

Incident Management of Information Technology in the Indonesia Higher Education based on COBIT Framework: A Review

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Abstract

Nowadays, implementing the IT management in Indonesia Higher Education (HE) has been an integral part of institution management and all business functions, starting from teaching & learning, academic information system, administration & payment system, registration of student's admission and so on. Handling incident response is an IT management and evaluation activity that must be done by the HE in Indonesia. Because, this activity is used to control the business sustainability and help perform attempts of betterment. To this matter, a standardized guideline is required so that the management of handling incidents in the HE environment can be performed effectively and efficiently. COBIT framework version 4 has four domains with 34 processes, while the version 5 has five domains with 37 processes. The process of handling incidents in COBIT 5 is discussed in the DSS02 process, namely Manage Service Request, and Incident of DSS domain. Meanwhile, COBIT 4 is discussed in the DS8 process, namely Manage Service Desk and Incidents. This paper reviews the status of management of handling IT incidents in Indonesia HE limited from 2010 to 2016.

Keywords: Management of Handling IT Incidents, COBIT Framework, Higher Education

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1. Introduction

Information Technology (IT) has been massively implemented in many Higher Education (HE) institutions in Indonesia as a medium for improving competitiveness [1] and to take a role in encouraging the accomplishment of mission, vision, and objectives of the HE, and to become one of the main components in entering the global era which is then indicated by the term of the world class university as well as network of cooperation with domestic and overseas institutions of the HE. The university is a business organization which moves in education field [2].

There are three domains of the IT utilization in Indonesia HE, namely as support services of (1) administration, (2)

teaching media and (3) information-communication. The administrative computation aims at facilitating in managing archives, handling received letters and a making of reports, covering the college payment of entrance fee and regular registration in every semester for fresh students, and other aspects unrelated to data processing and finance. As teaching media, the IT is used to support teaching and learning processes such as for developing blended learning, e-learning, virtual learning, and other platform variations. As a part of information-communication, it is used as a medium for announcing profile, achievements and internal activities in the campus on the website or e-magazine of the corresponding campus, for sharing information regarding scholarships, for improving the surveillance system of learning activities and achievements from students, guardianship, and many more. When implementing them, it

takes two main components, the first one is management, as to the extent of participation in the management of the IT and business. The second one is the organizational structure, as according to the organizational strategic plan and the management model of the IT.

Two things, when combined, are forming a management “framework” of the IT in which every organization is free to form the framework as necessary, but it should refer to the widely accepted standards [3]. Based on the evaluation, according to [4], the framework mostly used by the HE institutions in the evaluation of the IT is COBIT. Such framework has reached the version 5 which is the continuance of the previous one [5].

The COBIT as an acronym for Control Objectives for Information and Related Technology is a framework developed by International Technology Governance Institute (ITGI) with its base in the United States of America. The principles of the framework are briefly to meet the requirements for business development [6], to be representative and comprehensive, which then includes issues of planning, implementing, operation, and surveillance to the whole processes of the IT [7]. A review [8] of this framework shows that it has a simple but powerful characteristic. COBIT version 5 is the renewed version of its predecessor as shown in Figure 1.

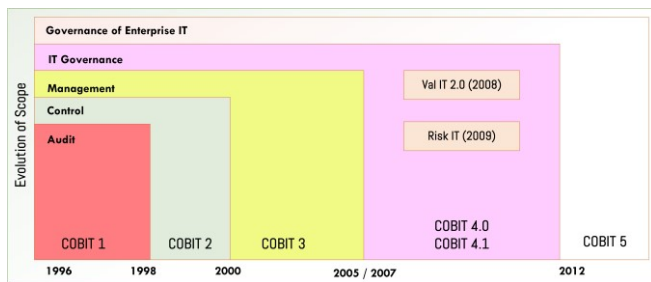


Figure 1. COBIT framework version

The benefits of COBIT 5 are that it can maximize the utilization of IT by maintaining the stability between optimizing the identification of risk level and the resources used thus it can bring the benefit into reality [9], this framework can comprehensively unite various managements, therefore this framework can bridge any business risks, the need to control the IT, and several technical issues related to the IT [10]. The COBIT framework version 4 has 4 (four) key domains used to conduct an IT audit. Meanwhile, the newer version, COBIT 5, has 5 (five) key domains. Not to say that all these components are to be implemented; it depends on the conditions in every institution of the HE, for instance, to the extent of infrastructure supports, internal structure of institution and etc.

