

Analysis of Information Technology Governance at the Office of Communication and Information (Diskominfo) using the Cobit 4.1 Method

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Abstract

Good Information Technology (IT) governance is needed. Ineffective IT governance can cause unexpected cost losses, suboptimal service, low quality of IT use and failure of IT to provide value to the organization. Analysis of IT governance in the Office of Communication and Informatics (Diskominfo) in Lima Puluh Kota Regency aims to measure the maturity level and determine the extent of IT governance in the Diskominfo Office in Lima Puluh Kota Regency using the Cobit 4.1 framework. The Cobit 4.1 method is an information system audit method used by IT Governance. COBIT 4.1 functions to bring together all control needs and technical issues, besides that COBIT is also designed to be a tool to solve problems by managing risks and relationships between information resources. Based on the results of calculating the maturity level that has been achieved by each process domain PO1, PO4, AI3, AI4, DS3, DS5, ME1, ME2, the maturity level results are obtained currently the analysis of IT governance in the Fifty Cities District Diskominfo Office is at level level 4 with a value of 3.95. This shows that the analysis of IT governance at the Fifty Cities District Office of Communication and Information has implemented IT standards throughout the agency environment.

Keywords : IT Governance, Cobit 4.1, Audit, Maturity Level, Domain.

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1. Introduction

Utilization of information technology in government processes can improve efficiency, effectiveness, transparency, and accountability of governance. In order for the implementation of IT governance to run effectively and efficiently, an organization evaluates the extent to which IT governance is running and can identify improvements that can be made. One of the government agencies implementing IT governance is the Communication and Information Service (DISKOMINFO) of Fifty Cities District. The Office of Communication and Information (DISKOMINFO) is an agency responsible for processing information within the Government environment in Fifty Cities District.

Information Technology (IT) has been widely used by various organizations (including government institutions) throughout the world. Utilization of information and communication technology in government processes (e-government) will increase the efficiency, effectiveness, transparency and accountability of government administration. This is in accordance with the objectives of developing e-government in Indonesia based on Presidential Decree No. 3 of 2003, is to develop electronic-based governance in order to improve the quality of public services effectively and efficiently. Through the

development of e-government, management systems and work processes are arranged in the government environment by optimizing the use of information technology [1]

Information Technology governance is carrying out the process of monitoring and controlling information technology (IT) capability decisions in ensuring value delivery (sending value) to key stakeholders in an organization [2]

Information Technology governance is part of Enterprise governance which consists of leadership and organizational structures and processes that ensure that the IT organization supports and uses the organization's strategy and goals. IT governance ensures the measurement of the effectiveness and efficiency of improving the company's business processes through IT-related structures towards the company's strategic goals. The system is a network of procedures that are interconnected with the procedural approach and with the component approach, gathering together to carry out an activity to complete a certain goal [3].

Analysis is a problem-solving process that starts with a hypothesis (conjecture, etc.) until it is proven true through some certainty (observations, experiments, etc.) [4].

Information is a collection of data that is processed into a form that is more useful and more meaningful to those who receive it. Without some information, a system will not run smoothly and can eventually die [5]. According to Jogyanto HM before understanding the meaning of information, we should know things related to information, namely data. Data is a collection of characters, facts, events or quantities which are input to the information system, usually this data cannot be used as a basis for the decision-making process by management. Meanwhile, information is data that is processed into the plural of a form that is more useful and more meaningful to those who receive it [6].

The quality of an information system depends on three things, namely information must be accurate, timely and relevant [7].

Cobit is an IT governance best part that helps auditors, management, users to bridge business aspects, control needs and technical IT. Cobit provides business-oriented directions (guidelines), and therefore business process owners and management including auditor managers and users, it is hoped that these guidelines will be utilized properly [8].

The Cobit 4.1 method is an information system audit method used by IT Governance. COBIT 4.1 functions to bring together all control needs and technical issues, besides that COBIT is also designed to be a tool for solving problems by managing risks and relationships between information resources [9].

