirmed, and the governance requirements for board members are met.									
Ensure Governance Framework Setting and Maintenance	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
		PA 1.1	P 2.1	P 2.2	P 3.1	P 3.2	P 4.1	P 4.2	P 5.1	P 5.2
Rating Based on Percentage	100%	40,40%								
Rating Based on Criteria	F	P								

b. EDM02 Ensure Benefit Deliver
EDM02 process is still included in the Large Achieved category with a result of 50.51%. Capability Level in the EDM02 process includes Level 1 because the percentage is less than the Fully Achieved category with a percentage of more than 85%, so the assessment process stops at Level 1.

Table 9 EDM02 Capability Level Assessment

EDM02 Ensure Benefit Delivery			
Governance Practice	Outputs	Exist	Score
EDM02.01 Evaluate value optimisation	Evaluation of strategic alignment	100%	51,52%
	Evaluation of investment and services portfolios	3,03%	
EDM02.02 Direct value optimisation	Investment types and criteria	100%	100%
	Requirements for stage-gate reviews	100%	
EDM02.03 Monitor value optimisation	Feedback on portfolio and programme performance	0%	0%
	Actions to improve value delivery	0%	
Average Score			50,51%

The following below is a Process Assessment Model (PAM) table:

Table 10 Process Assessment Model EDM02

Purpose	Secure the optimal value of IT-supported initiatives, services and assets; cost-effective delivery of solutions and services, and a reliable and accurate description of costs and possible benefits so that business needs are supported effectively and efficiently.									
Ensure Benefit Delivery	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
		PA 1.1	P 2.1	P 2.2	P 3.1	P 3.2	P 4.1	P 4.2	P 5.1	P 5.2
Rating Based on Percentage	100%	50,51%								
Rating Based on Criteria	F	L								

- c. EDM04 Ensure Resources Optimization
EDM04 process is still included in the Large Achieved category with a yield of 67.68%. Capability Level in the EDM04 process is included in Level 1 because the percentage is less than the Fully Achieved category with a percentage of more than 85%, so the assessment process stops at Level 1.

Table 11 EDM04 Capability Level Assessment

EDM04 Ensure Resources Optimization			
Governance Practice	Outputs	Exist	Score
EDM04.01 Evaluate resource management	Guiding principles for allocation of resources and capabilities	78,79%	48,48%
	Guiding principles for enterprise architecture	0%	
	Approve resources plan	66,67%	
EDM04.02 Direct resource management	Communication of resourcing strategies	100%	100%
	Assigned responsibilities for resource management	100%	
	Principles for safeguarding resources	100%	
EDM04.03 Monitor Resource management	Feedback on allocation and effectiveness of resources and capabilities	9,09%	54,55%
	Remedial actions to address resource management deviations	100%	
Average Score			67,68%

The following below is a Process Assessment Model (PAM) table:

Table 12 Process Assessment Model EDM04

Purpose	Ensuring that company resource requirements are optimally met, IT costs are optimized, and there is an increased likelihood of realization of benefits and readiness for future changes.									
Ensure Resources Optimization	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
			PA 1.1	P 2.1	P 2.2	P 3.1	P 3.2	P 4.1	P 4.2	P 5.1
Rating Based on Percentage	100%	67,68%								
Rating Based on Criteria	F	L								

- d. APO01 Manage the IT Management Framework
APO01 process is included in the Fully Achieved category with a result of 87.31%. Capability Level in the APO01 process includes Level 1, because the percentage is more than 85%, so the assessment process continues to Level 2.