In relation with the utilization of the IT in the environment of the HE, the *Delivery and Support* (DS) as well as the *Deliver, Service and Support* (DDS) domain are one of key

domains to maintain the sustainability of a business institute, for it is significantly related with the handling of potential risks/ incidents within the IT, such as virus attack to computers of administration division resulting in the corrupted data or interrupted services to students, the main website of the corresponding campus being hacked which potentially blocks the flow of information, and other kinds or examples of incidents. The domain is also expected to be able to handle such related incidents in order to ensure the smooth flow of networking or internet in the campus environment. In order to make the handling incidents effective and efficient, the attempts for time, resources and cost must be executed in an organized way and guided by the IT framework.

The COBIT framework framework consists of three parts: (1) focus on functional planning of audit procedures; (2) conduct the audit to investigate the current condition of IT management; (3) conduct the audit to investigate the as is condition as a fundamental for performing refinement in the future provided with the recommendation; and for framework/ model development by incorporating other factors. With reference to the description above, this paper attempts to analyze the second and third points. This paper will later contribute to examination or delineation of management status of the IT in several HE Institutions in Indonesia, to be measured based on COBIT framework, especially in the DS and DSS domain which is related with handling the IT incidents. Secondly, this paper is aimed to identify the technique of recommendation submission to be more optimal in managing IT utilization in the future provided with the as-is condition revealed.

This paper is a literature study in which the sources are obtained from scientific documents, *i.e.* journals, conference papers or final projects in related with IT audit using COBIT framework, especially in DS and DSS domains.

2. Basic Theories

2.1 The IT Incidents in HE Institutions and Cause

In the application of the IT, incidents may happen both expected and unexpectedly manifested in various forms, ex. malware or computer virus dissemination, email spams or email bombs, DoS attack, data bugging, network intrusion, etc. Such incidents might be caused by technical factors which are initiated from activities from certain parties, who were only curious (for fun). The most common mechanisms used to cause such incidents of the IT in addition to the email, *i.e.* *spamming* and *mail bomb*, or by social engineering.

A successful HE Institution usually can understand the use of IT and is able to take economic advantage of it and also manage any occurring risks. A COBIT framework provides services to help identify the main source of the IT,

investigate the needs for business, help organize activities of the IT into a common model process, identify and define targets of management control to be a matter of consideration [1]. This way, the campus can generate fine quality of education and education services because all processes of utilizing the IT can run well, from the very beginning point of entering the university to all administration processes until the student’s graduation [11].

2.2. COBIT version comparison

Control Objective for Information and Related Technology (COBIT) is a framework considered as the best practice standard manual of management of the IT for an organization [12]. COBIT is developed by *Information System Audit and Control Association* (ISACA) from 1996 with its first version, COBIT 1. During its development, COBIT has experienced several evaluations and improvements until 2005, COBIT 4 was launched with the focus on governance, which was then revised and became COBIT 4.1 in 2007, and then in June 2012, the renewed version, COBIT 5 was launched. The focus on this renewed version is governance enterprise.

There are several differences between COBIT 4.1 and COBIT 5, especially in the domain division and the working processes [13]. In the framework of COBIT 5, there is a distinct separation. Such separation may provide better

facilitation to institutions which are willing to distinctively separate its management and regular operational processes [14]. The main purpose of management in COBIT is to give its users value of “how to realize advantages or benefits,” and “how to optimize risks and resources”. In the standard of COBIT, several principles are defined to guide IT management, as shown in Table 1. It shows that the process of incident handling in COBIT 4 is discussed at DS8 in the DS domain, which is *Manage Service Desk and Incidents*. Meanwhile, such term in COBIT 5 is discussed in DSS02 process of *Manage Service Request and Incident* in DSS domain that is managed by the management.

