

AUDIT MODEL DEVELOPMENT OF ACADEMIC INFORMATION SYSTEM: CASE STUDY ON ACADEMIC INFORMATION SYSTEM OF SATYA WACANA

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ABSTRACT

Higher Education in Indonesia has not had a specific model of basic framework yet to build and audit an academic information system. In addition, monitoring and assessment of academic information system performance has not been done periodically and also handled based on complaints of working units. Audit model development of academic information system using Control Objective for Information and related Technology (COBIT) will facilitate Higher Education to measure its complete performance. By COBIT framework, this study resulted an audit model of academic information system which consists of the general audit model, the framework of audit model, and the audit steps of academic information system. The developed model is a basic framework to audit an academic information system. For further study, the developed model needs to be enlarged so that it will be able to be implemented to other institutions' and also becomes a general model for auditing widely academic information system.

Keyword: Academic Information System, Auditing, COBIT

INTRODUCTION

Information System (IS) is an asset for an organization when it is well managed, since it will provide advantages to compete and increase a successful chance of business. In order to manage this, IS should be controlled because controlling provides an adequate assurance to management that IS has been running according to organizational plan and objective. Any controlled process requires a measurement to indicate IS performance in achieving the goals of control and facilitates management to make performance improvement of IS. IS auditing is a form of IS measurement. One of IS auditing standards that combines views of business and Information Technology (IT) within its framework is COBIT (Control Objectives for Information and Related Technology). COBIT contains general control standards that can be accepted and implemented internationally.

Higher Education Institutions also take an advantage of IT in performing academic services as their main activity. An academic organization has its own unique characteristics, so a form of required IS also has its own characteristics. However, Higher Education in Indonesia has not had a specific model of basic framework yet to build an IS Academic (Mutyarini and Sembiring, 2006).

Indrajit (2008) stated that the usage of technology in educational institutions is based on stakeholders' demands. Higher education also has relationships with other entities, which are new entrants, suppliers, competitors, customers, and substitutes in order to perform its function as providers of education. Higher education manages these entities, so that organizational goals that are set out in the vision and mission can be achieved.

Satya Wacana Christian University (SWCU) is one of the universities, which has already used IT as an infrastructure and facility to provide services to students, lecturers and all staff, and also assist the running of activities around work units. In carrying out its main activity which is to provide educational services, SWCU has supported by IT of Satya Wacana Academic Information Systems (SIASAT).

Previous research on performance measurement of SIASAT found some facts that the success of SIASAT in providing information quality was not satisfactory for students. Although for one factor of timeliness, students were very satisfied while other factor of standardization and understandability they were not (Haryani and Pranoto, 2006). Haryani (2008) also found that students expressed dissatisfaction on SIASAT, while students understanding and participation was also considered low. In addition, the initial observation had found out that monitoring and assessment of SIASAT performance has not been done periodically and also human errors have often occurred. As a result, monitoring and assessment will be only handled based on complaints of working units.

To overcome problems related to SIASAT, SWCU ought to carry out IS auditing for SIASAT. Maniah and Surendro (2005) stated that IS auditing should be executed periodically to ensure continuity of IT operations and assess suitability of planning and implementation of system. Based on the importance of conducting regular IS auditing, this research results a model of Academic IS audit which can be used by auditors to audit SIASAT by refer to the COBIT framework.

LITERATURE REVIEW

Information System Auditing

Ron Weber (1999) argued that Information systems auditing is the process of collecting and evaluating evidence to determine if a computer system safeguards assets, maintain data integrity,

allow organizational goals to be achieved effectively, and use resources efficiently.

COBIT

Control Objective for Information and related Technology, abbreviated COBIT, is designed as a tool of IT Governance to help in understanding and managing of risks, benefits and evaluation related to IT. COBIT Standards has issued by the IT Governance Institute which is part of ISACA (Information System Audit and Control Association). COBIT guidelines consist of several directives, which are Control Objectives, Audit Guidelines, and Management Guidelines.