Table 13 APO01 Capability Level Assessment

APO01 Manage the IT Management Framework			
Governance Practice	Outputs	Exist	Score
APO01.01 Define the organisational structure	IT-related policies	100%	66,67%
	Non-compliance remedial actions	100%	
	Evaluation of options for IT organisation	0%	
APO01.02 Establish roles and responsibilities	Defined operational placement of IT function	100%	98,48%
	Definition of organisation structure and function	96,97%	
APO01.03 Maintain the enablers of the management system	Organisation operational guidelines	100%	100%
APO01.04 Communicate management objectives and direction	Communication ground rules	100%	100%
APO01.05 Optimise the placement of the IT function	Definition of IT-related roles and responsibilities	100%	100%
	Definition of supervisory practices	100%	

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APO01.06 Define information (data) and system ownership	Process capability assessments	100%	100%
	Process improvement opportunities	100%	
	Performance goals and metrics for process improvement tracking	100%	
APO01.07 Manage continual improvement of processes	Communication on IT objectives	0%	33,33%
	Data classification guidelines	100%	
	Data security and control guidelines	0%	
APO01.08 Maintain compliance with policies and procedures	Data integrity procedures	100%	100%
Average Score			87,31%

The following below is a Process Assessment Model (PAM) table:

Table 14 Process Assessment Model APO01

Purpose	Provide a consistent management approach to enable corporate governance requirements to be met, which includes process management, organizational structure, roles and responsibilities, reliable and repeatable activities, and skills.									
Manage The IT Management Framework	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
		PA 1.1	PA 2.1	PA 2.2	P 3.1	P 3.2	P 4.1	P 4.2	P 5.1	P 5.2
Rating Based on Percentage	100%	87,31%	100%	100%						
Rating Based on Criteria	F	F	F	F						

The table below is an explanation for achieving level 2 in the APO01 process on the results of the assessment of the capability level of the Higher Education Foundation Widya Dharma Pontianak.

Table 15 Performance Management APO01

2.1 Performance Management		
Generic Practices	Exist	Score
Identify the Objectives	✓	100%
Plan and Monitor the Performance	✓	100%
Adjust the Performance	✓	100%
Define Responsibilities	✓	100%
Identify and Make Available	✓	100%
Manage Interfaces	✓	100%
Average Score		100%

Table 16 Work Product Management APO01

2.2 Work Product Management		
Generic Practices	Exist	Score
Define the Requirements for the Work Products	✓	100%
Define the Requirements for Documentation and Control	✓	100%
Identify Document and Control Products	✓	100%
Review and Adjust Work Products	✓	100%
Average Score		100%

All processes that pass the Fully Achieved category with a percentage above 85% from level 1, are declared to pass for level 2 as well. APO01 process is at level 2 with the Fully Achieved category of 100%, but the capability assessment cannot be continued to level 3 due to the unavailability of process definition and process deployment in the form of SOP (Standard Operating Procedure) which is a condition of capability assessment to level 3.

e. APO02 Manage Strateg

APO02 process is included in the Large Achieved category with a result of 80.89%. Capability Level in the APO02 process includes Level 1, because the percentage is not more than 85% with the Fully Achieved category, so the assessment process stops at Level 1.

Table 17 APO02 Capability Level Assessment

APO02 Manage Strategy			
Governance Practice	Outputs	Exist	Score
APO02.01 Understand enterprise direction	Sources and priorities for changes	90,91%	90,91%
APO02.02 Assess the current environment, capabilities, and performance	Baseline of current capabilities	100%	96,97%
	Gaps and risk related to current capabilities	100%	
	Capability SWOT analysis	90,91%	
APO02.03 Define the target IT capabilities	High-level IT-related goals	100%	95,96%
	Required business and IT capabilities	87,88%	
	Proposed enterprise architecture changes	100%	
APO02.04 Conduct a gap analysis	Gaps and changes required to realise target capability	100%	100%
	Value benefit statement for target environment	100%	
APO02.05 Define the strategic plan and road map	Definition of strategic initiatives	100%	33,33%
	Risk assessment	0%	
	Strategic road map	0%	
APO02.06 Communicate the IT strategy and direction	Communication plan	100%	68,18%
	Communications package	36,36%	
Average Score			80,89%

The following below is a Process Assessment Model (PAM) table:

Table 18 Process Assessment Model APO02

Purpose	Aligning IT strategic plans with business objectives, communicating objectives and accountability are clearly related and understood by everyone, providing strategic options that are identified, structured, and integrated with business plans.									
Manage Strategi	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
		PA 1.1	P 2.1	P 2.2	A 3.1	A 3.2	A 4.1	A 4.2	A 5.1	A 5.2
Rating Based on Percentage	100%	80,89%								
Rating Based on Criteria	F	L								

f. APO04 Manage Innovation
APO04 process is included in the Large Achieved category with a yield of 69.44%. Capability Level in the APO04 process includes Level 1, because the percentage is not more than 85% with the Fully Achieved category, so the assessment process stops at Level 1.