The strengths of discussing the COBIT in incident handling is that of the explicit control and that it is defined strictly in all process goals, risks and security, and that the assignment and responsibility of the organization’s stakeholders are made more explicit using the mapping of *Responsible, Accountable, Consulted and Informed* (RACI). Additionally, the process evaluation which determines the degree of capability from such incident handling may facilitate the stakeholder being responsible for the incident in repairing the weaknesses form such incident handling. Furthermore, the weaknesses of COBIT are that the explanation of the process of handling the incident is less detailed, such as the principle and the stages of incident settlement.

Table 1. The domain comparison of COBIT version 4 [15] and COBIT version 5 [12]

COBIT 4		COBIT 5	
Planning and Organization (PO)		APO (Align, Plan and Organise)	
PO 1	Define a Strategic IT plan	APO 01	Manage the IT Management Framework
PO 2	Define the Information Architecture	APO 02	Manage strategy
PO 3	Determine Technological Direction	APO 03	Manage Enterprise Architecture
PO 4	Define the IT process, organization and Relationship	APO 04	Manage Innovation
PO 5	Manage the IT Investment	APO 05	Manage Portfolio
PO 6	Communicate Management Aims and Direction	APO 06	Manage Budget and Cost
PO 7	Manage IT Human Resources	APO 07	Manage Human Relations
PO 8	Manage Quality	APO 08	Manage Relationships
PO 9	Asses and Manage IT Risks	APO 09	Manage Service Agreements
PO 10	Manage Projects	APO 10	Manage Suppliers
		APO 11	Manage Quality
		APO 12	Manage Risk
		APO 13	Manage Security
Acquisition and Implementation (AI)		BAI (Build, Acquire and Implement)	
AI 1	Identify Automated Solutions	BAI 01	Manage Programs and Projects
AI 2	Acquire and Maintain Application Software	BAI 02	Manage Requirements Definition
AI 3	Acquire and Maintain Application Infrastructure	BAI 03	Manage Solutions Identification and Build
AI 4	Enable Operation and Use	BAI 04	Manage Availability and Capacity
AI 5	Procure IT Resources	BAI 05	Manage Organisational Change Enablement
AI 6	Manage Changes	BAI 06	Manage Changes
AI 7	Install and Accredited Solutions and Changes	BAI 07	Manage Changes Acceptance and Transitioning
		BAI 08	Manage Knowledge
		BAI 09	Manage Assesments
		BAI 10	Manage Configuration
Delivery and Support (DS)		DSS (Deliver, Service and Support)	
DS 1	Define and Manage Service Levels	DSS 01	Manage Operations
DS 2	Manage Third-Party Services	DSS 02	Manage Service Request and Incidents
DS 3	Manage Performance and Capacity	DSS 03	Manage Problems
DS 4	Ensure Continuous Service	DSS 04	Manage Continuity
DS 5	Ensure Systems Security	DSS 05	Manage Security Services
DS 6	Identify and Allocate Costs	DSS 06	Manage Business Process Controls

DS 7	Educate and Train Users		
DS 8	Manage Service Desk and Incidents		
DS 9	Manage the Configuration		
DS 10	Manage Problems		
DS 11	Manage Data		
DS 12	Manage the Physical Environment		
DS13	Manage Operations		
Monitoring and Evaluation (ME)		MEA (Monitor, Evaluate and Assess)	
ME 1	Monitor and Evaluate IT Performance	MEA 01	Monitor, Evaluate and Asses Performance and Conformance
ME 2	Monitor and Evaluate Internal Control	MEA 02	Monitor, Evaluate and Asses the System of Internal Control
ME 3	Ensure Regulatory Compliance	MEA 03	Monitor, Evaluate and Asses Compliance with External Requirements
ME 4	Provide IT Governance		
		EDM (Evaluate, Direct and Monitor)	
		EDM 01	Ensure Governance Framework Setting and Maintenance
		EDM 02	Ensure Benefits Delivey
		EDM 03	Ensure Risk Optimisation
		EDM 04	Ensure Resource Optimisation
		EDM 05	Ensure Stakeholder Transparency

3. Methods

As mentioned in Introduction, this work is the literature study in which the sources of literature are obtained from documents of study findings gathered from journals, conference papers or Final Projects within the last 6 years (2010-2016). This paper contains status of several Indonesia HE in terms of handling incidents of IT within their campus environment and measured based on COBIT Framework and on techniques of arranging recommendations from every institution referring to COBIT Framework (both in the version 4 and 5).