To provide information needed for companies to achieve organizational goals, the basic principles of COBIT describes:

1. Business requirements

It relates to effectiveness, efficiency, confidentiality, integrity, availability, compliance, reliability of information (Reliability of Information).

2. Process orientation

IT Domains

- Plan and Organise
- Acquire and Implement
- Deliver and Support
- Monitor and Evaluate

IT Processes

- IT strategy
- Computer operations
- Incident handling
- Acceptance testing
- Change management
- Contingency planning
- Problem management

Activities

- Record new problem
- Analyse
- Propose solution
- Monitor solution
- Record known problem
- Etc.

3. IT resource

Such as data; application system; technology including hardware, operation system, database management system, networking, and multimedia; facility; human including expert staff, awareness and productivity to plan, organize or carry out, acquire, deliver, support and monitor information systems services.

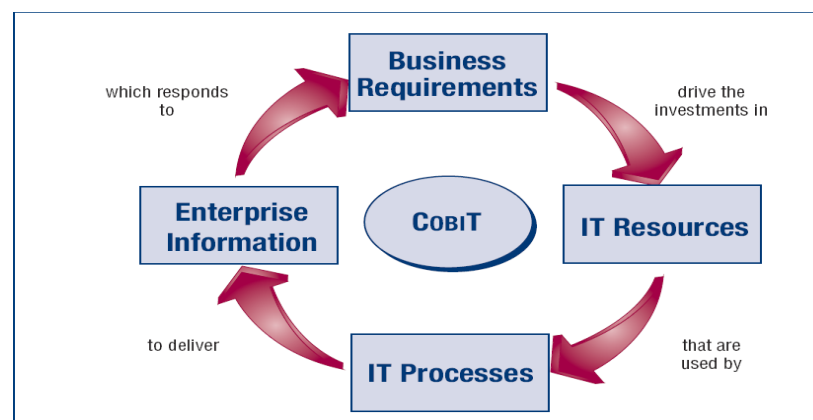


Figure 1. The Basic Principles of COBIT (Source: ISACA, 2004)

COBIT framework consists of 34 high-level control objectives in which each IT process is

grouped into four main domains: Planning and Organization (PO), Acquisition and Implementation (AI), Delivery and Support (DS), and Monitoring (M).