Table 19 APO04 Capability Level Assessment

APO04 Manage Innovation			
Governance Practice	Outputs	Exist	Score
APO04.01 Create an environment conducive to innovation	Innovation opportunities linked to business drivers	100%	100%
	Research analysis of innovation possibilities	100%	
	Evaluation of ideas for innovation	100%	
APO04.02 Maintain an understanding of the enterprise environment	Proof of concept scope and outline business case	100%	100%
APO04.03 Monitor and scan the technology environment	Test result from proof-of-concept initiatives	0%	0%
APO04.04 Assess the potential of emerging technologies and innovation ideas	Result and recommendations from proof-of-concept initiatives	100%	66,67%
	Analysis of rejected initiatives	0%	
	Innovation plan	100%	
APO04.05 Recommend appropriate further initiatives	Recognition and reward programme	0%	50%
	Assessments of the use of innovative approaches	100%	
APO04.06 Monitor the implementation and use of innovation	Evaluation of innovation benefits	100%	100%
	Adjusted innovation plans	100%	
Average Score			69,44%

The following below is a Process Assessment Model (PAM) table:

Table 20 Process Assessment Model APO04

Purpose	Achieve competitive advantage, business innovation, and increase operational effectiveness and efficiency by exploiting the development of information technology.									
Manage Innovation	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5				
		PA 1.1	P 2.1	P 2.2	P 3.1	P 3.2	P 4.1	P 4.2	P 5.1	P 5.2
Rating Based on Percentage	100%	69,44%								
Rating Based on Criteria	F	L								

g. APO05 Manage Portfolio
APO05 process is included in the Large Achieved category with a result of 79.46%. Capability Level in the APO05 process includes Level 1, because the percentage is not more than 85% with the Fully Achieved category, so the assessment process stops at Level 1.

Table 21 APO05 Capability Level Assessment

APO05 Manage Portfolio			
Governance Practice	Outputs	Exist	Score
APO05.01 Establish the target investment mix	Defined investment mix	100%	91,92%
	Identified resources and capabilities required to support strategy	87,88%	
	Feedback on strategy and goals	87,88%	
APO05.02 Determine the availability and sources of fund	Funding options	90,91%	90,91%
	Investment return expectation	90,91%	
APO05.03 Evaluate and select programmes to fund	Programme business case	100%	93,94%
	Business case assessments	100%	
	Selected programmes with ROI milestones	81,82%	
APO05.04 Monitor, optimise, and report on investment portfolio performance	Investment portfolio performance reports	0%	0%
APO05.05 Maintain portfolios	Updated portfolios of programmes, services, and assets	100%	100%
APO05.06 Manage benefits achievement	Benefit results and related communications	100%	100%
	Corrective actions to improve benefits realisation	100%	
Average Score			79,46%

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The following below is a Process Assessment Model (PAM) table:

Table 22 Process Assessment Model APO05

Purpose	Optimizing the overall portfolio performance of the p response to program and service performance and company priorities and demands.							
Manage Portfolio	Level 0	Level 1	Level 2		Level 3		Level 4	
		PA 1.1	PA 2.1	PA 2.2	PA 3.1	PA 3.2	PA 4.1	PA 4.2
Rating Based on Percentage	100%	79,46%						
Rating Based on Criteria	F	L						

- h. APO07 Manage Human Resources
 APO07 process is included in the Large Achieved category with a yield of 76.85%. Capability Level in the APO07 process is included in Level 1, because the percentage is not more than 85% with the Fully Achieved category, so the assessment process stops at Level 1.