Cobit 4.1 is the fifth generation after Cobit 1 which was discovered in 1996, Cobit 2 was found in 1998 [10]. COBIT 4.1 is a framework that can become a standard in the implementation of the auditing process which consists of four domains and is a process that can be used in carrying out an auditing activity [11]. Information technology activities in COBIT 4.1 have four domains, namely Plan and Organize(PO), Deliver and Support(DS), Acquire and Implement(AI), Monitor and Evaluate(ME) of the four domains are interconnected in the domain cycle auditing process can be seen in Figure 1. Cobit 4.1 domain cycle [12]

Based on the above constraints, it can be concluded that this study aims to analyze IT governance and measure the maturity level of information technology governance in order to provide maximum service and be supported by reliable management so that organizational goals can be achieved as expected.

2. Research methodology

To assist in the preparation of this research so that the steps in solving the problems to be discussed can be clearly structured, it is necessary to have a framework arrangement. The research framework contained in Figure.1

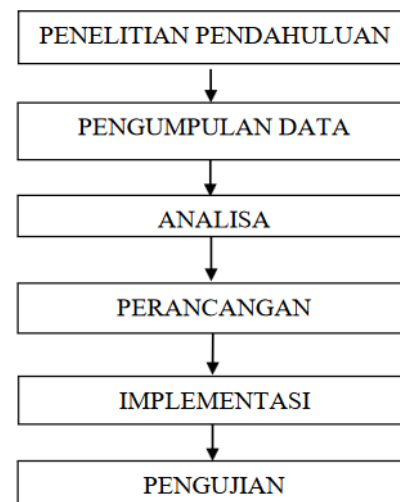


Figure 1. Research Framework

The research stage is a sequence of processes or steps that will be carried out in completing this research. The stages of this research are as follows:

Preliminary Research

From a research, first is to analyze the object to be processed. With preliminary research, it can provide initial evidence that the problems we will examine in the field really exist. Therefore, time is needed for data collection, research time, research locations, research methods, field research, library research, and laboratory research.

Data collection

In collecting data, the authors obtain data from various sources, such as this research obtained from journals and books as references. And this research was also carried out directly by conducting observations and interviews as well as distributing questionnaires to the respondents who were involved in the Office of the Office of Communication and Information (DISKOMINFO) of Fifty Cities District.

Analysis

The analysis phase is one of the most important stages in this research because it is at this stage that the problems that exist in measuring information technology governance will be identified , as well as analyzing the data obtained, where the data is in the form of criteria used as assessment in determining the size of information technology governance measurements. The method used in analyzing this data is to apply the Cobit Framework to produce quality values that are appropriate to the data indicators being managed, as well as the steps needed for the desired design to analysis which are expected.

Design

In this design stage, the researcher uses the Unified Modeling Language (UML) as a tool in explaining the flow of program analysis.

Implementation

System implementation is the stage of laying the system so that it is ready to operate. Implementation aims to confirm the design modules, so that users can provide input to information technology management. At this stage the design of quality measurement applications is carried out using the Visual Studio 2010 programming language and EMS MySQL Manager Lite.

Testing

This stage will test applications created using the Visual Studio 2010 programming language and EMS MySQL Manager Lite. This is done in order to find out whether the application can run according to the design that is done.

3. Results and Discussion

Data analysis

At this stage what is needed is the measurement of information technology governance at the Fifty Cities Diskominfo District based on the Cobit 4.1 Framework with PO1, PO4, AI3, AI4, DS3, DS5, ME1, ME2 domains.

Questionnaire Preparation

At this stage, data was collected by distributing questionnaires or a collection of several questions. Then given to Users and Managers of the technology governance.

After conducting the analysis, several questions and results were obtained from the questionnaire based on the 8 domains. Among them can be seen in Table 1.