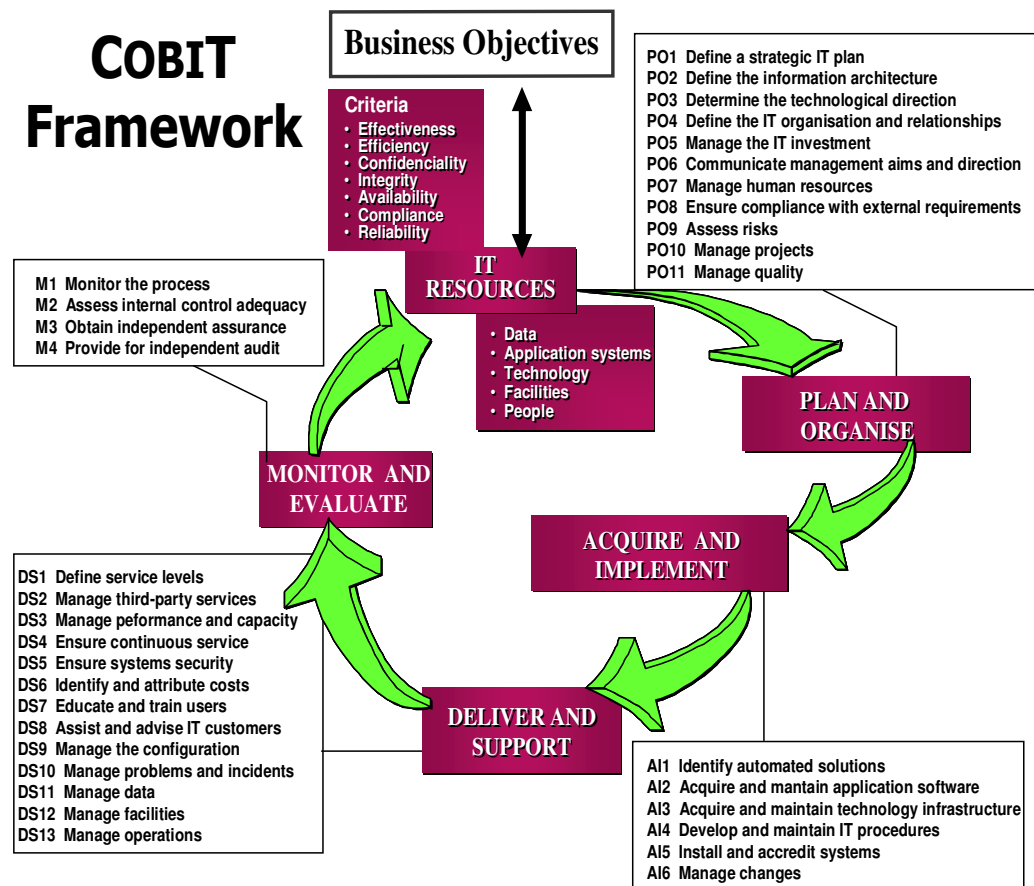


Figure 2. COBIT Framework (Source: ISACA, 2004)

IT COBIT Process will define Critical Success Factor (CSF), which will be used as constraints to determine performance measurement criteria for each process. Performance measurement criteria are symbolized by its indicators, namely Key Goal Indicator (KGI) and Key Performance Indicators (KPIs). CSF and indicators that are related are determined by COBIT. Defining CSF and KPI of an information system is prepared so that activities are carried out under control to provide assurance that the objectives of IT processes is reached.

Previous Researches

Previous studies related to IS for higher education, among other is a study conducted by Mutyarini and Sembiring (2006). The result of this study was a model of IS architectural for higher education by referring to The Open Group Architecture Framework (TOGAF), and Control Objectives for Information and related Technology (COBIT). The model was created by adapting architecture principles of Monash University which has built its academic information system using TOGAF. Besides, COBIT framework is not only used to design IS architecture but also to measure IS architecture performance.

Setiawan (2008) also conducted a research of IT implementation using a sample of 50 private universities in Yogyakarta. The research found that IT implementation using the COBIT framework provides benefits in business architecture, information architecture, technology architecture and solution architecture as a guideline for IS development in private universities in Yogyakarta. The

study also found that maturity level of IT implementation of private universities in Yogyakarta was influenced by service quality through a criteria value distribution professionally.

The study of Maniah and Surendro (2005) stated that IS audit plays an important role for organization since it is a measurement form of whether IS performance in organization fits with the business plan and objective or not. In addition, this study stated that IS audit should be run periodically to ensure continuity of IT operation used. The study offered a model of IS audit to assess the process of information services delivered in the aircraft industry using COBIT framework since it loads up a generic control and can be set in a proper IS characteristic of company/organization.

Julianita (2009) on Academic IS audit of School of Informatics Management and Computer Engineering (STIKOMP) Surabaya which used COBIT standard 4.0 of Deliver and Support domain found: (i) Academic IS has performed almost all IT activities and has a maturity level of 1.46 which means that IT management of academic is repeatable but intuitive; (ii) Analysis of control objectives domain Deliver & Support (DS) has indicated that DS5 and DS11 have a high level of importance. It has been associated with the maturity level of DS11 that below from the standard of Information Systems Audit and Control Association (ISACA). So that the processes associated with its sub-domains need to be considered, managed and monitored.

Previous studies related to Academic IS among others are by Haryani and Pranoto (2006) in which performance is measured based on satisfaction level of students. This study used samples of 263 Professional Program students of SWCU. By factors of standardization, understandability and timeliness, SIASAT performance in information quality provision was unsatisfied, although students were very satisfied on timeliness. Haryani (2008) also measured SIASAT performance based on students' understanding and participation, with a sample of 387 students from all faculties at SWCU. Research concluded that understanding and participation directly affect students' satisfaction of SIASAT. Students expressed dissatisfaction with SIASAT, while understanding and participation of students were considered low.