Table 23 APO07 Capability Level Assessment

APO07 Manage Human Resources			
Governance Practice	Outputs	Exist	Score
APO07.01 Maintain adequate and appropriate staffing	Staffing requirement evaluations	21,21%	73,74%
	Competency and career development plans	100%	
	Personnel sourcing plans	100%	
APO07.02 Identify IT key personnel	Skills and competencies matrix	100%	100%
APO07.03 Maintain the skills and competencies of personnel	Skills development plans	100%	33,33%
	Review reports	0%	
	Personnel goals	0%	
APO07.04 Evaluate employee job performance	Performance evaluations	0%	64,65%
	Improvement plans	100%	
	Inventory of business and IT human resources	93,94%	
APO07.05 Plan and track the usage of IT and business human resources	Resourcing shortfall analysis	78,79%	89,39%
	Resource utilisation records	100%	
APO07.06 Manage contract staff	Contract staff policies	100%	100%
	Contract agreements	100%	
	Contract agreement reviews	100%	
Average Score			76,85%

The following below is a Process Assessment Model (PAM) table:

Table 24 Process Assessment Model APO07

Purpose	Improve the ability of human resources to meet company goals.									
Manage Human Resources	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
		PA 1.1	PA 2.1	PA 2.2	PA 3.1	PA 3.2	PA 4.1	PA 4.2	PA 5.1	PA 5.2
Rating Based on Percentage	100%	76,85%								
Rating Based on Criteria	F	L								

- i. BAI01 Manage Programmes dan Projects
 BAI01 process is included in the Large Achieved category with a yield of 82.58%. Capability Level in the BAI01 process includes Level 1, because the percentage is not more than 85% with the Fully Achieved category, so the assessment process stops at Level 1.

Table 25 BAI01 Capability Level Assessment

BAI01 Manage Programmes dan Projects			
Governance Practice	Outputs	Exist	Score
BAI01.01 Maintain a standard approach for programme and project management	Updated programme and project management approaches	90,91%	90,91%
	Stakeholder engagement plan	100%	
BAI01.02 Initiaa a programme	Result of stakeholder engagement effectiveness assessments	96,97%	98,99%
	Programme concept business case	100%	
	Programme mandate and brief	96,97%	
BAI01.03 Manage stakeholder engagement	Programme benefit realisation plan	0%	96,97%
	Programme plan	100%	
BAI01.04 Develop and maintain the programme plan	Programme budget and benefits register	100%	48,48%
	Resources requirements and roles	96,97%	
	Results of benefit realisation monitoring	100%	
BAI01.05 Launch and execute the programme	Results of programme goal achievement monitoring	0%	50%
	Result of programme performance reviews	100%	
BAI01.06 Monitor, control, and report on the programme outcomes	Stage-gate review results	100%	100%



BAI01.07 Start up and initiate projects within a programme	Project plans	90,9 1%	90,9 1%
	Project baseline	90,9 1%	
BAI01.08 Plan projects	Project reports and communications	96,9 7%	96,9 7%
	Quality management plan	96,9 7%	
	Requirements for independent verifications of deliverables	96,9 7%	
BAI01.09 Manage programme and project quality	Project scope statements	90,9 1%	90,9 1%
	Project definitions	90,9 1%	
BAI01.10 Manage programme and project risk	Project risk management plan	0%	0%
	Project risk assessment results	0%	
	Project risk register	0%	
BAI01.11 Monitor and control projects	Project performance criteria	100 %	100 %
	Project progress reports	100 %	
	Agreed-on changes to project plan	100 %	
BAI01.12 Manage project resources and work packages	Project resource requirements	100 %	98,9 9%
	Project roles and responsibilities	100 %	
	Gaps in project planning	96,9 7%	
BAI01.13 Close a project or iteration	Post-implementation review results	100 %	100 %
	Project lessons learned	100 %	
	Stakeholder project acceptance confirmations	100 %	
BAI01.14 Close a programme	Communication of programme retirement and ongoing accountables	90,9 1%	90,9 1%
Average Score			82,5 8%

The following below is a Process Assessment Model (PAM) table:

Table 26 Process Assessment Model BAI01

Purpose	Recognize business benefits and reduce the risk of unexpected delays, costs, and impairment by increasing business communication and engagement to end users, ensuring the value and quality of project results, and maximizing the contribution of investment and service portfolios.									
	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
Manage Programmes and Projects	PA 1.1	P A 2.1	P A 2.2	P A 3.1	P A 3.2	P A 4.1	P A 4.2	P A 5.1	P A 5.2	
Rating Based on Percentage	100 %	82,58 %								
Rating Based on Criteria	F	L								

j. BAI02 Manage Requirements Definition

BAI02 process is included in the Large Achieved category with a yield of 63.38%. Capability Level in BAI02 process is included in Level 1, because the percentage is not more than 85% with the Fully Achieved category, so the assessment process stops at Level 1.

