Evaluation of Using Information Technology in STD Bali with ISO 20000 and COBIT5 Framework

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***Abstract*— The development and the use of information technology increased significantly must be balanced with the evaluation process to determine the standardization of technologies that are already running so it can be used as a reference for the future policy formulation. One way to evaluate is to audit. In this study, to discuss the evaluation of using information technology at the College of Design (STD) Bali. Its objective is to conduct an audit for using information technology in accordance with the standards of ISO 20000 and COBIT 5 framework. In ISO 20000 framework, the focus is on the process while in the Service Management Process meanwhile COBIT 5 framework is focused on the evaluation domain, likes Evaluate, Direct, and Monitor (EDM). When do the audit, the process begins with the collection of data through interviews and questionnaires with sources that have been determined in accordance with the domain and control objectives are consists students, faculty, and staff of STD Bali. Furthermore, in the process of data analysis, conducted several stages of the domain determination, determination of process control, determination of indicators, and the mapping of the level of maturity (maturity level). The conclusion of the process of evaluation of using information technology in STD Bali is on level 3, it defined where STD Bali application of information technology has done well and is already prevalent in all fields.**

Keywords*— *IT Governance, COBIT, ISO20000, Maturity level

I. INTRODUCTION

The uses of information technology are developing rapidly in today's digital era. Speed in extracting and sending the data is very dependable to help facilitate the work. Not least the world of education also needs information technology's role in it. Based on the importance of information technology so that it takes careful planning and implementation of optimal in order to achieve its objective by an agency. The role of information technology is very high should be balanced with the ability of management and proper arrangement so that information technology is able to meet all the needs of its users. As well, the need for academic services in the world of education [1] .

In the world of education, developmental enhancement of information technology in education services can be felt as well as in STD Bali. All business processes related to academic done with the help of information technology and computers, causing the use of information technology has become a claim. However, in the application of information technology sometimes there are various constraints / threats such as unpreparedness users in the face of information technology development, the limitations of supporting facilities, information technology, the network is not reliable, all leaked data, the data and information provided is inaccurate, improper use of information technology facilities , the level of availability of information technology, and procurement of high value information technology investment, but does not offset the value of benefits commensurate returns. All of these will affect the decision-making processes that affect the success in achieving its objectives [2].

According to the required evaluation of the using information technology to determine the level of using information technology in STD Bali. One of the evaluations that can be used is an audit. In the framework of the audit process required in accordance with auditing purposes. In this study, used two frameworks, they are ISO 20000 and COBIT frameworks 5. Combining both of them is expected to provide evaluation results more effective and efficient so it can be standard or level of information technology in STD Bali. In addition, the framework is expected to provide input that can be used for repair application of information technology in the future.

II. LITERATURE REVIEW

A. Audit of Information Technology

The audit is essentially a systematic and objective process of obtaining and evaluating evidence of economic measures in order to give the assertion/statement and assess how far economic actions are in accordance with the applicable criteria and communicating the results to the relevant parties [3].

While the audit of information technology is the process of collecting, and evaluating evidence to determine whether the information system has been maintaining the integrity of the data so that they can be directed to the achievement of

business goals effectively and efficiently use resources.

Essentially, an audit of information systems and information technology are stand alone and not part of the audit of the financial statements as necessary to check the level of maturity or readiness of an organization in managing information technology (IT Governance). The level of readiness can be seen from the information management, the level of awareness of all stakeholders about the current position and the desired direction in the future so that the information technology planning should be done more carefully[2] .

These are the following types of information technology audit.

a. System Audit
   The audit of a documented system to ensure it meets national and international standards
b. Compliance Audit
   To test the effectiveness of the implementation of policies, procedures, controls, and other legal elements.
c. Product / Service Audit
   To test a product or service is in compliance such as predetermined specifications and suitable for use.

B. The Rules that Used

Here is a list of rules that used in the audit of information technology.

1. *Law Decree No. 11 Year 2008 on Information and Electronic Transaction*
2. *Law Decree No. 14 Year 2008 on openness Public Information*
3. *Circular of the Minister of Communications and Information No. 05 / SE / M.KOMINFO / 07/2001 on Implementation of Information Security Governance*

C. ISO 20000 Framework

ISO 20000Framework is an audit framework that focuses on information technology management services and originally named BS. ISO 20000 is a standard BS15000 which is the first in the world for information technology management services in 2000 [4] .