Table 1. Questionnaire Questions

A	PO1 - Determine the IT strategic plan	Answer				
		No	1	2	3	4
1	Currently technology already supports the company's operational activities.					
2	Employees have been provided with an understanding of SOP (standard operating procedures) standard operating procedures for new applications or applications being developed.					
3	Operational changes have been supported by IT alignment.					
B PO4 - Defining IT Processes, Organizations and Relationships						
No Questions / Statements						
1	Clear and documented definitions of					

	roles and responsibilities so that staff can do their jobs properly.					
2	IT business processes that support each other between divisions that have been described in the framework.					
3	IT operations are in line with the operations of other divisions.					
C AI3 - Maintain Technology Infrastructure						
No Questions / Statements						
1	Procurement of new hardware and software in accordance with predetermined requirements .					
2	The performance of the current IT infrastructure is in accordance with system requirements so that system performance can run well .					
3	IT infrastructure maintenance is carried out regularly so that it is useful for IT maintenance.					
4	Perform routine maintenance on existing hardware and software .					
D AI4 - Run Operations and use them						
No Questions / Statements						
1	The software provided is in accordance with operational needs and in accordance with user needs.					
2	Users can use the software properly.					
3	Users properly follow the software usage training.					
4	Software development continues to be carried out according to user needs.					
E DS3 - Managing Performance and Capacity						
No Questions / Statements						
1	Is there a good management of IT performance and capacity?					
2	Does the IT unit carry out all IT performance and capacity management in accordance with established procedures?					
3	Is there monitoring that is carried out periodically regarding the performance and capacity of existing IT?					
4	Does the IT unit carry out all IT performance and capacity management in accordance with established procedures?					
F DS5 - Ensuring System Security						
No Questions / Statements						
1	Do all users of the information system comply with all established data security regulations?					
2	Are there rules for the use of data in information systems defined and provided to users of information systems?					
3	All requests for information system user access rights are submitted by the head of the user unit?					
4	Are information system user access rights granted by the information system unit?					
G ME1 - Monitor and Evaluate IT Performance						
No Questions / Statements						
1	What about system performance in terms of time responsiveness , upload/download					

	capability, and reporting?					
2	What is the response regarding IT security and oversight?					
H	ME2 - Monitoring and Evaluating Internal Controls					
No	Questions / Statements					
1	How is the assessment related to the internal control framework?					
2	In terms of effective and efficient, how responses to IT-related internal controls?					

Answer Description:

1 = Very Bad

2 = Not Good

3 = Enough

4 = Good

5 = Very Good

In assessing the score of each respondent, the author uses a scale that reflects the pattern of answers 1, 2, 3, 4 and 5 . Furthermore, the data was obtained by distributing the questionnaire in a way that each answer was given a value/weight on a scale of 1, 2, 3, 4 and 5. For the purposes of the answers, the data can be scored as shown in Table 2 below.

Table 2. Results of the Questionnaire

A	PO1 - Determine the IT strategic plan	Answer				
No	Questions / Statements	1	2	3	4	5
1	Currently technology already supports the company's operational activities.	-	-	2	4	4
2	Employees have been provided with an understanding of SOP (standard operating procedures) standard operating procedures for new applications or applications being developed.	-	-	2	6	2
3	Operational changes have been supported by IT alignment.	-	-	3	7	-
B	PO4 - Defining IT Processes, Organizations and Relationships					
No	Questions / Statements					
1	Clear and documented definitions of roles and responsibilities so that staff can do their jobs properly.	-	-	3	6	1
2	IT business processes that support each other between divisions that have been described in the framework.	-	1	3	4	2
3	IT operations are in line with the operations of other divisions.	-	2	1	4	3
C	AI3 - Maintain Technology Infrastructure					
No	Questions / Statements					
1	Procurement of new hardware and software in accordance with predetermined requirements .	-	1	2	6	1
2	The performance of the current IT infrastructure is in accordance with system requirements so that system performance can run well .	-	1	2	3	4
3	IT infrastructure maintenance is carried out regularly so that it is useful for IT maintenance.	-	-	3	3	4
4	Perform routine maintenance on existing hardware and software .	-	-	2	3	5
D	AI4 - Run Operations and use					