Table 27 BAI02 Capability Level Assessment

BAI02 Manage Requirements Definition			
Governance Practice	Outputs	Exist	Score
BAI02.01 Define and maintain business functional and technical requirements	Requirements definition repository	100%	65,66%
	Confirmed acceptance of requirements from stakeholders	96,97%	
	Record of requirement change requests	0%	
BAI02.02 Perform a feasibility study and formulate alternatives solutions	Feasibility study report	90,91%	90,91%
	High-level acquisition/development plan	90,91%	
BAI02.03 Manage requirements risk	Requirements risk register	0%	0%
	Risk mitigation actions	0%	
BAI02.04 Obtain approval of requirements and solutions	Sponsor approvals of requirements and proposed solutions	100%	96,97%
	Approved quality reviews	93,94%	
Average Score			63,38%

The following below is a Process Assessment Model (PAM) table:

Table 28 Process Assessment Model BAI02

Purpose	Make optimal solutions that are feasible to meet company needs while minimizing risk.									
	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
Manage Programmes and Projects	PA 1.1	P A 2.1	P A 2.2	P A 3.1	P A 3.2	P A 4.1	P A 4.2	P A 5.1	P A 5.2	
Rating Based on Percentage	100 %	63,38 %								
Rating Based on Criteria	F	L								

4.8 Summary of COBIT 5 Process Capability Level Measurement Results

Based on the results of the discussion regarding the measurement of the Capability Level of each process, the measurement results will then be summarized into a table below that has been adjusted to the COBIT 5 guide: Self Assessment Guide by presenting information on the Capability Level of the process along with the percentages and criteria that have been achieved.

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Table 29 Summary of COBIT 5 Process Capability Level Measurement Results

Proses	COBIT 5 Process	Measurement results	Capability Level						
			0	1	2	3	4	5	
EDM01	Ensure Governance Framework Setting and Maintenance	40,40% (L)		1					
EDM02	Ensure Benefit Delivery	50,51% (L)		1					
EDM04	Ensure Resources Optimization	60,94% (L)		1					
APO01	Manage the IT Management Framework	87,31% (F)			2				
APO02	Manage Strategy	80,89% (L)		1					
APO04	Manage Innovation	69,44% (L)		1					
APO05	Manage Portfolio	79,46% (L)		1					
APO07	Manage Human Resources	76,85% (L)		1					
BAI01	Manage Programmes and Projects	83,73% (L)		1					
BAI02	Manage Requirements Definition	63,38% (L)		1					

4.9 Results of Capability Level Calculation

Referring to the results of the assessment of 10 selected COBIT processes, the Capability Level calculation results obtained are described as follows:

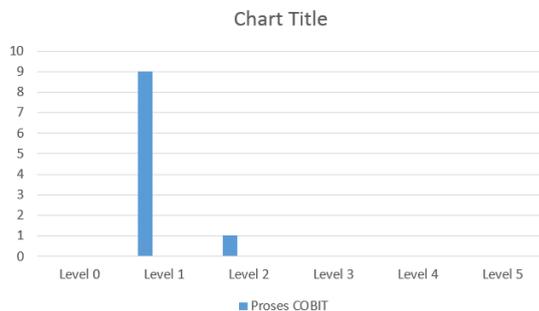


Figure 7 Capability Level Calculation

Based on the picture above, there is only 1 process that reaches level 2, and the rest are only at level 1. The target capability level desired is level 3. This target is determined based on the results of interviews with stakeholders / stakeholders one of them is the Head of IT Center or IT Center as the person in charge of IT management within the company. The calculation process is carried out using the average formula as follows:

$$Capability\ Level = \frac{(0 * y_0) + (1 * y_1) + \dots + (5 * y_5)}{z}$$

Explanation :

y_n ($y_0 \dots y_5$) = number of processes in level n

z = the number of COBIT processes that are evaluated

Then :

$$Capability\ Level = \frac{(0 * 0) + (1 * 9) + (2 * 1) + (3 * 0) + (4 * 0) + (5 * 0)}{10}$$