The purpose of establishing ISO 20000 is to replace BS15000 which is topped for IT Service Management, Network. ISO 20000 is special because it is said to have a process that is almost similar such as ITIL, COBIT, and Six Sigma. Framework ISO 20000 certification and tended to be reserved for qualification personal level [5].

The main processes in ISO 20000 are five, they are Service Delivery Management, relationship, Release, Resolution, and control. In Fig.1 following a barrage of gam-process contained in ISO 20000.

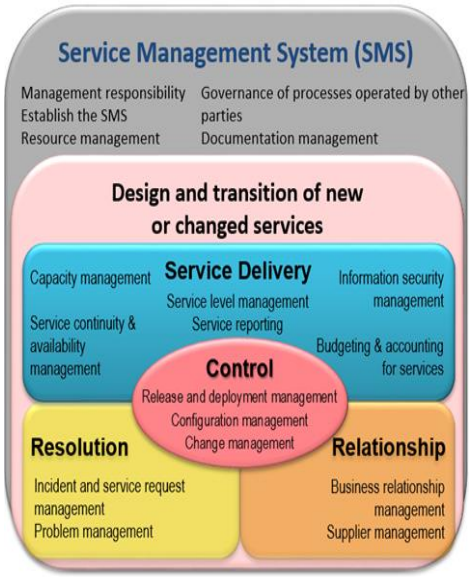

Fig.1 The audit process within the ISO 20000 framework but focus refractive votes only in the design and transition of new or changed services [6].

D. Framework COBIT 5

COBIT (Control Objectives for Information and Related Technology) is a methodology that provides a basic framework in according to the Information Technology organization [7].

COBIT is a set of documentations for IT Governance best practices that can help auditors, management, and users to bridge the gap between business risks, control needs, and technical issues.

COBIT is a framework that prepares to establish and implement IT Governance. Overall there are five domains and 37 processes control as in Fig.2 below.

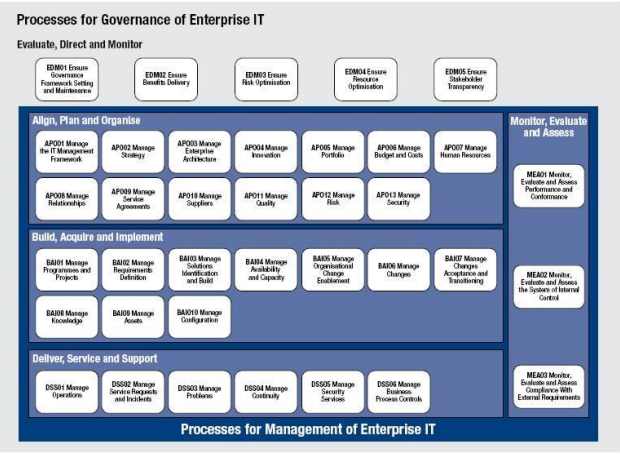

Fig 2. Process for Governance for Governance of Enterprise IT in COBIT 5 [7].

E. Maturity Model

Maturity is a maturity model for control processes using Information Technology assessment/scoring. The aims of Maturity models are.

a. Organization can find out where is the current maturity level
b. Organizations continuously and sustainably will seek to increase the level to the highest level so that governance aspects of the information technology can run effectively.

The scale used for assessment is a 0-5 scale, such as the illustration of Fig. 3.

Fig. 3 Maturity Scale models used for assessment in the audit process [1].

Table I. The following is an assessment of the maturity scale models.

TABLE I. RATING SCALE MATURITY MODEL [7].

0 – No Existent	The company does not care about the importance of information technology to be managed well by the management.
1 – Initial	The company reactively perform application and implementation of information technology in accordance with the needs of existing immediate needs without preceded by prior planning.
2 – Repeatable	The company has a pattern that repeatedly performed in the management of activities related to information technology governance but its existence not yet defined well and formal so is still inconsistency.
3 – Defined	The Company has formal and documented standard operating procedures that have been communicated to all levels of management and employees to comply the standard operating procedures in daily activities.
4 – Managed	The company has a number of indicators or quantitative measures that serve as targets and performance objectives for each implementation of information technology applications.
5 – Optimized	The Company has implemented information technology governance, which refers to the "best practice".

F. Relationship between IT Governance with ISO 20000 and COBIT 5

Based on literature review, there are some frameworks that refer to the management of IT Governance. The frameworks are COBIT 5 and ISO 20000.

