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AUDIT OF ACCOUNTING INFORMATION SYSTEM USING COBIT 4.1 FOCUS ON DELIVER AND SUPPORT DOMAIN

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ABSTRACT

The audit is required at a university to evaluate the IT services on accounting information system. The audit of accounting information system at one of the universities in Indonesia aims to determine the maturity level of IT services in support the financial data management. Audit of accounting information system is very important because the university can determine the extent of IT services that has been given. In addition, the audit results can also be used as a reference for the future in improving IT services in accounting information system. Stages of accounting information system audit begin with choosing a domain which includes the identification of business goals, IT goals, IT process and control objectives using COBIT 4.1 framework. The next stage is to collect the necessary data through interviews and surveys using questionnaires. The data collected are then processed to obtain a maturity level. Results of audit of accounting information system that has been conducted show that the maturity index of the entire IT process is 2.69, which means the current level of maturity in 3-defined. The expected level of maturity is 4-managed. A comparison of the current and expected level of maturity to give rise the gap. Improvement strategy are given to overcome the gaps that appear based on the COBIT 4.1 framework and supported by ITIL V3 framework that has been through the mapping process using the COBIT 4.1 IT process.

Keywords: *Audit of Information System, COBIT 4.1, ITIL V3, Maturity Level, Gap, Improvement*

1. INTRODUCTION

The role of information technology within the university in Indonesia is very important, especially for a university that has the status as a BLU. Each university, which has status as a BLU required to manage financial data independently, systematically and accountable.

Financial data management that independent, systematic and accountable requires a good information technology governance [3]. Information technology governance as an integral part of a company that consists of the leadership, structures and organizational process ensures that information technology within the organization to continue and the organization is improve goals and strategies [2][4].

Audit of accounting information system needs to be done to improve the financial data management and to create an accountable financial report in accordance with accounting standard. Audit of accounting information system is also expected that IT services can provide effectiveness and efficiency in the future.

Audit of accounting information system focus on the delivery and support of IT services is to meet the needs and satisfaction of users. This audit is using two IT governance frameworks that is COBIT 4.1 and to supported by ITIL V3.

COBIT 4.1 is a framework for IT governance that includes planning, implementation, operation and monitoring of the entire process. COBIT 4.1 consists of 4 domains, namely Plan and Organise, Acquire and Implement, Deliver and Support, Monitor and Evaluate with 34 IT process in them [5][9][11]. ITIL V3 framework is a guidelines that provided the best practices for service management [6]. ITIL V3 consists of Service Operation, Service Transition, Service Design, Service Strategy and Continual Service Improvement [10].

COBIT 4.1 framework is used as a reference in determining the IT process and measure the maturity level of IT process. The poor current level of maturity made it necessary to determine an expected maturity level target, which give rise to gap. The gap that appear is used as a reference to determine improvement strategy.

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Improvement strategy are determined based on the COBIT 4.1 framework that is supported by ITIL V3 framework that has been through the mapping process of the IT process in COBIT 4.1 framework [7][12].

Audit of accounting information system using two frameworks provided a better audit results. In addition, weaknesses in accounting information system can be seen in more detail by using two frameworks that COBIT 4.1 and ITIL V3 [10].

Audit of accounting information system using are COBIT 4.1 framework which is used to measure the maturity level of IT services and ITIL V3 as a support in recommendations for improvement. The audit only focused on the 13 IT process in Deliver and Support domain COBIT 4.1 framework. Deliver and Support domain is more emphasis on the process of IT services, system security, training, data management and other of the accounting information system that has been used. While some people have also been conducted audits using IT governance frameworks such as COBIT, ISO 27000, ITIL, COSO and others [5][6][10].

2. AUDIT METHOD

The stages will be performed in audit of accounting information system is shown in Figure 1.

Figure 1: Stage of Audit Process

The initial stage in planning an audit is to determine the problem formulation, purposes and problem limitations. In the planning stage, literature study and university data collection are performed to support the audit process. The next step is selection of domain based on the COBIT 4.1 framework.

Selection of domain is conducted to choose the IT process that will be used in the audit. The IT process are obtained through the identification of business goals, IT goals, identification of IT process and identification of control objectives according to the COBIT 4.1 framework.

Data collection is conducted through interviews and surveys using questionnaires. Data were obtained from interviews and surveys using questionnaires then processed to obtain the maturity level of IT process.

