Information System Analysis at SMAN 1 Ajibarang Using COBIT 4.1

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Abstract— The Role of Information Systems (IS) in Information Technology Governance (ITG) has an important role in high school (SMA) educational institutions. ITG becomes very important for educational institutions in discussing the assessment of the correlation between Information Technology (IT) investment and business in each school. State Senior High School (SMAN) 1 Ajibarang has problems with academic service software for student operations and teacher administration needs. IT investment and best services in accessing the needs of teachers and students are important references about school business. The purpose of this study was to analyze IS risk management at SMAN 1 Ajibarang school using the Control Objective for Information and Related Technology (COBIT) 4.1 Framework. This study uses quantitative research methods by distributing questionnaires to respondents to obtain data on validity and reliability tests for good results. The results of the analysis show that the value of the maturity level shows at level 3, which means the value is in the defined process position. The process of achieving its goals in a much more organized manner using organizational assets is well defined. The recommendation of this research is the need for repairing network installations at SMAN 1 Ajibarang and updating administrative software for teachers and students.

Keywords— analysis, cobit, maturity level, information system, risk management,

I. INTRODUCTION

Information Technology (IT) is computer hardware and software that has the design, development, implementation of computer-based information system management [1]. As a result, Information Technology (IT) is very crucial for government agencies and educational institutions during the COVID-19 pandemic [2][3]. Information technology has the benefits of personal computer applications to protect, store, update, process and receive information safely for computer users.

Information Technology is one of the electronic tools that are so important for many organizations that apply Information Technology to organizational activities [4]. This information technology applies to information management at this time because it can affect the increasing complexity of information system management [5]. Information Technology (IT) also requires a faster response time for all mobility activities and human work that allows companies to develop and compete with other companies [6].

This IT has an important function for the success of daily operations and the competitive value of the agency [7]. The positive benefits of IT are company growth solutions, operational solutions, and agency business so that they can compete with agencies [8]. However, IT also has negative impacts, including theft of confidential data, data hacking, and virus attacks on computer software [9]. For example, one of the educational institutions that utilize IT and information systems optimally is the SMAN 1 Ajibarang school. The school service unit of SMAN 1 Ajibarang uses Information Systems (SI) and IT to improve and provide good service to teachers and school students at SMAN 1 Ajibarang.

School Education Agencies of SMAN 1 Ajibarang in the Banyumas area, Central Java in collaboration with Government Education Agencies who are trying to maximize the functions of IS and IT at SMAN 1 Ajibarang schools [10]. IT Utilization maximally in the school unit of SMAN 1 Ajibarang, it is necessary to pay attention to risk management simultaneously when the information system is also working. The linkage of risks in IT services at SMAN 1 Ajibarang schools will find solutions to reduce the level of risk of using IT at SMAN 1 Ajibarang schools [11]. SMAN 1 Ajibarang requires IT and IS Risk Management Analysis to record, analyze and reduce the risks that have occurred. a good information system based on risk analysis, the school institution of SMAN 1 Ajibarang will have IT governance that supports the business strategy of the SMAN 1 Ajibarang school.

Control of Information and Related Technology Objectives (COBIT) 4.1 is a medium to measure the IT governance framework on the use of COBIT 4.1 to analyze risk management of information systems in school institutions SMAN 1 Ajibarang especially the Plan and Organize (PO) domain [12][13]. IT services show information system management, departmental control, and information system functions that are even more crucial for business process owners, which will ensure the confidentiality, integrity, and availability of sensitive and critical data and information [14]. COBIT 4.1's mission is to conduct research, development, publishing, promotion of papers, updating the order or provisions of IT Control Objectives, Meanwhile, COBIT 4.1's vision is to make CO-BIT a model for IT control and management [15]. The following are 4 Domains of COBIT 4.1. variables:
1. Plan and Organize (PO)
2. Acquire and Implementation (AI)
3. Deliver and Support (DS)
4. Monitoring and Evaluation (ME).