Basically, two of the frameworks have the same goal in the management of information technology which each framework consists of a process. ISO 20000 is a framework that focuses on information technology management services and can operate at a low level. While the COBIT 5 support on risk management and connects the gap between control requirements and the technical problems in the business risk of IT Governance.

III. RESEARCH METHODOLOGY

A. Research Method

The used method in this research is a qualitative method. Qualitative method is investigated troubleshooting procedures by describing the situation of the subject or research objects like a person, institution, community, etc. Based on the actual situation at the moment, stages of doing a qualitative descriptive research is to identify problems, collect information actual and detail, making a comparison or evaluation of the problem, and determine what must do if the research found the same problem.

B. Location of Research

Location of this research is Sekolah Tinggi Desain Bali (STD Bali). This research is doing on November 9, 2016. And this research starting with interviews and distributing questionnaires to the Respondents who have been determined. The number of Respondents who participated in this research are 46 people.

C. Population and Sample

Based on the rules for a sampling of the population in the Cohen table in this study made the level of Respondents including of three levels are professors, employees, and students. The sample was taken directly from the Respondents related to information technology to be audited. The following Table II is a Cohen table that will use as a reference in the sampling process.

TABLE II. COHEN TABLE

Population	Confidence level 90 per cent			Confidence level 95 per cent			Confidence level 99 per cent		
	Confi-dence	Confi-dence	Confi-dence	Confi-dence	Confi-dence	Confi-dence	Confi-dence	Confi-dence	Confi-dence
30	27	28	29	28	29	29	29	29	30
50	42	45	47	44	46	48	46	48	49
75	59	64	68	63	67	70	67	70	72
100	73	81	88	79	86	91	87	91	95
120	83	94	104	91	100	108	102	108	113
150	97	111	125	108	120	132	122	131	139
200	115	136	158	132	150	168	154	168	180

Sampling using tables Cohen only need to consider the amount of the population. In this study, the number of samples that will be taken for lecturers are 14 from a population of 15 people, for the employees are 28 from the amount population 30 and for students are 44 from the amount average population of each department and each class is 50 people.

Based on a number of samples that have been determined it will carry out the data collection process in which only 16 Respondents from Employees, 9 Respondents from Lecturers., and 21 Respondents from students who want to answer the questionnaire.

D. Assessment Scales

Two type of assessment scales used in this research. There are Likert Scale and Guttman Scale.

Likert scale used for assessment of the audit process on COBIT5 framework because the Likert scale can use for measure attitudes, opinions, and one's perception of a situation. Likert scales that will be used are very good, good, fair, bad, and very bad.

Meanwhile, Guttman scale used to assess according to standardization of ISO 20000-1. Guttman scale is a scale that definite and clear where options of answer are yes, no, and not knowing. With Guttman scale, there will be no ambiguous answer from Respondents, so the results become more accurate.

The process of calculating the final Result of the audit process will meger from results of the Likert and Guttman scale so that the assessment process should be equated. In this case, the assessment will be equated Guttman scale where if yes then be rated 5 and will not be rated 0.

E. Data Collection Methods

Methods to obtain data that used in this research are using questionnaires and interviews. The questionnaires distributed to Respondents who have previously determined are lecturers, employee, and university students. Interviews were conducted with employees of STD Bali in order with the aim to know the state or standard of the information technology system at this time.

F. Data Analysis Methods

Methods of data analysis in this research in several stages, there are,

a. Domains Selection

In this stage will determine the domain of the two frameworks that used in the audit process. Although in IS0 20000 there is no domain but there are grouping the work process. In this study focused on work processes in Service Delivery Management for ISO 20000 and COBIT 5 for domain focused on Evaluate, Direct, and Monitor (EDM). The domain is selected according to with the analysis needed.

b. Determination of Process Controls

At this stage, it created a list of priorities for the process control contained in each domain that has been determined in previous stages. To get the priority control process created questionnaires that will distribution to Respondents are lecturers, staff, and students of STD Bali.

c. Determination of Performance Indicators

The performance indicators define how the process of information technology functions can be implemented properly to reach a goal. Determination of indicators based on control objectives from each framework is ISO 20000 and COBIT 5. In this research uses 16 control objectives from two frameworks including the following.

1. ISO 20000 Framework

Clause: Service Delivery Management.