	them					
No	Questions / Statements					
1	The software provided is in accordance with operational needs and in accordance with user needs.	-	-	1	7	2
2	Users can use the software properly.	-	-	2	6	2
3	Users properly follow the software usage training.	-	-	4	2	4
4	Software development continues to be carried out according to user needs.	-	-	1	8	1
E	DS3 - Managing Performance and Capacity					
No	Questions / Statements					
1	Is there a good management of IT performance and capacity?	-	-	1	7	2
2	Does the IT unit carry out all IT performance and capacity management in accordance with established procedures?	-	-	2	8	-
3	Is there monitoring that is carried out periodically regarding the performance and capacity of existing IT?	-	-	3	7	-
4	Does the IT unit carry out all IT performance and capacity management in accordance with established procedures?	-	-	3	7	-
F	DS5 - Ensuring System Security					
No	Questions / Statements					
1	Do all users of the information system comply with all established data security regulations?	-	-	2	5	3
2	Are there rules for the use of data in information systems defined and provided to users of information systems?	-	-	5	5	-
3	All requests for information system user access rights are submitted by the head of the user unit?	-	-	1	6	3
4	Are information system user access rights granted by the information system unit?	-	-	2	7	1
G	ME1 - Monitor and Evaluate IT Performance					
No	Questions / Statements					
1	What about system performance in terms of time responsiveness , upload/download capability, and reporting?	-	-	1	6	3
2	What is the response regarding IT security and oversight?	-	1	4	2	3
H	ME2 - Monitoring and Evaluating Internal Controls					
No	Questions / Statements					
1	How is the assessment related to the internal control framework?	-	-	3	5	2
2	In terms of effective and efficient, how responses to IT-related internal controls?	-	-	2	3	5

maturity level of the attributes /questions will be calculated using the formula:

$$\sum Xi = \frac{\sum Xn}{\sum R} \quad (1)$$

Where:

X_i = The average maturity value of the cobit attribute.
 $\sum X_n$ = Sum of attribute values for each Detail of Control ` Objective (DCO).
 $\sum R$ = Number of respondents

Domain maturity value with the formula:

$$\sum Di = \frac{\sum Xin}{\sum D} \quad (2)$$

where:

XDi = Cobit domain maturity average value.
 $\sum X_i n$ = Sum of all average values
 $\sum D$ = Number of attributes from the Cobit domain

Questionnaire maturity level with the formula:

$$\sum co = \frac{\sum Di}{8} \quad (3)$$

where :

Xco is the average value of the current questionnaire maturity level. While $\sum Di$ is the sum of all the average cobit domain maturity values. And 8 is the Number of cobit domains. This needs to be proven again with detailed calculations with the formula above.

Maturity value PO1 question 1
 $X_i = (3+3+4+4+4+4+5+5+5+5)/10 = 4.20$
 Maturity value PO1 question 2
 $X_i = (3+3+4+4+4+4+4+4+5+5)/10 = 4.00$
 Maturity value PO1 question 3
 $X_i = (3+3+3+4+4+4+4+4+4+4)/10 = 3.70$
 Domain PO1 maturity value
 $XDi = (4.20+4.00+3.70)/3 = 3.97$

Po4 maturity value question 1
 $X_i = (3+3+3+4+4+4+4+4+4+5)/10 = 3.80$
 PO4 maturity value question 2
 $X_i = (2+3+3+3+4+4+4+4+5+5)/10 = 3.70$
 PO4 maturity value question 3
 $X_i = (2+2+3+4+4+4+4+4+5+5+5)/10 = 3.80$
 PO4 Domain maturity value
 $XDi = (3.80+3.70+3.80)/3 = 3.77$