1. Plan and Organize

In this domain, it has an IT strategy and identification that can best contribute to achieving a good organization's business goals with the right technology infrastructure. The domain has 10 indicators as shown in Table 1:

Table 1. Indicator of Plant and Organize

Indicator	Explain
PO1	Determine a strategic information technology plan.
PO2	Define the information architecture.
PO3	Specify technology direction.
PO4	Define IT organization and relationships.
PO5	Manage investment in information technology
PO6	Communicate management objectives and direction
PO7	Manage human resources.
PO8	Manage quality
PO9	Assess risk.
PO10	Manage the project.

2. Acquire and Implementation (AI)

This domain describes the realization of IT strategy, building IT, identifying IT solutions, and integrating IT into business processes. This domain has 7 indicators, as in Table 2:

Table 2. Indicator of Acquire and Implementation

Indicator	Explain
AI1	Identify automated solutions
AI2	Acquire and maintain software applications
AI3	Acquire and maintain technology infrastructure
AI4	Develop and maintain IT procedures
AI5	Meet IT Data Source
AI6	Manage changes
AI7	Installing and accrediting the system and its changes

3. Delivery and Support (DS)

In this domain, it functions to provide security process services, aspects of business continuity, and the provision of training. The domain has 13 indicators, as in Table 3:

Table 3. Indicator of Delivery and Support

Indicator	Explain
DS1	Define And Manage Service Levels
DS2	Manage Third-Party Services
DS3	Managing Performance and Capacity
DS4	Ensure Continuous Service
DS5	Turn Off the Security System
DS6	Identify and Allocate Costs

DS7	Educate and Train Users
DS8	Manage Services and Incidents
DS9	Manage Configuration
DS10	Managing Problems
DS11	Manage Data
DS12	Manage Facilities
DS13	Manage Operations

4. Monitor dan Evaluation (ME)

This domain serves to periodically assess IT processes based on the quality and suitability of control requirements. The domain has 4 indicators, as in Table 4:

Table 4. Indicator of Monitor and Evaluation

Indicator	Explain
ME1	Monitor And Evaluate IT Performance
ME2	Monitor And Evaluate Internal Control
ME3	Ensure The Fulfillment of External Needs
ME4	Provide IT Governance

5. COBIT Maturity Rate 4.1

COBIT 4.1 has a maturity level that is used to control IT processes by using an assessment method to assess IT processes on a scale of 0 to 5. COBIT 4.1 maturity levels are in Table 5:

Table 5. COBIT Maturity Level 4.1

Value	Explain
0 - 0,5	0: None
0,51 - 1,50	1: Initials
1,51-2,50	2: Repeatable but Intuitive
2.51-3.50	3: Defined Process
3.51-4.50	4: Managed and Scalable
4,51-5.00	5: Optimized

6. Compliance Value

In the technique of measuring the level of maturity by using several questions, each question will have a group of appropriateness groupings by using the assessment standard as below in Table 6:

Table 6. Compliance Value

Scale	Question Scale INITIAL VALUES	Compliance Value
1	Not true	0
2	Sometimes	0.33
3	Often	0,67
4	Very true	1

Based on the explanation of the research background above, two research questions will serve as additional guidelines for conducting the research.

RQ1: What is the maturity level of risk management in terms of Plan and Organize Domain in Information Systems at SMAN 1 Ajibarang school?

RQ2: What recommendations will be given based on the maturity level of risk management in Information Systems at SMAN 1 Ajibarang school?

The process of research method steps from research procedures, data analysis, determination, data sampling, discussion, and concluding. The analysis that can be done is descriptive analysis and inference of maturity level, limitations, and research recommendations that are supported by other studies.

II. METHOD

The following describes the research process:

1. Observation

In this study, initial observations were made to the object: the SMAN 1 Ajibarang school by conducting interviews with the school's IT staff before distributing the revised questionnaire.

2. Preliminary Research

This research conducts initial research by obtaining approval for the object of research through notification of a research approval letter, after that makes a questionnaire that will be used as additional data for the study, then revises the questionnaire so that it becomes a superior questionnaire and conducts interviews with new respondents. The study also conducted instrument trials to determine the validity and reliability of several questions.

By conducting a validity test, it is possible to find out whether the measuring instrument needs to be measured. This study uses the Statistical Product and Service Solutions (SPSS) method by correlating each question with a total score of each variable. Each correlation number obtained statistically must

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be compared with the statistical correlation value of r with a level of 95%. The results of conducting a reliability test to determine whether the data collection shows stability, accuracy, or consistency in the specific symptoms per individual. Reliability test with valid questions. When r count > r table then the results of the data are substantial (valid) in research testing, and vice versa, when r count < r table then the results of the data are not significant (invalid) and not feasible in research testing.