RESEARCH METHODOLOGY

This research was a combination of descriptive study that describes the actual phenomenon in an event or population, and exploratory research that develops a model of Academic IS audit by a "Research and Development" approach, which was a research program that is followed up by the development program. Model of IS audit was developed by systematic steps in a process of action, reflection, evaluation, and innovation by applying the method of survey research, development, experiment, and evaluation.

The location of this study, Satya Wacana Christian University Salatiga Indonesia, was chosen on purpose. Primary data of this study was the results of guided interviews and observation. While secondary data such as documents, reports and policies related to SIASAT was gathered by documentation study.

The steps of this study are as follow:

a. Preliminary studies

In the initial study, there were preliminary research on previous studies, literature and standards that support the research topic, guided questionnaire drafting, and SIASAT understanding.

b. Data collection

At this stage, the data was obtained by interview, observation, and questionnaires given to the relevant units and users of SIASAT. The secondary data is also collected from related units of SIASAT.

c. Framework development of audit model of IS

At this stage, framework development of audit model of IS was managed by interviews, observation and related documents to state parameters and Critical Success Factor (CSF), which will be used as constraints to determine criteria of performance measurement of SIASAT based on COBIT.

d. Establishment of audit steps of IS

At this stage, an audit step of SIASAT was established based on COBIT.

e. Conclusions and recommendations

In the final stage of this research, a conclusion and suggestions from all research processes were stated.

RESULT AND DISCUSSION

Audit Model of SIASAT

Pyle (2003) stated the development of the audit model will refer to one of audit modeling which developed based on its components, among others are business processes along with correct data. Audit model of SIASAT was developed by 2 stages: to develop a framework of audit model of IS and to establish audit steps of IS (figure 3).

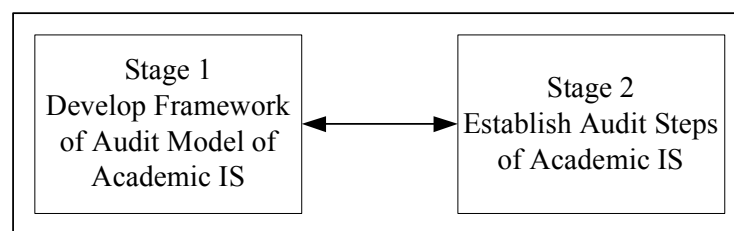


Figure 3. General Audit Model of Academic Information System

Framework of Audit Model of SIASAT

Framework of audit model of academic IS consists of several interconnected parameters, among others are (a) internal business processes of higher education, (b) functions related to outside of higher education, (c) stakeholders related to information management of higher education, (d) basic framework methodology of IT, (e) information systems requirements related to academic activities. These parameters are expected to be factors to determine an observed academic information system performance. Then how these parameters can be controlled and regulated, in order to obtain a desired system performance.

Internal business processes of higher education is started when potential students enroll, new students register, attending courses, until graduation. Parameters of related outside functions of educational institutions, such as controlling function performed by the government as the highest policy holders in the education system of Indonesia who should be able to make a breakthrough so that every higher education will have no trouble in holding or accessing various technology infrastructure.

Related to stakeholders parameters of academic IS, the research of Indrajit, 2008 stated that stakeholder type in IT context of higher education, among others are (1) Parents or the elderly who sponsor students for attending higher education. IT paradigm as a source of knowledge will be one of the main criteria used by them in determining their choice. (2) Students who attend in a higher education will assess the education quality through various IT applications used by teachers since it is a characteristic of modern education. (3) Foundation or owners of higher education would allocate financial resources to be invested in various IT applications development as part of transformation of education running. (4) Teachers who will be recruited by a higher education should have competency and expertise in usage and utilize computers and other related technology equipment. (5) Employees at higher education should be skilled at using various IT applications to support their daily tasks and activities in managing various terms and requirements related to teaching-learning process. (6) Head of higher education who has the highest responsibility in services delivery effectiveness should be able to bring about analysis, monitoring, and evaluation of institution process. Therefore, the head will require a number of IT applications to support these strategic activities.