4.1 Service Delivery
- 4.1.1 Capacity Management
- 4.1.2 Service Continuity and availability management
- 4.1.3 Service level management
- 4.1.4 Service reporting
- 4.1.5 Information Security Management

4.2 Control
- 4.2.1 Configuration Management
- 4.2.2 Change Management

4.3 Release
- 4.3.1 Release Management

4.4 Resolution
- 4.3.1 Incident Management
- 4.3.2 Problem Management

4.5 Relationship
- 4.5.1 Business Relationship Management

2. COBIT 5 Framework

Domain: Evaluate. Direct, and Monitor (EDM)

EDM01 – Ensure governance, framework setting, and maintenance
EDM02 – Ensure Benefits Delivery
EDM03 – Ensure Risk Optimization
EDM04 –Ensure Resource Optimization
EDM05 – Ensure Stakeholder Transparency.

d. Maturity Level Mapping

In this stage mapping maturity level of information technology application in STD Bali by adopting a standard maturity level from COBIT 5. In Table III is the value of maturity level that will be used.

TABLE III. MATURITY LEVEL

Range	Level	Explanation
0.00 – 0.49	Level 0	nonexistent
0.50 – 1.49	Level 1	Initial / Ad hoc

1.50– 2.49	Level 2	Repeatable but intuitive
2.50 – 3.49	Level 3	Defined
3.50 – 4.49	Level 4	Managed and measurable
4.50– 5.00	Level 5	Optimized

IV. RESULT AND DISCUSSION

Results of this research is the result of calculation based on the maturity level from each group of Respondents and domain process. Results will be divided based on the framework and will be merged at the end to be able to take a conclusion.

A. Result of ISO 20000 Framework

a. Capacity Management (4.1.1)

TABLE IV. RESULT OF CAPACITY MANAGEMENT

Respondents	**Maturity Index Values**	
	Index	**Maturity Level**
Lectures	2.992063	Level 3
Staff	2.5625	Level 3
Students	3.33333	Level 3
Average		2.96

Based on Table IV it can be seen that the maturity level from the Capacity Management process across the group Respondents said it was on level 3 with 2.96 Average values. It concluded that STD Bali in Capacity Management process is already at the level defined, which means STD Bali already has clear standards that have been socialized into all levels of management and employees to always be followed and carried in academic services every day.

b. Service Continuity and Availlability Management (4.1.2)

TABLE V. RESULT OF SERVICE CONTINUITY AND AVAILABILITY MANAGEMENT RESULT

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	2.54861	Level 3
Staff	2.80702	Level 3
Students	2.66667	Level 3
Average		2.67

In Table V it can be concluded that the service continuity and availability management is in level 3 that defined meaning STD Bali has run and socialized well into all levels of management and staff.

c. Service Level Management (4.1.3)

TABLE VI. RESULT OF SERVICE LEVEL MANAGEMENT

Respondents	**Maturity Index Values**	
	Index	**Maturity Level**
Lectures	3.166667	Level 3
Staff	2.74722	Level 3
Students	2.166667	Level 2
Average		2.33

In the assessment process of Service Level Management, there are differences between the results of the student Respondents with Lectures and Staff. Lectures and Staff agree that the service level management in STD Bali is in level 3 but Students said service level management at the level of 2 is repeatable that means STD Bali already has efforts to increase the use of information technology, but there are still some issues that have not able to be resolved and going inconsistency. But if looks average from all respondents is at level two, which means they need improvement in the process of Service Level Management.

d. Service Reporting (4.1.4)

TABLE VII. RESULT OF SERVICE REPORTING

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	3.3664	Level 3
Staff	3.3333	Level 3
Students	4.4444	Level 4
Average		3.71

In the process of reporting service, STD Bali is at level 4 if it is taken from average results of the overall assessment respondents. However, if the result of Respondents assessment viewed the Lectures and staff said that service reporting at the level 3 and according to the Students is in level 4. But in essence, it can be concluded that the service reporting in Bali STD has been running well.

e. Information Security Management (4.1.5)

TABLE VIII. RESULT OF INFORMATION SECURITY MANAGEMENT

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	3.065448	Level 3
Staff	2.8125	Level 3
Students	2.89474	Level 3
Average		2.92

In Table VIII shows that the entire Respondents agree that the Information Security Management in STD Bali is in defined position or level 3.

f. Configuration Management (4.2.1)

TABLE IX. RESULT OF CONFIGURASI MANAGEMENT

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	3.54762	Level 4
Staff	3.35132	Level 3
Students	2.37845	Level 2
Average		3.09