3. Data Analysis

In analyzing COBIT 4.1 data, especially the PO9 domain to determine the level of risk management maturity [16]. This study calculates the normalization of value data from the PO9 maturity level and obtains the value of each group with each total value of compliance. Therefore, research needs to get the value of the contribution of each group by multiplying the value of compliance at the individual level.

The calculation of the contribution value is the maturity level index following the formula below:

$$ML = \sum CON \qquad \dots (1)$$

CON: Value Contribution

ML: Maturity Level

$$NV = \frac{CV}{TCV} \qquad \dots (2)$$

CV: Compliance Value

NV: Normalization of Data Value

TCV: Total Compliance Score

$$CONV = \frac{CV}{LV} \qquad \dots (3)$$

CV: Compliance Value

LV: Level

CONV: Contribution Value

4. Discussion

The discussion phase of the data analysis of this research will compare it with information system data regarding risk management that occurs at SMAN 1 Ajibarang school.

5. Recommendations and Suggestions

In the research that has been done, it can be concluded that the results of the discussion from the respondents provide positive recommendations for Information System Service Institutions at SMAN 1 Ajibarang school. So that it can also provide suggestions for those who are researching to be interested in continuing the research that has been done so that furthermore they can provide additional explanations of research results in the object of the school at SMAN 1 Ajibarang.

III. RESULTS AND DISCUSSION

The first step in data analysis is to identify the profile of the respondents at the SMAN 1 Ajibarang school which has the education level of teachers who teach, students, and staff computer skills.

Table 7. Respondent Profile

Standard	Indicator	%
Computer Level	Staf	12
Learning rate	Student	91,7

1. Validity Test

The data obtained from the validity formula for the results of the instrument validity test, as shown in Table 8 below:

Table 8. Validity Test Results (Level 0-5)

Level	Items	Average count	Table	Result
0	3	0,609	0,576	Valid
1	5	0,814	0,576	Valid
2	2	0,845	0,576	Valid
3	5	0,945	0,576	Valid
4	9	0,944	0,576	Valid
5	5	0,891	0,576	Valid

2. Reliability Test

The results of the reliability test observations from the research data entered into the reliability formula and the results from the reliability tests obtained all values from the results of the Level 0 to Level 5

variables all of which resulted in Cronbach's alpha values > 0.6. So that all the instruments from the calculation of the reliability test in this study are reliable or consistent.

use the PO9 Domain (Assessing Risk) in the COBIT 4.1 Framework are in Table 9, Table 10, Table 11, Table 12, Table 13, Table 14 as below:

3. Maturity Test

The results of the risk management maturity level test at SMAN 1 Ajibarang that

Table 9. Compliance Level 0

No	Statement	0	0,33	0,66	1	Total
	Maturity Level 0					
1	Risk assessment does not take place in schools.	2	7	2	1	4,63
2	Information system risk management is not the desired solution	3	4	4	1	4,96
3	Risk Management does not need a solution to the vulnerability of the virus	5	4	1	2	3,98
	COMPLIANCE LEVEL					13,57

Table 10. Compliance Level 1

No	Statement	0	0,33	0,66	1	Total
	Maturity Level 1					
1	It is important to start paying attention to IT risk assessment when using information systems	0	2	3	7	9,64
2	Accessing school-side IT services can determine risk assessment	0	3	6	3	7,95
3	Feeling that risk assessment is rarely carried out by IT services in schools	1	5	3	3	6,63
4	Manager IT services rarely carry out a risk assessment	0	7	2	3	6,63
5	IT service management meetings are rarely carried out in discussions about risk assessment	0	6	3	3	6,96
	COMPLIANCE LEVEL					38,41

Table 11. Compliance Level 2

No	Statement	0	0,33	0,66	1	Total
	Maturity Level 2					
1	Conduct a risk assessment of the management of IT services in schools	1	5	2	4	6,97
2	Principals carry out risk assessments only when there is a big risk	2	5	3	2	5,63
	COMPLIANCE LEVEL					12,6