Then the obtained IT process maturity level is analyzed. Afterwards the expected level of maturity is determined to see the level of maturity that has been achieved. Comparison of the current maturity level with the expected maturity level give rise to gap.

The gap that appears need to be overcome to provide improvement strategy. It is a step to achieve the expected level of maturity.

The providing of improvement strategy is based on the COBIT 4.1 and ITIL V3 framework that has been through the mapping process. After giving the recommendation, then the final stage of the audit process is the preparation of the final report of the audit results.

3. AUDIT MODEL

3.1. Questionnaire Draft of Maturity Level

Maturity level questionnaires are distributed to 29 respondents within the university. The selected respondents are respondents who have the duty and responsibility in the use of accounting information system.

The statement was designed based on the existing control objective in COBIT 4.1 IT process. Each IT process control objective has statement that describe how those controls are implemented and maintained [11]. Table 1 shown an example of control objective statement draft DS2.2 in IT process DS2.

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Table 1: Example of Control Objectives Statement Draft DS 2.2

Domain DS2 Managed Third-party Services Control Objective DS2.2 – Supplier Relationship Management		
No	**Statement**	**Value**
1	The involvement of the system developers, internal parties and users are very close in creating a high value system.	

Each respondent gives rating to the IT process control objective statement that has been determined. The rating of statements is necessary because any such statements are not of equal value in its application [1].

Table 2: The Rating of the Risk Assessment

Risk	**Value**
High	0,7 – 1,0
Medium	0,4 – 0,6
Low	0,1 – 0,3

The rating is determined from the implementation guidelines and level of importance to the organization. Statement that rated with high risk mean that the statement is very important to be done or implemented. Statement with medium risk rating do not have the threat as big as the high, but still need to be implemented as a precautionary measure. Low risk is not required to be applied, but if it is implemented will increase the performance of system [1].

After making the statement, then questions representing each control objective statement are made. Each statement does not always produced only one question, but it can be more than one as long as these questions can represent each statement [1][3]. Table 3 is contained question draft example that represent a control objective statement of DS2.2 in IT process DS2.

Table 3: Example of Question Draft Represent the Control Objective Statement DS2.2

Domain DS2 Managed Third-party Services Control Objective DS2.2 – Supplier Relationship Management								
No	**Question**	**Score**						
		0	**1**	**2**	**3**	**4**	**5**	
1	In what extent is the involvement of the system developers, internal parties and users in creating a high quality system?							

Each respondent provides an assessment of the question that represents the control objective statement by ticking (√) one score in accordance with the opinion of the respondent. Score of 0 means non-existents, a score value of 1 means the initial, score of 2 means repeatable, a score of 3 means defined, score of 4 means managed, score of 5 means optimized. Score values being used refers to the maturity level of the COBIT 4.1 framework described in Table 4 [11].

Table 4: COBIT 4.1 Maturity Level

Level	**Description**
0 (Non-existents)	Organization knew nothing about the issue to be solved. Each process or problem is not clearly defined.
1 (Initial)	The organization already has proof in identifying existing problems but needs to be directed. There i no standard process and the approach taken is ad-hoc.
2 (Repeatable)	Organization has a developed process. There is a procedure to run a defined process, there is no formal training and standard communication procedures.
3 (Defined)	The organization already has a standardized and documented procedure. The procedure has been well communicated through formal training. But at the implementation stage it depends on the individual whether to follow the established procedures or not. Procedure of the organization is not yet perfect but it is a mere formality on existing practice.
4 (Managed)	Organization monitors and measures the procedures and policies that have been effectively implemented. In the event of errors and irregularities, a series of procedures for corrective actions to be undertaken are already exist. Repair are carried out consistently and provide best practices and results. Automation and tools are used limited and fragmented.
5 (Optimized)	The conducted process has had improvement efforts at the level of continuous best practices that produces the best process and best results. The use of integrated information technology is already available there by automation can be done within the organization. A tool to improve the value and effectiveness is already exists thus the organization can well adapt.

3.2. Measurement of Maturity Level

The results of the questionnaire data processing are used as a benchmark to determine the maturity level of IT process. In Table 5, COBIT 4.1 maturity level assessment criteria are shown [11].