AI3 maturity score question 1
 $X_i = (2+3+3+4+4+4+4+4+4+5)/10 = 3.70$
 AI3 maturity score question 2
 $X_i = (2+3+3+4+4+4+4+5+5+5+5)/10 = 4.00$
 AI3 maturity score question 3
 $X_i = (3+3+3+4+4+4+4+5+5+5+5)/10 = 4.10$
 AI3 maturity score question 4
 $X_i = (3+3+4+4+4+4+5+5+5+5+5)/10 = 4.30$
 AI3 Domain maturity value
 $XDi = (3.70+4.00+4.10+4.30)/4 = 4.03$

AI4 maturity score question 1
 $X_i = (3+4+4+4+4+4+4+4+4+5)/10 = 4.00$
 AI4 maturity score question 2
 $X_i = (3+4+4+4+4+4+4+4+4+5+5)/10 = 4.10$
 AI4 maturity score question 3
 $X_i = (3+3+4+4+4+4+4+4+4+5+5)/10 = 4.00$
 AI4 maturity score question 4
 $X_i = (3+3+3+3+4+4+4+5+5+5+5)/10 = 4.00$
 AI4 Domain maturity value
 $XDi = (4.00+4.10+4.00+4.00)/4 = 4.03$

DS3 maturity value question 1
 $X_i = (3+4+4+4+4+4+4+4+5+5)/10 = 4.10$
 DS3 maturity value question 2
 $X_i = (3+3+4+4+4+4+4+4+4+4)/10 = 3.80$
 DS3 maturity value question 3
 $X_i = (3+3+4+4+4+4+4+4+4+4)/10 = 3.70$
 DS3 maturity value question 4
 $X_i = (3+3+4+4+4+4+4+4+4+4)/10 = 3.70$
 DS3 Domain maturity value
 $XDi = (4.10+3.80+3.70+3.70)/4 = 3.83$

DS5 maturity value question 1
 $X_i = (3+3+4+4+4+4+4+4+5+5+5)/10 = 4.10$
 DS5 maturity value question 2
 $X_i = (3+3+3+2+3+4+4+4+4+4)/10 = 3.50$
 DS5 maturity value question 3
 $X_i = (3+4+4+4+4+4+4+4+5+5+5)/10 = 4.20$
 DS5 maturity value question 4
 $X_i = (3+3+4+4+4+4+4+4+4+5)/10 = 3.90$
 DS5 Domain maturity value
 $XDi = (4.10+3.50+4.20+3.90)/4 = 3.93$

ME1 maturity value question 1
 $X_i = (3+4+4+4+4+4+4+4+5+5+5)/10 = 4.20$
 Maturity value ME1 question 2
 $X_i = (2+3+3+3+3+4+4+4+5+5+5)/10 = 3.70$
 Domain ME1 maturity value
 $XDi = (4.20+3.70)/2 = 3.95$

ME2 maturity value question 1
 $X_i = (3+3+3+4+4+3+4+4+5+5)/10 = 3.90$
 ME2 maturity value question 2
 $X_i = (3+3+4+4+4+4+5+5+5+5)/10 = 4.30$
 ME2 Domain maturity value
 $XDi = (3.90+4.30)/2 = 4.10$

So that from the results of calculating the maturity level of the PO1 – ME2 domain , the results of calculating the maturity level of the following questionnaire are obtained :

$$Xco = (3.97+3.77+4.03+4.03+3.83+3.93+3.95+4.10) / 8 = 3.95$$

The questionnaire was distributed to 10 respondents and the following is the overall result of completing the questionnaire which can be seen in Table 3.