4. Results and Discussion

In this part, we discuss the Implementation in Indonesia’s HE Institutions. The study of using COBIT framework has been massively done in a HE institution in which later the study finding can be made as a recommendation for bettering IT management as well as for giving the best solutions for improving the performance of human resources [11].

Table 2 and Table 3 consists of 5 (five) columns, namely: the references cited written in numbers, the research subjects and instrument for data collection, the addressed COBIT domains, study findings and technique of recommendation arrangement. This paper is not intended to describe the weaknesses of each studies mentioned, especially the method of recommendation arrangement.

Reviewing the discussion on Table 2 and Table 3, we can see that the framework of COBIT is one of the models considered appropriate for evaluating IT management in the business process of the Indonesia HE institution. The result of the study is the institution’s condition at that time, which in other words, such condition might change right now and even better considering that the IT penetration within the campus environment is getting

sharper and the demand for a better quality of human resources is ever increasing to be more advanced. Moreover, a new policy has been issued regarding the need for reorganizing management for the optimization of IT use. Nevertheless, the author is incapable of showing any corresponding evidences because the literature obtained has not shown the gradual study outcomes. Meaning that, a typical study is done in different ranges of time in order to investigate the improvement in the findings. To achieve that, it should be done only by the same researchers using the same instruments thus the findings can be representative.

Furthermore, it can be observed that the version 4 is used more frequently due to the year when the studies were conducted. The applications of COBIT 5 for IT audit in HE institutions are only found after 2013, only a year after its launch. On the other hand, COBIT 4 was launched earlier in 2007, in which the IT use is still on-going or even has just started the penetration in campus environment in Indonesia (use of internet network, computerized administration, and etc.) which makes it worth more uses. Other factors causing the number of COBIT audit applied in HE institutions might highly be dependent on the willing of researchers to conduct IT assessment in the campus environment. The most contributing studies come from study findings for theses of bachelors and masters as well as final projects. However, the topics under investigation are not limited to only campus environment but also to enterprises, or other nonprofit or institutions. Such issue becomes one of the factors of limited literature to be reviewed for this paper. About determining the respondents, several of the researchers use random sampling technique by taking several respondents (referring to RACI chart or not) who they thought are related or associated with IT management or knowledgeable. RACI is an acronym for *Responsible* (the executor of duties), *Accountable* (the person responsible in its eventual and rightful to make decisions), *Consulted* (the person to communicate with), and *Informed* (the person informed about the process development, or decisions or measures taken). One of the

respondents is the one having an important function in one of the divisions within an organization, and that person should be the head or the representative.

Recommendation is made in order that IT can be exploited optimally, especially in managing incidents occurring within the internal environment thus they can assure the smooth flow of IT use in the environment. The

IT audits in HE institutions have been conducted by the corresponding researchers accordingly with the research objectives. It may be done to a larger sample, such as more than 10 HE institutions in a certain area. Not only that the researchers investigate the maturity level but also arrange the recommendation, thus it is more appropriate to be applied in a campus environment, both at a faculty or university scale.