Table 5: COBIT 4.1 Maturity Level Assessment Criteria

Maturity Index	**Maturity Level**
0 – 0,50	*0 – Non-existents*
0,51 – 1,50	*1 – Initial/ad hoc*
1,51 – 2,50	*2 – Repeatable but Intuitive*
2,51 – 3,50	*3 – Defined Process*
3,51 – 4,50	*4 – Managed and Measurable*
4,51 – 5,00	*5 – Optimized*

The maturity level is determined in accordance with the COBIT 4.1 framework that provides company capability grouping in the management of IT process from level zero (non-

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existent) to level five (optimized). Each maturity level has a list of statements used as a guidelines in assessing the extent to which the process takes place in the company has fulfilled the statement [8][11]. The maturity level calculation is described as follows [1][2][6].

1. Calculation of the average value of each statement (if the statement is more than one).

$$\text{Total Rating} = \frac{(\text{Statement Rating 1}) + (\text{Statement Rating 2..n})}{\text{Total Statement}}$$

2. Calculation of the value score of each statement.

$$\text{Total Score} = (\text{Question Score 1}) + (\text{Question Score 2...n})$$

3. Calculation of the value score average of each statement.

$$\text{Value Score} = \text{Total Score} / \text{Total Question}$$

4. Calculation of the maturity level.

$$\text{Maturity Level} = (\text{Total Rating}) \times (\text{Value Score})$$

4. RESULT AND ANALYSIS

4.1. Determination of IT Process

Determination of IT process is performed through several phases. The initial stage is to align the vision, mission and purposes of the university in implementing the accounting information system to the business goals COBIT 4.1. Alignment conducted in order to obtain business goals COBIT 4.1. COBIT 4.1 framework has 17 business goals that are grouped based on the Balanced Scorecard [11].

Next, the related IT goals are associated with IT process contained in the COBIT 4.1 framework for obtaining IT process that will be used in audits of accounting information system. In Table 6 are shown the IT process used in the audit process.

Table 6: IT Process being Used

IT Process	Description
DS1	Define and Manage Service Levels
DS2	Manage Third-party Services
DS3	Manage Performance and Capacity
DS4	Ensure Continuous Service
DS5	Ensure Systems Security
DS6	Identify and Allocate Costs
DS7	Educate and Train Users
DS8	Manage Service Desk and Incidents
DS9	Manage the Configuration
DS10	Manage Problems
DS11	Manage Data
DS12	Manage the Physical Environment
DS13	Manage Operations

Based on the selection of a domain that has been done, an audit of accounting information system focus on the Deliver and Support domain that consists of 13 IT process based on COBIT 4.1 framework.

4.2. Analysis of Current Maturity Level

Analysis of IT process maturity level on Deliver and Support domain is conducted based on the COBIT 4.1 framework to determine the current level of maturity in the accounting information system. The questionnaire calculation results for the entire IT process distributed to 29 respondents can be seen in Table 7.

Table 7: Current Maturity Level of IT Process

IT Process	Current Maturity	
	Value	Level
DS1 Define and Manage Service Levels	2,80	3-*Defined Process*
DS2 Manage Third-party Services	2,67	3-*Defined Process*
DS3 Manage Performance and Capacity	2,86	3-*Defined Process*
DS4 Ensure Continuous Service	2,75	3-*Defined Process*
DS5 Ensure Systems Security	2,76	3-*Defined Process*
DS6 Identify and Allocate Costs	2,52	3-*Defined Process*
DS7 Educate and Train Users	2,68	3-*Defined Process*
DS8 Manage Service Desk and Incidents	2,71	3-*Defined Process*
DS9 Manage the Configuration	2,60	3-*Defined Process*
DS10 Manage Problems	2,61	3-*Defined Process*
DS11 Manage Data	2,65	3-*Defined Process*
DS12 Manage the Physical Environment	2,76	3-*Defined Process*
DS13 Manage Operations	2,62	3-*Defined Process*
Maturity Level Average	**2,69**	**3-*Defined Process***

In Table 7 is shown that the average level of maturity is 2.69 so that the condition of the current level of maturity is in 3-defined. The maturity level of 3-defined is a condition in which the accounting information system already has standardized and documented procedures. The procedure has been well communicated through formal training but at the implementation stage it depends on the individual whether to follow the established procedures or not.

4.3. Analysis of the Current and the Expected Maturity Level

COBIT 4.1 framework has a measure of maturity level ranging from 0 (non existents) to 5 (optimized) [8][11]. Target level of maturity IT process gradually determined by looking the current level of maturity that is in the 3-defined. It

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is also based on the purpose, vision and mission of the university to be achieved in implementing the accounting information system. Comparison of the current level of maturity with the expected level of maturity is shown in Table 8.