Table 3. The results of calculating the level of domain maturity

No	Domain	Question	Question Index	Domain Index
1	PO1 Determine the IT strategic plan	A01	4,20	3,97
		A02	4,00	
		A03	3,70	
2	PO4 Defining IT Processes, Organizations and Relationships	A04	3,80	3,77
		A05	3,70	
		A06	3,80	
3	AI3 Maintain Technology Infrastructure	A07	3,70	4,03
		A08	4,00	
		A09	4,10	
		A10	4,30	
4	AI4 Run Operations and use them	A11	4,00	4,03
		A12	4,10	
		A13	4,00	
		A14	4,00	
5	DS3 Manage Performance and Capacity	A15	4,10	3,83
		A16	3,80	
		A17	3,70	
		A18	3,70	
6	DS5 Ensure System Security	A19	4,10	3,93
		A20	3,50	
		A21	4,20	
		A22	3,90	
7	ME1 Monitor and Evaluate IT Performance	A23	4,20	3,95
		A24	3,70	
8	ME2 Monitoring and Evaluating Internal Controls	A25	3,90	4,10
		A26	4,30	
Amount			31,61	
Maturity Level = number of index domains : number of domains			3,95	

Next, the calculation of the gap maturity level of the GAP gap is carried out with the formula:

$$\text{Gap Value (GAP)} = \text{Expected Value (to be)} - \text{Rated Current (as is)}$$

Table 4 Gap Levels (GAP)

No	Domain	Process	Maturity Level		
			Rated Current (as-is)	Expected Value (to-be)	Gap (GAP)
1	PO1	Determine the IT strategic plan	3.97	4	0.1
2	PO4	Defining IT Processes, Organizations and Relationships	3.77	4	0.3
3	AI3	Maintain Technology Infrastructure	4.03	4	0.1
4	AI4	Run Operations and use them	4.03	4	0.1
5	DS3	Manage Performance and Capacity	3.83	4	0.2
6	DS5	Ensure System Security	3.93	4	0.1
7	ME1	Monitor and Evaluate IT Performance	3.95	4	0.1

8	ME2	Monitoring and Evaluating Internal Controls	4.10	4	0.1
Average					0.14

Based on the calculation of the maturity model level in the PO1, PO4, AI3, AI4, DS3, DS5, ME1, ME2 processes, the results for the domain position are obtained, which can be seen in the domain index graph and the maturity index graph in the figure below

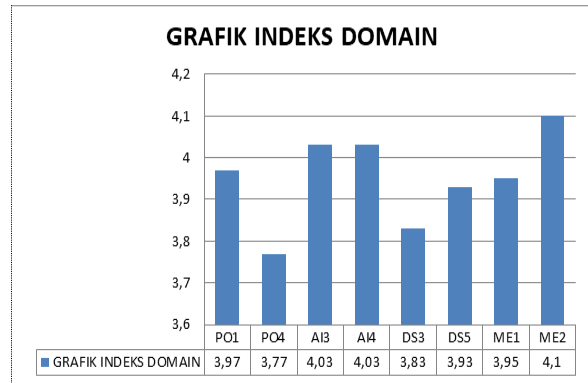


Figure 1. Domain Index Graph

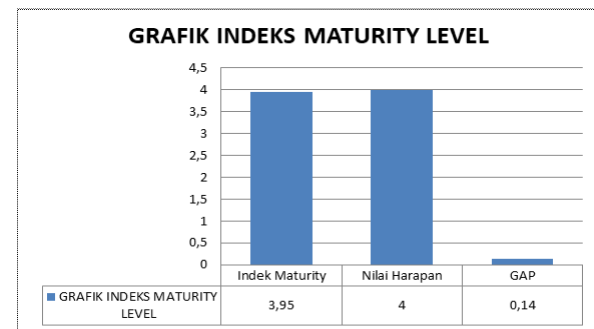


Figure 2. Maturity Level Index Chart

From the picture above it can be concluded that the maturity level PO, AI, DS, ME sub-domains which ranges from 3.7 – 4.1 which is at level 4 Managed and Measurable.

Maturity level of analysis information technology at the Fifty Cities District Diskominfo Office using the COBIT 4.1 framework has a maturity lever of 3.95 is at level 4 (Managed and Measurable), while the maturity level target to be achieved by the Fifty Cities District Office of Communication and Information is level 4 (Managed and Measurable).

it can be obtained that the GAP with an average of 0.14. This indicates that the maturity level target has not been achieved as expected by the Fifty Cities District Office of Communication and Information.