In the assessment of configuration management can view the difference from votes each group Respondents. Lectures said that configuration management at the level 4, while the staff is in level 3 and the Students is in level 2. This may be influenced by the level of understanding Respondents to the assessment domain. However, when taken Average it can be said that the configuration management in STD Bali is in level 3 is defined.

g. Change Management (4.2.2)

TABLE X. RESULT OF CHANGE MANAGEMEN

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	3.54167	Level 4
Staff	2.34375	Level 2
Students	2.14286	Level 2
Average		2.67

From the results of the audit process of change management can be said to occur a significant difference in assessment from lectures with employees and Students. The results can be seen in Table X. However, an average of assessment is still in level 3, which means defined.

h. Release Management (4.3.1)

TABLE XI. RESULT OF RELEASE MANAGEMENT

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	3.1746	Level 3
Staff	3.61111	Level 4
Students	2.85714	Level 2
Average		3.21

In the process of release management assessment like in Table XI, Students was not involved in it. So, students pass assessments on level 2. Meanwhile, staff gives the position at level 4 and Lectures provide a position at level 3. However, for the average of all respondents, release management is at level 3, which means defined.

i. Incident Management (4.4.1)

TABLE XII. RESULT OF INCIDENT MANAGEMENT

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	3.33333	Level 3
Staff	4.28571	Level 4
Students	5	Level 5
Average		4.21

In Table XII states that incident management gets different results between each respondent. Respondent Students give a value of 5, which means optimized, where the management of information technology in the management incident at STD Bali has entered into the category of best practice. However, the group respondent lectures provide level 3 and staffs give on level 4. From all respondents of the group, said that the management of incident management is already good, but each respondent has an opinion about the level of good.

j. Problem Management (4.4.2)

Problem management is an important part in the management of information technology. That can be seen from the assessment provided by the Respondent in Table XIII. Average assessment from respondents declared that the problem management in STD Bali is on level 2, which means STD Bali are still in the development or improvement of problem management.

TABLE XIII. RESULT OF PROBLEM MANAGEMENT

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	1.87652	Level 2
Staff	2.85714	Level 3
Students	2.22222	Level 2
Average		1.77

k. Business Relationship Management (5.5.1)

TABLE XIV. RESULT OF BUSSINESS RELATIONSHIP MANAGEMENT

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	2.91667	Level 3
Staff	2.29167	Level 2
Students	2.29167	Level 2
Average		2.23

In Table XIV shows the assessment of the business relationship management process that has been done by the STD Bali by respondents. Student and staff give an assessment on level 2 to the level of business relationship management in STD Bali, but the lectures give a level 3. However, if seen average from all the Respondents position STD Bali on business relationship management is at level 2 that means it is still in the development process.

B. Result of Framework COBIT 5

a. Ensure Governance, Framework Setting, and Maintenance (EDM01)

TABLE XV. RESULT OF ENSURE GOVERNANCE, FRAMEWORK SETTING, AND MAINTENANCE

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	2.3	Level 2
Staff	3.8875	Level 4
Students	3.752380952	Level 4
Average		3.31

In EDM01 domain, the assessment results can be seen in Table XV. Where the staff and students give an assessment on level 4 and the lectures give on level 2, but if done average of EDM01, it is in a level 3 that means defined.

b. Ensure Benefits Delivery (EDM02)

EDM02 assessment results can be seen in Table XVI wherein average assessment from the respondent is at level 3, that means defined.

TABLE XVI. RESULT OF ENSURE BENEFITS DELIVERY

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	2.375	Level 3
Staff	3.75	Level 4
Students	3.642857143	Level 4
Average		3.26

c. Ensure Risk Optimisation (EDM03)

TABLE XVII. RESULT OF ENSURE RISK OPTIMISATION

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	2	Level 2
Staff	3.625	Level 4
Students	3.380952381	Level 3
Average		3.002

Table XVII is the result from assessment EDM03. Where the lectures give a level 2, staffs give a level 4, and Students give a level 3. But when taken average of EDM03 the position is at the level 3, which means defined.

d. Ensure Resource Optimisation (EDM04)

TABLE XVIII. RESULT OF ENSURE RESOURCE OPTIMISATION

Respondents	Maturity Index Values	
	Index	Maturity Level
Lectures	2.28125	Level 2
Staff	3.9375	Level 4
Students	3.761904762	Level 4
Average		3.327

In Table XVIII is the result from assessment EDM04 where staff and students agreed to give a level 4 for EDM04, however, lectures give a level 2. Here, there is a difference of opinion among Respondents. However, if viewed from the role of lecture respondent should be more aware of assessment aspects in EDM04. But if taken an average from all respondents, it can be concluded that EDM04 is in level 3 that means defined.