Table 8: IT Process Gaps

IT Process	Maturity Level		
	Current	Expected	Gap
DS1 Define and Manage Service Levels	2,80	4	1,20
DS2 Manage Third-party Services	2,67	4	1,33
DS3 Manage Performance and Capacity	2,86	4	1,14
DS4 Ensure Continuous Service	2,75	4	1,25
DS5 Ensure Systems Security	2,76	4	1,24
DS6 Identify and Allocate Costs	2,52	4	1,48
DS7 Educate and Train Users	2,68	4	1,32
DS8 Manage Service Desk and Incidents	2,71	4	1,29
DS9 Manage the Configuration	2,60	4	1,40
DS10 Manage Problems	2,61	4	1,39
DS11 Manage Data	2,65	4	1,35
DS12 Manage the Physical Environment	2,76	4	1,24
DS13 Manage Operations	2,62	4	1,38

Table 8 is shown that the expected level of maturity is 4-managed. Maturity level of 4-managed is a condition where it is possible to monitor and measure compliance to procedures and policies of accounting information system. If an error occurs when using the accounting information system, a series of procedures for improvement actions to be undertaken is available. Improvement are performed consistently and provides to practices and best results.

Graphic representation of the current level of maturity with the expected level of maturity is shown in Figure 2.

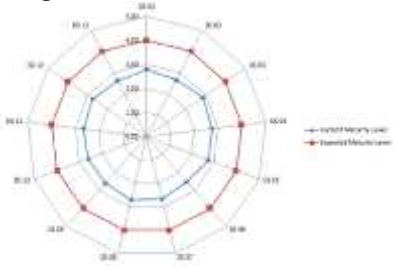

Figure 2: Current and Expected Maturity Level Chart

The graph in Figure 2 is shown that the IT process in the Deliver and Support domain are at the current level of maturity is 3-defined and have not reached the expected level of maturity in 4-managed, thus causing the gap. Recommendations for improvement should be provided to overcome the that arise gaps so that the expected level of maturity is the maturity level 4-managed can be achieved.

4.4. Improvement Strategy based on COBIT 4.1 and ITIL V3

Recommendations are provided to overcome the gaps refer to the COBIT 4.1 and ITIL V3 frameworks. Improvement strategy are also supported by ITIL V3 framework through mapping process using COBIT 4.1 IT process. COBIT 4.1 framework mapping with ITIL V3 is presented in Table 9 [12].

Table 9: COBIT 4.1 and ITIL V3 Mapping

COBIT 4.1 IT Process	ITIL V3 Process
DS1 Define and Manage Service Levels	• SD 4.2 Service level management
DS2 Manage Third-party Services	• SD 4.2.5.9 Develop contracts and relationships • SD 4.7 Supplier management
DS3 Manage Performance and Capacity	• SD 4.3 Capacity management • SO 5.1 Monitoring and control (performance monitoring)
DS4 Ensure Continuous Service	• SD 4.5 IT service continuity management • SO 4.6.8 IT service continuity management
DS5 Ensure Systems Security	• SD 4.6 Information security management • SO 5.13 Information security management and service operation
DS6 Identify and Allocate Costs	• SO 4.6.7 Financial management for IT services
DS7 Educate and Train Users	• SO 5.14 Improvement of operational activities
DS8 Manage Service Desk and Incidents	• SO 4.2 Incident management
DS9 Manage the Configuration	• ST 4.3 Service asset and configuration management
DS10 Manage Problems	• SO 4.4 Problem management
DS11 Manage Data	• SD 5.2 Data and information management • SO 5.2.3 Backup and restore
DS12 Manage the Physical Environment	• SD App E Environmental architectures and standards • SO 5.12 Facilities and data centre management
DS13 Manage Operations	• SO 5.1 Monitoring and control • SO 6.4 IT operations management

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Based on the COBIT 4.1 and ITIL V3 frameworks mapping process, recommendations will be given to overcome the gaps that arise so that the expected level of maturity is in 4-managed can be achieved. ITIL V3 framework is an IT governance guidelines that provides the best practices service management. Improvements strategies towards maturity level 4-managed are shown in Table 10 [11][13][14][15].