Table 2. The implementation of COBIT 5 covering the DSS 02 subdomain

Ref.	Research subjects and instrument for data collection (year)	The addressed domains	Study findings	Technique of recommendation arrangement
[16]	<p>Directorate of SISFO <i>i-Gracias Telkom University</i> (2015)</p> <p>Questionnaire, interview following RACI chart have been mapped with the structure of organization in the Tel-U and field survey.</p>	<p>COBIT 5.0</p> <p>Specific on DSS (<i>Deliver, Service and Support</i>)</p> <p>DSS 01 until DSS 06</p>	<p>The DSS 02 subdomain is for managing service demands and managing incidents reach the scale 4 (<i>Managed</i>).</p> <p>While the overall <i>capability level</i> based on the overall means from DSS 01 until DSS 06 is at 3 (<i>defined</i>), meaning that most activities in DSS domain for the Directorate SISFO Telkom University have been performed, using the application standard in implementing such process, documented and the communication has run well.</p>	<p>The audit is done by collecting evidences of the existing condition within the environment of DSS domain that is from DSS 01 until 06 obtained from the source of information (the selected respondents).</p> <p>The recommendation withdrawal gap analysis obtained from the achieved target level (<i>To Be</i>).</p>
[17]	<p>The library of STMIK Potensi Utama Medan (2014)</p> <p>A questionnaire is distributed to 20 respondents with the question referring to COBIT 5.0:</p> <ul style="list-style-type: none"> • 2 librarians, • 1 IT staff, • 1 administration staff, • 2 academic staff, • 2 financial staff, • 3 heads of study programs, • 3 secretaries of study programs, • 6 students. 	<p>COBIT 5.0</p> <ul style="list-style-type: none"> • EDM (01,03, 04) • APO (01,13) • BAI (04, 01,10) • MEA (01,02) <p>DSS (001, 002, 004), namely:</p> <ul style="list-style-type: none"> - 01: <i>Manage operations</i> - 02: <i>Manage service request and incident</i> - 04: <i>Manage continuity</i> 	<p>The <i>maturity level</i> for DSS domain in the open source-based library auto system is 3.133 (with DSS02 = 3.05), while the proprietary based one is 3.31 (with DSS02 = 3.2).</p> <p>The overall value for <i>open source</i> is 2.9923 and <i>proprietary</i> is 3.0423. This calculation is obtained from the total average of the five domains. In other words, both systems have achieved <i>defined level</i>.</p> <p>The study findings conclude that the library auto system that is considered appropriate for the corresponding campus is the <i>proprietary</i> based, although the discrepancy of the two is mere 0,05</p>	<p>The study objective is to conduct audit of the two library auto systems which have been used for two years in the campus since 2010, namely open source and proprietary based system.</p> <p>The comparison for measurement outcome of the <i>maturity level</i> from the two systems becomes the standard of determining which of the two systems is more appropriate.</p>
[18]	<p>Politeknik Sekayu (2013)</p> <p>Two questionnaires are distributed to 45 respondents:</p> <ul style="list-style-type: none"> • 30 employees as informants for <i>maturity levels</i> • 15 employees for <i>awareness</i> <p>Validity test and reliability test are done in this study.</p>	<p>COBIT 5.0</p> <ul style="list-style-type: none"> • EDM (01 - 05) • APO (01 - 13) • BAI (01 - 10) • DSS (01 - 06) • MEA (01 - 03) 	<p>The researcher made the standard for the to-be <i>maturity level</i> is 5 for all domains from the two kinds of questionnaire.</p> <p>The study reveals that the as is condition of IT management for DSS domain is 1.87, while the management awareness is 4.27</p> <p>On the other hand, the average from all domains is at level 2, which means <i>repeatable but intuitive</i>. The gap between the current condition and the to-be one is still large.</p> <p>Next, the mean of management awareness test has reached 4.20 (of the to-be condition at 5), meaning that most respondents agree that the processes defined in the IT management (in this case is the COBIT framework) is important.</p> <p>Upon knowing the as is condition and the awareness of the importance of standardized management, it is expected that evaluation and correction is immediately conducted during the process of achieving level 5.</p>	<p>The study objective is to investigate the as is condition, and then is to identify whether the standard of COBIT in IT management is crucial.</p> <p>There are two kinds of questionnaires, one contains questions which refer to COBIT 5.0 and the questionnaire of management awareness to obtain descriptive understanding about the scope of IT management needed and required in the development of IT management.</p> <p>The recommendation is proposed implicitly through the management awareness test. It means that the researchers arrange the recommendation from the distributed questionnaire and implicitly state it to the respondents through that closed questionnaire.</p>