Capability Level = **1,1**

Based on the above calculation results, the capability level of the information system governance is currently at the level of 1.1 and has a gap of 1.9 to be able to achieve the company's capability level target, which is at level 3.

4.10 GAP Analysis

To display the value of gaps / gaps that occur per process, it will be described as is condition (X), to be condition (Y), and gap ($X-Y=Z$) in the following table.

Table 30 Gap Analysis of Conditions

Process ID	COBIT 5 Process	X	Y	Z
EDM01	Ensure Governance Framework Setting and Maintenance	1	3	2
EDM02	Ensure Benefit Delivery	1	3	2
EDM04	Ensure Resources Optimization	1	3	2
APO01	Manage the IT Management Framework	2	3	1
APO02	Manage Strategy	1	3	2
APO04	Manage Innovation	1	3	2
APO05	Manage Portfolio	1	3	2
APO07	Manage Human Resources	1	3	2
BAI01	Manage Programmes and Projects	1	3	2
BAI02	Manage Requirements Definition	1	3	2

The following is a radar diagram that illustrates the current conditions and target conditions.

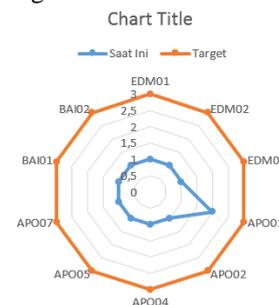


Figure 8 Radar Diagram of Gap Analysis

Referring to the results of the capability level assessment process the current condition gaps that occur due to:

- EDM01 Ensure Governance Framework Setting and Maintenance

There is no available decision making model related to IT management. And there is no evaluation process related to the performance of stakeholders in IT management in the company.

- b. EDM02 Ensure Benefit Delivery
There is no metric to measure the results achieved, so that the company cannot provide feedback on the portfolio and program performance that has been implemented. And there are no reports related to the achievements of the portfolio and program performance, so actions to optimize the values have not been done.
- c. EDM04 Ensure Resources Optimization
There is no enterprise architecture guide for the company. And monitoring has not been done related to the allocation and effectiveness of the use of existing resources and capabilities, so that monitoring / monitoring is done directly.
- d. APO01 Manage the IT Management Framework
Process capability assessment has never been done by the company. And there are no specific guidelines (KPI) for monitoring the performance of the IT Center. Monitoring is only carried out directly in the field by the company.
- e. APO02 Manage Strategy
No risk analysis has been carried out that can occur during the process, strategic road maps are made related to initial planning and not yet equipped with content, and there is no communication package in delivering the IT strategy.
- f. APO04 Manage Innovation
There is no reward as a token of appreciation to employees for the idea of innovation that has been implemented in the company, there has not been a test in the form of simulations related to proposed innovation ideas, so there is no evidence related to the concept of innovation, and there is no analysis or review has been done for ideas that have been rejected.
- g. APO05 Manage Portfolio
There are no written reports regarding the progress of the project being undertaken. Adjustments to existing milestones / milestones are based on verbal reports.
- h. APO07 Manage Human Resources
There has not been a review of reports related to competencies and capabilities possessed by IT staff, the personnel goals for each company employee have not yet been implemented, so they only work according to their respective duties, and there have not been periodic evaluations related to the performance of each employee referring to the KPI, so the evaluation actions are only carried out directly.
- i. BAI01 Manage Programmes dan Projects
There has not been an assessment related to the effectiveness of involving stakeholders. And there is no plan to conduct an audit process, planning has not been carried out for risk management, so the company has not been able to estimate the risks that can befall the company's projects in general. And there has not been a risk assessment result because there has been no assessment or assessment process or planning to address the risk. Then there is not yet a list of possible risks, official team or committee liquidation has not yet been conducted, and there has not been a review of the projects that have been completed.
- j. BAI02 Manage Requirements Definition

There is no company risk register as an effort to avoid risk. And there is no risk mitigation action as an effort to prevent or minimize the risk.