Table 10: Improvements Strategies Based on COBIT 4.1 and ITIL V3

Improvements strategies towards level 4 COBIT 4.1	**Improvements strategies towards level 4 ITIL V3**
DS 01	SD 4.2
• It is necessary to measure and assess the IT services based on defined criteria effectively. • It is necessary for an analysis of the causes of the problems in the service were not fulfilled.	• There are plans to increase IT services that is run effectively. • There is policies and procedures are always followed. • There are SLA and OLA are used as a guidelines in managing IT service levels.
DS 02	SD 4.2.5.9 and SD 4.7
• Has the policies and procedures established to manage the relationship between services with system developers effectively. • There is an agreement of all the parties involved to monitor the IT services provided by the system.	• There are monitoring results reported from developer system effectively. • There are plans to run of IT services to improve the services to be provided by the system developer.
DS 03	SD 4.3 and SO 5.1
• It is necessary to monitor the performance and capacity so that if not enough can be overcome with established procedures. • It is necessary for reporting of performance and capacity that is used to support the passage of effective IT services.	• There are a plans the availability of performance and capacity are defined to improve the IT services. • There are monitoring and reporting the availability of IT services are conducted to effectively.
DS 04	SD 4.5 and SO 4.6.8
• Responsibility and plan of IT service continuous contained in the contract that has been set. • Monitoring of IT services effectively to ensure and improve IT service continuous.	• There are records about the use of IT services that serve as a reference in ensure continuous service. • There is a risk management according to ITIL V3 framework. • There are policies and procedures for continuous services. • There is a continuous service plan to be implemented in the future to support the improvement of IT services.
DS 05	SD 4.6
• Has the security policies and procedures are established and implemented effectively. • It is necessary for testing, monitoring and reporting to lead to improved levels of security effectively.	• There are policies and procedures of IT security that must be adhered and understood. • There is IT security audit be done effectively. • There is a setting user access rights in IT service management. • There is a security testing of IT services.
DS 06	SO 4.6.7
• It is necessary to understand the accountability of IT services costs. • Has the policies of IT services cost allocation are set so that the use of funds does not deviate. • It is necessary for monitoring and evaluating the cost of IT services to prevent irregularities costs. • Has the evaluation report on the cost of IT services effectively.	• There is a cost allocation policies for IT services that according to user needs. • There are reports of the use of IT service costs. • There is an evaluation of the budgeted costs and expenses that have been used.
DS 07	SO 5.14
• Education and training are performed effectively to develop the IT services to suit the user's needs and developing technology. • It is necessary to classify the duty and responsibility of the user to take part in education and training. • It is necessary to monitor the program are given in the education and training effectively.	• There are measurements through operational audits. • There is a responsibility of each staff of the given task. • There are problems management that have a lot of improvement solutions. • There are education and training that conducted and monitored effectively. • There is a measurement of the results of education and training which aims to enhance education and training in the future.
DS 08	SO 4.2
• It is necessary to handle the incident in accordance of established responsibilities and standards. • It is necessary to train the service desk staff to be able to handle the problem/incident that appears effectively.	• There is a procedures to identification and classification of the incident/problem. • There are diagnosis and investigation of IT services to effectively.
DS 09	ST 4.3
• It is necessary for monitoring, tracking and reporting on configuration file storage effectively.	• There is a configuration management policies to adhered and understood. • There are monitoring

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	and reporting to the configuration management.
DS 10	SO 4.4
• Responsibility in solving problems. • It is necessary to recording and reporting identifying the problem effectively. • It is necessary for the integrated management of problems through communication among staff involved in solving problems.	• There is a detection of problem according to the standard ITIL V3. • There is a problem categorization . • There are records of problems that arise. • There is a detection of problem during system development.
DS 11	SD 5.2 and SO 5.2.3
• It is necessary to manage data in accordance with the duties and responsibilities. • It is necessary to monitor the management of data such as back up and restore data effectively.	• There is a strategy to restore and backup data. • There is the responsibility of the administrator to manage the data. • There is a data management process to manage data assets.
DS 12	SD App E and ST 3.1
• Has the security procedures of environment and physical that is used to control access the environments and hardware . • It is necessary to monitor the environment and physical access.	• There is access limitation to the environment and physical . • There is agreement against any person who will access the environment and physical. • There are monitoring and reporting to the environment and physical.
DS 13	SO 5.1 and SO 6.4
• It is necessary to monitor the computing resources and tasks assigned. • It is necessary to document the tasks and schedules that are owned by the staff to the management of IT and business can more easily monitor the operations.	• There is a record of operations carried out effectively. • There are monitoring and recording of notifications that appear. • There is monitoring of the operation so that if a problem occurs can be taken improvement action.