Table 3. The implementation of COBIT version 4.0 and 4.1 covering the DS 8 subdomain

Ref.	Research subjects and instrument for data collection (year)	The addressed domains	Study findings	Technique of recommendation arrangement
[19]	<p>Universitas Riau (2013)</p> <p>The questionnaire is distributed randomly to functionaries, lecturers and staff related to IT, the samples are 3 faculties (engineering, sciences and math, medical faculties) (FT, FMIPA, FK), PUSKOM and the heads of the university</p> <p>Test of validity and reliability are conducted here. The study covers characterizing the respondents (gender, age, year of service & level of education)</p>	<p>COBIT 4.1</p> <ul style="list-style-type: none"> • PO (01-10) • AI (01-07) • ME (01-04) • DS (01-13) 	<p>The study discusses several issues: (1) analyzing the IT maturity level in UNRI, (2) analyzing every domain in each sample and (3) analyzing the maturity level in each sample.</p> <p>The PO domain above the scale of 3 (<i>defined</i>), a part of AI is still at 2 (<i>repeatable but intuitive</i>), a part of ME is still even at 1 (<i>initial</i>) and in DS</p> <p>Overall, the maturity level of IT use is found below 3 except in the part of the university heads.</p>	<p>The recommendation is arranged based on the result of questionnaire in which the lowest objective score is used as the standard.</p>
[1]	<p>50 Private HE Institutions in Yogyakarta (2010)</p> <p>The samples are 50 private HE institutions which are selected randomly from all the existing HE institutions in Yogyakarta. In other words, the quality status of the private institutions is not considered in this study. The questionnaire is distributed to all the 50 samples.</p>	<p>COBIT 4.1</p> <ul style="list-style-type: none"> • PO (01-10) • AI (01-07) • ME (01-04) • DS (01-09) 	<p>The study has concluded that the private HE institutions in Yogyakarta (recapitulation by 85.44%) generally have the maturity level at 3 (<i>defined</i>) of the scale 5 (to-be).</p> <p>Specially for DS 8 subdomain, the mean has reached above 3.5 (reaching <i>managed</i>).</p> <p>Generally, the evaluation for the maturity level of the IT implementation in private HE institutions in Yogyakarta has been influenced by the dimension of service quality by distributing the criteria scores proportionally.</p>	<p>It is a census study employing the survey approach, by the purpose of identifying the maturity level, performance and development of IT in the private institutions in Yogyakarta. The findings are not classified into the which of the samples are low, medium, or high.</p> <p>No recommendation proposed.</p>
[20]	<p>10 private HE institutions in Semarang city (2011)</p> <p>As many as 10 private HE institutions are considered the best, and the research instruments used are interview and questionnaire.</p>	<p>COBIT 4.0</p> <p>Specific for DS (<i>Delivery and Support</i>)</p> <p>DS 01 until DS 13</p>	<p>Overall, the maturity level of private HE institutions is above 3 (<i>defined</i>) from the to-be level of 4.</p> <p>The distribution of the maturity level is classified into three, as follows:</p> <ul style="list-style-type: none"> • High level: IKIP PGRI, UDINUS and UNISSULA • Medium level: UNIMUS, UNWAHAS, USM, STEKOM and UNIKA • Low level: UNPAND and UNISBANK. 	<p>The purpose of the study is to identify the maturity level, performance and IT development in the private HE institutions in Semarang city.</p> <p>Based on the gap analysis (the difference level to be achieved with the as is condition) can be made as the standard for the betterment. There is no recommendation provided.</p>
[21]	<p>Academic Information System (SIAK) STMIK Widya Pratama Pekalongan (2016)</p> <p>The questionnaire is distributed to 20 respondents as the samples (<i>random</i>) containing questions which refer to COBIT 4.1:</p> <ul style="list-style-type: none"> • 2 academic staff, • 3 staff of information resources unit, • 4 staff of study programs, • 39 assistant students 	<p>COBIT 4.1</p> <ul style="list-style-type: none"> • ME (01-04) • DS (01-13) minus 02 	<p>The study has found that the maturity level is 0.67 (<i>initial</i>) both in DS domain (12 control processes) and in ME domain (4 control processes)</p> <p>Specifically, in DS8 subdomain the <i>maturity level</i> is 0.57 (<i>initial</i>) meaning that the handling of issues occurring during IT utilization has not been managed well.</p>	<p>The study is aimed to observe the condition of IT management in the campus.</p> <p>There is no recommendation provided.</p>
[22]	<p>Financial Information System (SIK) Universitas Kristen Duta Wacana Yogyakarta (2016)</p> <p>The primary data are obtained from interview, questionnaire and observation done to the Financial Information System. The interview is done to several parties, namely the developer, the maintenance, the decision maker, and users of SIK. The secondary data are obtained from relevant documents and head's policies with the financial information system.</p>	<p>COBIT 4.1</p> <ul style="list-style-type: none"> • ME (01-04) • DS (01-13) minus 02 	<p>The study has found that for DS8 subdomain is 3.6 (<i>managed</i>). SOP and user manual have been provided to help users operate SIK. Should any incidents occur while using IT, the follow-up measure should be done by the unit of PUSPINDIKA on an <i>Ad-hoc</i> basis or by cooperating with another unit specializing on it to find the temporary solution. Such incidents are then analyzed in order to observe the occurring pattern. Then, the source of the problem and settlement mechanism can be identified.</p> <p>The capability maturity level as a whole from the management of SIK in UKDW is 4</p>	<p>The objective of the study is to observe the process condition of development, maintenance, application and utilization of SIK in UKDW</p> <p>The finding is presented descriptively from each subdomain under investigation.</p> <p>There is no recommendation provided.</p>