Methodology parameter of IT framework used in this study was based on the result of previous research on performance measurement SIASAT, which found facts that SIASAT success in providing information quality was not satisfactory for students, although one of the factors of Timeliness which students were very satisfied, while factors of Standardization and Understandability were not (Haryani and Pranoto, 2006). Research of Haryani (2008) also found that understanding and participation directly affects student satisfaction of SIASAT. Students expressed dissatisfaction of SIASAT, while understanding and participation of students was also considered low. In addition, the initial observation had found out that monitoring and assessment of SIASAT's performance has not been done periodically and also human errors have occurred often. Because of monitoring and assessment will be only handled based on complaints of working units. Based on the previous reasons, this study only focused on model designing of academic IS audit using IT methodology of COBIT, especially for domain of Delivery and Support (DS). This domain, concentrate on service process provided by IT system.

For parameter of IS requirements related to academic activities of higher education consists of information about admission, student registration, course registration, grade and graduation. Admission information consists of information regarding enrollment of prospective new students which covers registration process, data inputting, photo taking, selection, announcement of selection result, printing of Rector Decree about new admission and information regarding re-signing up includes taking an acceptance letter, registration payment, informing a bank payment receipt, filling out a registration form, and obtaining student's number. IS need related to student registration among others include providing information about types of registration, information of procedures, requirements and student registration deadline. Student registration is an activity of registration or recording of active-status as the University's student and must be done by students each semester.

Course registration is a subject registration process as a participant of course in current semester. Subject registration process includes academic supervision, financial (dispensation), internet, course registration schedule of study program/department. IS ought to provide information related to grade of subject for each student and each semester which will be presented either in a

study result card or an academic transcript. As for graduation activities, IS should provide information includes registration, graduation ceremony, and diploma delivery

The relationship between five parameters in model designing of Academic Information Systems audit can be seen in Figure 4.

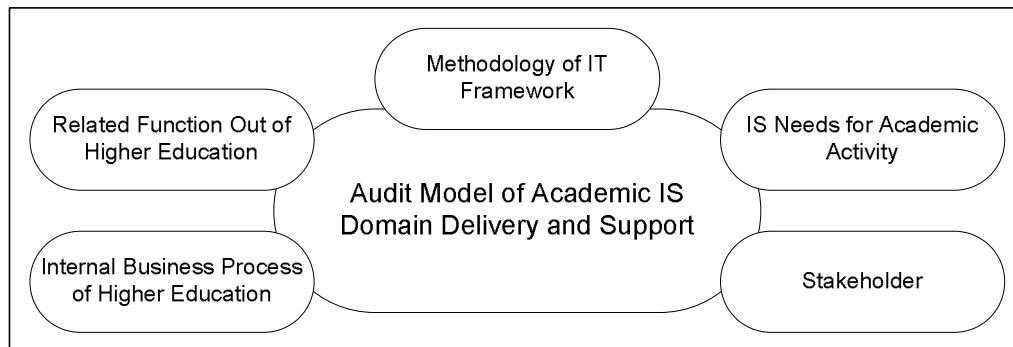


Figure 4. Five Parameters in Audit model of Academic Information Systems

Those processes identified Critical Success Factor (CSF), which will be used as constraint to determine the performance measurement criteria for each process. Based on direct observation of SIASAT, if connected with function of SIASAT in delivering services, CSF of SIASAT is as follows (1) Individual impact and information use, (2) Service quality, (3) Quality system and (4) Information quality.

The main focus of IT COBIT processes for each level in the domain of delivery and support (DS) will be described as follows:

- DS1 Define and manage service levels

The main focus of DS1 is to identify service requirements, service level approval, and to monitor each quality service achievement.

- DS2 Manage third-party services

The main focus of DS2 is to build bilateral relationships and responsibilities with third party service providers and to monitor quality service delivering to verify and ensure compliance of determined agreements.

- DS3 Manage performance and capacity

The main focus of DS3 is to meet response time requirements of service quality approval, to minimize downtime, and to create building of capacity and sustainable IT performance, through monitoring and measurement.