System Testing

System testing is the stage for testing the program or system from the design that has been done. This testing stage contains the results of program execution

and program explanations made to support the system that has been designed. Here's the program execution analysis of information technology governance at the Fifty Cities District Communication and Information Service (Diskominfo). Which the author has designed.

1. Login Page

login page is the page that will be displayed for the first time when opening an information technology governance measurement information system . for more details can be seen in Figure 4 below :



Figure 3. Login page

2. Domain Data Input Page

Domain data input page is a page that is used to add domain data by entering the domain code, domain name and domain information .

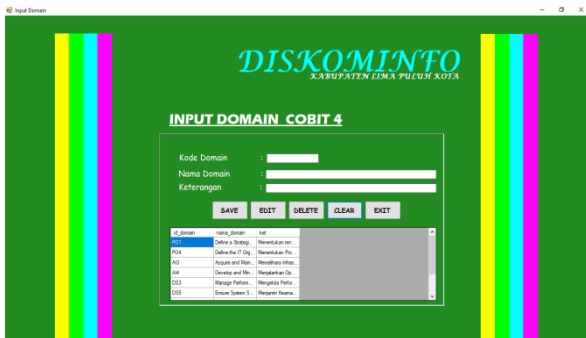


Figure 5 . Domain Data Input Page

3. Attribute Data Input page

attribute data input page is a page that is used to add attribute data by inputting the attribute code, domain code and attribute name .

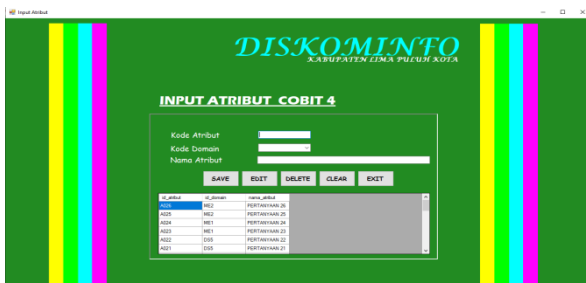


Figure 6 . Attribute Data Input page

4. Question Data Input Page

Data entry page question is a page that is used to add question data by inputting the domain code, attribute code and questions .



Figure 7 . Question Data Input Page

5. Input page Question Choice Value and Question Maturity

The option value input page is a page that is used to input existing choice data from the questionnaire by inputting the choice code, selecting the domain code, inputting the question and inputting the number of assessments 1-5, and displaying the results of question maturity by pressing the Calculate button .



Figure 4. Input page Question Choice Value and Question Maturity

6. Domain Maturity Value Input Page

The domain maturity value input page is a page used to display domain maturity data by inputting a value code, selecting a domain code, selecting a domain name and inputting the maturity value of each question, and displaying the results of domain maturity by pressing the Calculate button .

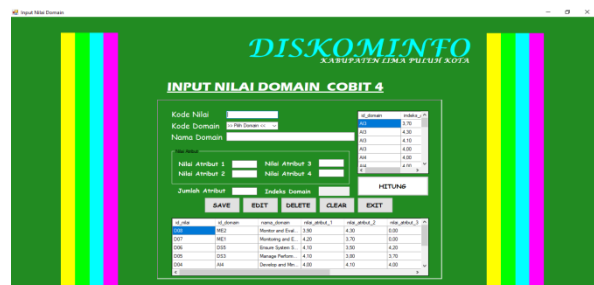


Figure 9 . Domain Maturity Value Input Page

7. Questionnaire Maturity Level Value Input Page

The Questionnaire Maturity Level value input page is a page that is used to display maturity data from all questionnaires by inputting maturity level codes, inputting questionnaire objects, inputting questionnaire

information and inputting maturity values from each domain, and displays the results of the maturity level questionnaire by pressing Calculate button .