Table 12. Compliance Level 3

No	Statement	0	0,33	0,66	1	Total
	Maturity Level 3					
1	When an error occurs in computer services, have a risk management policy in managing each IT service	0	7	1	4	6,97
2	There is Risk Management training available to all staff members in the school	0	6	4	2	4,64
3	Every staff in the school can receive a Risk Management assessment by the principal on the management of IT services	0	6	4	2	4,64
4	A risk assessment has been identified to reduce the risk that occurs to the school	0	8	2	2	5,96
5	Subsequent actions in the process can reduce Information System Risk Management in schools	0	6	3	3	6,96
	COMPLIANCE LEVEL					29,17

Table 13. Compliance Level 4

No	Statement	0	0,33	0,66	1	Total
	Maturity Level 4					
1	There is an official procedure for risk assessment of hardware (computer, RAM, etc.) it often happens to experience risk management in schools	0	6	2	4	7,3
2	Making reports on the official person in charge of IT management activities that require risk	1	5	4	2	6,96
3	Hardware and Software have IT risk management and responsible management level	0	4	6	2	7,28
4	IT service staff has carried out risk monitoring activities in understanding IT management risk level assessment	0	4	5	3	7,63
5	School management receives advice on changes affecting IT management-related risks in schools	0	4	4	4	7,96
6	School administrators can monitor risks	0	3	6	3	7,95
7	There is a problem or trouble with the computer staff can handle all risks	0	3	7	2	7,61
8	Fundamental problems related to the level of risk with the application of educational technology applications in the learning process	1	5	5	1	5,95
9	Develop management based on Risk Management and RD according to existing conditions in the school	0	4	6	2	6,28
	COMPLIANCE LEVEL					64,24

Table 14. Compliance Level 5

No	Statement	0	0,33	0,66	1	Total
	Maturity Level 5					
1	Computers that are not up to date have been updated to the latest to reduce evolving risk management	0	4	6	2	7,3
2	IT staff managers have risk reporting automatically, the Principal on the data manager can be handled properly	0	5	3	4	7,63
3	The school has a risky task based on the policy of the Principal	2	4	4	2	5,96
4	The school management has integrated/unified business and IT concepts from a data or system on a computer in the school	1	4	4	3	6,96
5	School IT staff can deal with viruses and assess the risk of existing mitigation strategies on computers if they experience trouble	1	5	2	4	6,97
	COMPLIANCE LEVEL					34,82

Table 15. Calculation of PO9 Maturity Level (Grade 0-5)

Level	Compliance Value	Normalization Value	Contribution
0	13,57	0,07	0
1	38,41	0,19	0,19
2	12,6	0,06	0,12
3	29,17	0,15	0,45
4	64,24	0,33	1,32
5	34,82	0,18	0,9
Total	192,81	0,98	2,98

A. RESULT

Based on the calculations that have been carried out on the Validity Test, the Average rcount value> 0.576 (rtable) so that the value obtained from this validity test is valid, the Reliability Test produces a Cronbach's Alpha value> 0.6 so that all values of the instrument in this reliability test are reliable, and

Calculation of Maturity Level PO9 from level 0-5 shows the contribution value obtained from COBIT Maturity Level 4.1 is the specified Process.

B. DISCUSSION

Based on the respondents from the questionnaires that have been carried out, it shows that the data from the research that has been carried out are accurate and accountable results in the information system on risk management [17]. COBIT Framework 4.1 Domain P09 has communication correlation and IS development control to analyze risk management in information systems in the school environment of SMAN 1 Ajibarang [18]. At the stage of the validity test and reliability test, it shows that the calculations obtained from the questionnaire questions are

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valid and consistent results, being a measuring tool for IT governance, information systems from risk management are very accurate [19].

IV. CONCLUSION

The results of the study indicate that the maturity level is at level 3, which means the value is in the defined process position. The process of achieving its goals in a much more organized manner using organizational assets is well defined. The recommendation of this research is the need for repairing network installations at SMAN 1 Ajibarang and updating administrative software for teachers and students so that there is an improvement in IT investment to increase business at SMAN 1 Ajibarang. Research suggestions related to the same research is the need to add a domain in COBIT 4.1 in addition to the PO 9 domain as a basis for analysis in addition to the basis for risk management.

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