5. CONCLUSION

The conclusion of the audit that has been done is an audit of the accounting information system includes audit planning, the selection of the domain consists of identifying the business goals, IT goals, IT process and control objectives, data collection, processing and analysis of data, improvement strategy and preparation of an audit results of final report. Audit of accounting information systems focus on the domain Deliver and Support with 13 IT process contained in it. The measurement of the maturity level using is COBIT 4.1 framework. The maturity level of IT process is at the maturity level of 3-defined and the expected level of maturity is 4-managed to give rise the gap. The improvement strategy given to overcome the appear gaps are based on COBIT 4.1 supported by ITIL V3 framework.

6. FURTHER RESEARCH DIRECTION

The audit results are expected to be used as a reference in developing and improving IT services in accounting information system in the future. The audit of accounting information system in the future is also expected to not only focus on IT process in the Deliver and Support domain but also the entire IT process contained in the COBIT 4.1 framework. The expected maturity level must also be increased to the maturity level of 5-optimized which is the highest maturity level in the COBIT 4.1 framework. The next audit it is also expected to be able to use some of the IT governance framework as comparison.

REFERENCES :

[1] Uma Sekaran, “Metodelogi Penelitian Untuk Bisnis”, Jakarta: Salemba Empat, 2006.
[2] Gondodiyoto, “Audit Sistem Informasi Lanjutan”, Jakarta : Mitra Wacana Media. 2007.
[3] Sarno Riyanarto, “Audit Sistem dan Teknologi Informasi”, Surabaya : ITS Press. 2009.
[4] HM Jogiyanto and Wily Abdilah, “Sistem Tata Kelola Teknologi Informasi”, Yogyakarta : Andi. 2011.
[5] Maria Yulita Putu Dita, I Made Sukarsa and I Ketut Adi Purnawan, “Assesment of COBIT Maturity Level with Exixting Conditions from Auditor”, International Journal of Computer Science and Information Security (IJCSIS), Vol. 10, No. 6, 2012.
[6] Diema Hernyka Satyareni and Fia Mahanani, “Audit Sistem Informasi Akademik Perguruan Tinggi XYZ Menggunakan Kerangka Kerja COBIT 4.1”, Seminar Nasional Aplikasi Teknologi Informasi (Yogyakarta), 2014. ISSN: 1907-5022.
[7] Gusti Ayu Theresia Krisanthi, I Made Sukarsa and I Putu Agung Bayupati, “Governance Audit of Application Procurement Using COBIT Framework”, Journal of Theoretical and Applied Information Technology (JATIT), Vol. 59, No. 2, 2014.

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

[8] I Gusti Ayu Dian Sasmita Ratih, I Putu Agung Bayupati and I Made Sukarsa, "Measuring the Performance of IT Management in Financial Enterprise by Using COBIT", I.J. Information Engineering and Electronic Business (IJIEEB), Vol. 6 No. 1: 15-24, 2014.

[9] Riza Afriza Islami, I Made Sukarsa, I Ketut Adi Purnawan, "Information Technology Governance Archetype in an Indonesian University", TELKOMNIKA Indonesian Journal of Electrical Engineering, Vol. 12, No. 7, 2014.

[10] Samir Bahsani, Abdelaali Himi, Hassan Moubtakir and Alami Semma, "Towards a Polling of ITIL V3 and COBIT", International Journal of Computer Science Issues (IJCSI), Vol. 8, Issue. 6 No. 2, 2011. ISSN (Online): 1694-0814.

[11] IT Governance Institute Team, "COBIT 4.1", United States of America: IT Governance Institute, 2007.

[12] IT Governance Institute Team, "COBIT Mapping; Mapping ITIL V3 with COBIT 4.1", United States of America: IT Governance Institute, 2008.

[13] Office of Government Commerce (OGC), "ITIL version 3 Service Design", The Stationery Office - TSO, London, 2007.

[14] Office of Government Commerce (OGC), "ITIL version 3 Service Operation", The Stationery Office - TSO, London, 2007.

[15] Office of Government Commerce (OGC), "ITIL version 3 Service Transition", The Stationery Office - TSO, London, 2007.