- DS4 Ensure continuous service

The main focus of DS4 is to provide sustainable IT services which require developing, maintaining, and testing of continuous IT planning as well. Effective and sustainable of service process minimizes likelihood and impact of main interruption of IT service on business processes functions.

- DS5 Ensure systems security

The main focus of DS5 is to define policy, procedure, and IT security standards, and to monitor, detect, report, and resolve vulnerabilities and security incidents.

- DS6 Identify and allocate costs

The main focus of DS6 is a complete representation of complete and accurate IT costs, a fair cost allocation system approved by business users, and reporting systems of cost allocation and IT usage on time.

- DS7 Educate and train users

The main focus of DS7 is to clarity of IT training needs for users, implementation of effective training strategy and measurement of training output.

- DS8 Manage service desk and incidents

The main focus of DS8 is to provide a professional service desk function with quick response, procedures clarity, and also settlement and trends analysis.

- DS9 Manage the configuration

The main focus of DS9 is to establish, to maintain accuracy and completeness of storage configuration, and to compare it with existing asset configuration.

- DS10 Manage problems

The main focus of DS10 is to record, to track, and to resolve operational problems, to investigate root causes for all existing problems, and to define a solution for identification of operating problems.

- DS11 Manage data

The main focus of DS11 is to maintain completeness, accuracy, availability, and protection data.

- DS12 Manage the Physical Environment

The main focus of DS12 is to provide and to maintain appropriate physical environment to protect IT equipment from access, interference, or theft.

- DS13 Manage operations

The main focus of DS13 is to meet each level operational service activities for processing scheduling of data, protecting sensitive output as well as supervision and maintenance of infrastructure.

The critical factors relevant to the IT COBIT processes have been mapped in Table 1 below.

Table 1. CSF in IT COBIT Process

Critical Success Factor (CSF)	TI COBIT Process
<i>Individual Impact and Information Use</i>	<ul style="list-style-type: none"> • DS3 <i>Manage Performance and Capacity</i>
<i>Service Quality</i>	<ul style="list-style-type: none"> • DS4 <i>Ensure Continuous Service</i> • DS8 <i>Manage Service Desk and Incidents</i>
<i>System Quality</i>	<ul style="list-style-type: none"> • DS5 <i>Ensure Systems Security</i> • DS7 <i>Educate and Train Users</i> • DS11 <i>Manage Data</i> • DS12 <i>Manage the Physical Environment</i> • DS13 <i>Manage Operations</i>
<i>Information Quality</i>	<ul style="list-style-type: none"> • DS11 <i>Manage Data</i> • DS13 <i>Manage Operations</i>

Relation between IT process of COBIT and IT process of SIASAT has shown in Table 2 below.

Table 2. Relation between IT process of COBIT and IT process of SIASAT

IT Process of COBIT \ IT Process of SIASAT	Admission	Student Registration	Subject Registration	Grade	Graduation
DS3 <i>Manage Performance and Capacity</i>	X	X	X		
DS4 <i>Ensure Continuous Service</i>	X	X	X	X	X
DS5 <i>Ensure Systems Security</i>	X	X	X	X	X
DS7 <i>Educate and Train Users</i>	X	X	X	X	X
DS8 <i>Manage Service Desk and Incidents</i>	X	X	X	X	X
DS11 <i>Manage Data</i>	X	X	X	X	X
DS12 <i>Manage the Physical Environment</i>	X				
DS13 <i>Manage Operations</i>	X	X	X	X	X

Description: Mark "X" denotes IT process COBIT (column 1) related to IT process of SIASAT (column 2 to column 5) which are associated to admissions, student registration, subject registration, grade and graduation.

Example of DS8 – it serves to help giving advice users, either to candidate students, Bureau of Academic Administration or faculties who related to SWCU. Admission process will record and store data of candidate students, selection result, the Rector's Decree on new student admission and information regarding candidate student registration which is stored by student's number. Then system will provide information to user, who has already accepted in a certain faculty and what their name are, and how many new students who have done registration and who have not which will be followed-up by faculty so that candidate student will soon make registration.