C. Results of Merging ISO 20000 dan COBIT 5

The result of the merger ISO 20000 and COBIT5, aims to improve the quality of audits conducted on the use and management of information technology in STD Bali.In Fig.4 following a graphic the assessment evaluation of information technology used in STD Bali.

Fig 4 shows an intercourse between respondent assessment and also occurred differences in assessment so far. Such as in EDM01, EDM02, EDM03, and EDM04 occur common understanding between staff and lecture. And get similarly, in 4.1.4, 4.1.5, and 4.2.1 occurred common understanding between lectures and staff.

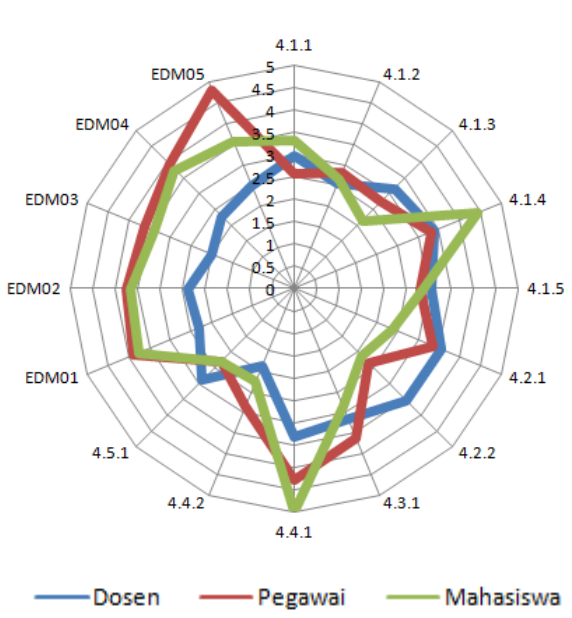

Fig 4. Diagram Maturity level from emerging ISO 20000 and Cobit 5 Framework.

From the similarities and differences Assessment due to differences in understanding, level of education, and connectedness with assessment factors. But an outline, the process of evaluation the Technology Information used in STD Bali is located on level 3 that means defined. So, can conclude that STD Bali own standard procedures on management of information technology, but still need to improvement and development to enhance the application of information technology on STD Bali.

V. RECOMMENDATION

Process solution is done by looking values the detail of each question. Why not based on Average? Because when it only focused on value average then distribution is uneven and a lot of little things that will be a miss if only attention on maturity level. The solution is intended to questions that have a value of <2.5.

Solutions and suggestions offered.

1. Construction of the park for supporting the use of IT
2. Upgrade the speed of Internet network
3. Development the website for each department
4. Development of an integrated information system
5. Construction of scheduling information system
6. The use of IT for class conference
7. Development e-thesis to upload the final project students
8. Improved the security login

VI. CONCLUSION

Generally, in the use of information technology in STD Bali is already well underway. Staff can run the system with regular jobs in the process. In the audit process, there are some findings that can later be used as a reference for determining the strategy in the next research, as should the addition of information technology devices, upgrading the speed of internet, the development of system scheduling, development of websites for each department, development parks internet, system construction integration, and the development of e-paper.

To provide solutions to the auditing process, the future required needs a trial schedule and periodic application in the organizational structure in the academic area in using this system. This can also maximize the use of information technology at STD Bali.

REFERENCE

[1] ISACA, *A Business Framework for the Governance and Management of Enterprise IT*. .

[2] R. K. Candra, I. Atastina, and Y. Firdaus, "Audit Teknologi Informasi menggunakan Framework COBIT 5 Pada Domain DSS (Delivery , Service , and Support) (Studi Kasus : iGracias Telkom University)."

[3] G. Principles, "Information Technology Audit," pp. 1–26.

[4] "Notulensi Pelatihan ISO 20000-1 : 2011," 2014.

[5] M. Utomo, A. Holil, N. Ali, and I. Affandi, "Pembuatan Tata Kelola Keamanan Informasi Kontrol Akses Berbasis ISO / IEC 27001 : 2005 Pada Kantor Pelayanan Perbendaharaan Surabaya I," vol. 1, no. 1, pp. 2–7, 2012.

[6] ISO, "ISO / IEC 20000 overview."

[7] ISACA, "cobit-5-introduction-plgr-53-638." .