4.11 Recommendations and Suggestions for Improvement

Based on the results of the Gap analysis above, there are processes / Work Products that are not implemented by the company referring to the COBIT 5 framework. The gap between the results of the current Capability Level assessment results 1.1 with the target that the company wants to achieve is quite far at 3, resulting in recommendations and suggestions for improvement so that the company can achieve its capability targets. Based on the results of the assessment the suggested corrective actions that need to be taken include:

- a. EDM01 Ensure Governance Framework Setting and Maintenance
Provides a model of decision making related to IT management at the Institution. And conduct an assessment process related to the performance of stakeholders in IT management in the company.
- b. EDM02 Ensure Benefit Delivery
Provides a metric or benchmark to measure the results achieved, so that the company can provide feedback on the portfolio and program performance that has been implemented. And making reports related to the achievements of the portfolio and program performance, so that actions can be taken to optimize values.
- c. EDM04 Ensure Resources Optimization
Creating an enterprise architecture guide for guidelines for the company. And conduct monitoring related to the allocation and effectiveness of the use of existing resources and capabilities, so that monitoring / monitoring can be done regularly and regularly.
- d. APO01 Manage the IT Management Framework
Carrying out an assessment of process capability by the company. And provides a specific guide (in the form of KPI) to monitor the performance of the IT Center. So that the monitoring process can be done regularly and regularly by the company.
- e. APO02 Manage Strategy
Conduct a risk analysis process that may occur during the process, provides Strategic road map related to planning complete with contents, and provide a communication package for delivering IT strategies so that communication can take place properly.
- f. APO04 Manage Innovation
Giving rewards as a token of appreciation to employees for the innovation ideas that have been implemented in the company, conducting tests in the form of simulations related to proposed innovation ideas, so that there is evidence related to the concept of innovation, and analyzing or reviewing ideas that have been rejected.
- g. APO05 Manage Portfolio
Provide written reports related to the progress of the project being carried out. So that adjustments to milestones / pre-existing milestones are based on written reports.

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- h. APO07 Manage Human Resources
Reviewing reports related to competencies and capabilities possessed by IT staff, applying personnel goals for each company employee, so employees can work in accordance with their respective duties and achieve personnel goals, and conduct periodic evaluations related to the performance of each employee referring to KPI, so that evaluation actions can be carried out referring to KPI (Key Performance Indicators).
- i. BAI01 Manage Programmes dan Projects
Assess the effectiveness of the process involving stakeholders, planning for an audit process. And planning for a risk management process, so the company can estimate the risks that can befall a company's project in general. And then conduct a process of assessment or assessment of risks so as to produce an assessment result as a plan to overcome risks, provide a list of risks / risk registers that may occur, and conduct a process of dissolution of a team or committee that has completed a project / program officially. And reviewing projects that have already been completed.
- j. BAI02 Manage Requirements Definition
Make a list of risks / risk registers of the company in an effort to avoid risk. And perform risk mitigation actions as an effort to prevent or minimize the risk.

V. CONCLUSION

Referring to the results of the assessment and evaluation of information system governance, it can be concluded that the results of the assessment and analysis of 9 selected COBIT processes are based on the mapping of core problems / pain points, there are 8 processes at level 1 Performed and 1 process at level 2 Manage. The result of calculating the capability of the IS / IT Governance at present (as is) is 1.1 and the target capability level desired by the company (to be) is 3, resulting in a gap of 1.9. The assessment results show that the company has not implemented information system governance properly, referring to the number of work products that have not been produced / are not yet available in each of the assessed processes. So that the gaps / gaps that occur in IS / IT Governance still have problems with the planning process (Planning), Evaluation (Evaluation), Monitoring (Monitoring), and Documentation (Documentation) in each IT process.

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