Framework of Audit model of SIASAT figured is as follow.

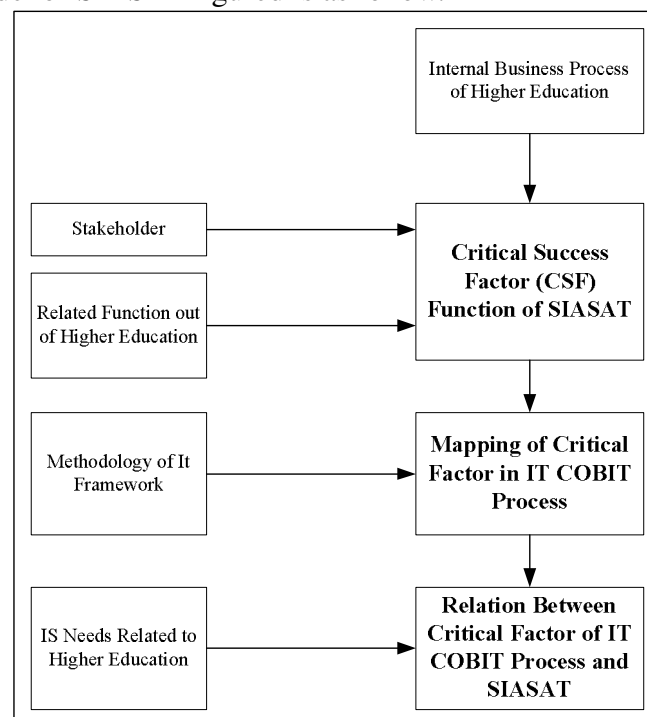


Figure 5. Framework of Audit model of SIASAT

Audit Steps of SIASAT by COBIT

According to framework of audit model of SIASAT, which has been prepared before, audit of academic IS was conducted by assessment approach which separated assessment process into several interconnected steps as follow:

a. Planning Phase

At this stage, management determines assessment scope and purpose on academic IS to be communicated to auditor. This is useful for auditor to find out COBIT domain which will be audited. Then, auditor will perform data collection such as policy and rule of university's head related to services and procedures of academic that construct academic SI to understand business process of educational institution. After that, auditor will design audit program. Audit program includes scheduling of outline audit work, design effective audit procedures in assessment process, determination of staff and time which required in audit work running.

b. Preparation Phase

At this stage, auditor will make audit model of academic IS by determining COBIT Control Objective, determining Critical Success Factor (CSF) function of Academic IS and determining relation between CSF function of Academic IS and COBIT Control Objective and academic IS. Based on these relationships, auditor will design a questionnaire and purpose of any question related to internal control of Academic IS as an audit scope. Respondents of questionnaire is an IT division as a creator and developer of Academic IS and also management including university's , deans, head of study program, academic administration and financial administration as users of Academic IS.

Auditor also set assessment standard as a control tool in academic IS performance assessment. Standard-setting refers to COBIT assessment.

c. Implementation Phase

At this stage, audit process is conducted according audit program which has been prepared at planning stage by conducting interviews, observations, reviews of documentation and dissemination of questionnaires to defined respondents. Auditor will perform data questionnaire processing which was completed by respondent to result maturity level of Academic IS. It will be presented in a table and web graph by using Microsoft Office Excel. Then, data analysis and control objectives were derived from maturity level, and to perform gap analysis and recommendations Academic IS audit results. All results will be documented in working paper audit.

d. Phase Completion assessment

At this stage, auditor will make reporting of audit results to be submitted to management.

CONCLUSION

Auditing has played an important role to increase the performance of an academic information system in Higher Education. Audit model development of academic information system using COBIT facilitates Higher Education to measure its complete performance.

By COBIT framework, this study resulted an audit model of academic information system which consists of the general audit model, the framework of audit model, and the audit steps of SIASAT. The developed model is a basic framework to audit an academic information system. For further study, the developed model needs to be enlarged so that it will be able to be implemented to other institutions' and also becomes a general model for auditing widely academic information system.

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