Figure 10 . Questionnaire Maturity Level Value Input Page

4. Conclusion

The results of the analysis of information technology governance measurements using the Cobit 4.1 method in the domains PO1, PO4, AI3, AI4, DS3, DS5, ME1, ME2 , yield a maturity value of 3.95 for the current situation (*as is*). This can be interpreted as a measurement of information technology governance at the Fifty Cities District Diskominfo Office is at level 4 (*Managed and Measurable*) which means that in general the technology governance process has met the standards of IT processes that are implemented thoroughly within the scope of the agency, which means that the entire organization has implemented the process .

References

[1] Sofa, K., Suryanto, TLM, & Suryono, RR (2020). Information Technology Governance Audit Using the COBIT 5 Framework at the Tanggamus Regency Public Works Office. *Journal of Technology and Information Systems*, 1(1), 39-46. <https://doi.org/10.33365/jtsi.v1i1.50>

[2] Suryono, RR, Darwis, D., & Gunawan, SI (2018). Information Technology Governance Audit Using the Cobit 5 Framework (Case Study: Center for Aquaculture Fisheries in Lampung). *Teknoinfo Journal*, 12(1), 16-22. <https://doi.org/10.33365/jti.v12i1.38>

[3] Rifqo, MH (2019). INTRACAMPUS ORGANIZATIONAL INFORMATION SYSTEM AT MUHAMMADIYAH BENGKULU UNIVERSITY. *JSI: Journal of Information Systems (E-Journal)*, 11(1). <https://doi.org/10.36706/jsi.v11i1.7681>

[4] Pradana, MIW, & Mahendra, GK (2021). Analysis of the impact of Covid-19 on the tourism sector in the Pindul cave tourist attraction, Gunungkidul Regency. *Journal of Social Politics and Governance (JSPG)*, 3(2), 73-85. <https://doi.org/10.24076/JSPG.2021v3i2.623>

[5] Hasan, S., & Muhammad, N. (2020). Web-Based Study Fee Payment Information System at the Wiratama Polytechnic of Science and Technology, North Maluku. *IJIS-Indonesian Journal On Information System*, 5(1), 44-55. <https://doi.org/10.36549/ijis.v5i1.66>

[6] Syaifullah, M. (2017). Traffic Shaping Method at Layer 7 Protocol for Optimizing Computer Network Performance

Using Mikrotik. *Journal of Computer Science and Business*, 8(1), 1890-1898.

[7] Azizah, N., Yuliana, L., & Juliana, E. (2017). Design of Payroll Information System for Freelance Employees at PT Flex Indonesia. *Journal Sensi*, 3(1), 14-21. <https://doi.org/10.33050/sensi.v3i1.756>

[8] Zuraidah, E. (2020). Information technology governance audit using the COBIT 4.1 framework (in the PT Grace case study). *PROSISKO: Journal of Research Development and Observation of Computer Systems*, 7(2), 84-95. <https://doi.org/10.30656/prosisko.v7i2.2289>

[9] Darwis, D., & Pauristina, DM (2020). Information System Audit Using the Cobit 4.1 Framework as an Evaluation Effort for Data Processing at Bpk Penabur Vocational High School Bandar Lampung. *Scientific Journal of Information Technology Infrastructure*, 1(1), 1-6. <https://doi.org/10.33365/jiiti.v1i1.254>

[10] Winalia, W., Renaldi, F., & Hadiana, AI (2017, August). Information technology maturity level measurement using COBIT 4.1 at Jenderal Achmad Yani University. In the National Seminar on Information Technology Applications (SNATI).

[11] Andry, JF, Geasela, YM, Wailan, A., Matjik, BA, Kurniawan, A., & Junior, J. (2019). Use of COBIT 4.1 with domain me on an attendance information system (Case Study: XYZ University). *inform. Mulawarman J.Ilm. Computing Science*, 13(2), 97. <http://dx.doi.org/10.30872/jim.v13i2.1152>

[12] Andry, JF (2019). Information Technology Governance Using the COBIT 4.1 Framework at PT. Saftindo World. *Systemation: Journal of Information Systems*, 8(3), 329-340. <https://doi.org/10.32520/stmsi.v8i3.464>