			(<i>managed</i>). In other words, there is already SP for monitoring financing processes, performing backup, recovery and removing data periodically, the facility of environment security physically, surveillance of IT performance, the SIK has involved several external rules, especially those issued by the government, installing firewall and antivirus, as well as training for using the application.	
[23]	<p>Academic Information System of University of XYZ, done by researchers from Universitas Pesantren Darul Ulum Jombang (2014)</p> <p>The primary data are obtained from interview, observation and questionnaire which are addressed to the director of PUSKOM, web staff of PUSKOM, networking staff of PUSKOM, Head of general bureau, administration staff of PUSKOM, the chancellor, vice chancellor of finance, vice chancellor of academics, staff of academic bureau, head of academic bureau, and maintenance staff of PUSKOM.</p>	<p>COBIT 4.1</p> <ul style="list-style-type: none"> Specific for <i>Delivery and Support</i> DS 01 – DS 13 <p>ITIL V3</p>	<p>Analysis of each activity is divided into 6 (obtained from items in the questionnaire) which represents the maturity attribute, namely: Skill and Expertise; Awareness and Communication; Policy, Plan and Procedure; Tools and Automation; Duty and Accountability; Determination and Goal Measurement.</p> <p>The study has found that the maturity level is at 2 (<i>Repeatable but intuitive</i>) although SI has been implemented for approximately 6 years.</p> <p>Especially for DS8 subdomain, the <i>maturity</i> level is 1 (<i>initial</i>) of the to-be condition, 2. It means that there is not yet SOP for handling such incidents with reactive and intuitive activities, that the occurring incidents are not documented nor classified. There is no escalation procedure to cope with the problem yet, neither is determination of incident priority scales.</p>	<p>The audit of information system in the study is aimed to investigate the as is maturity level, gap and recommendation to minimize such gap.</p> <p>The to-be maturity level is obtained through interview with respondents who are questioned simultaneously about the as is condition, and the to-be condition in the future, which is 2 and 3 (for DS8 subdomain is 2).</p> <p>The recommendation is arranged based on the gap between the as is and the to-be condition. This recommendation is enriched with ITIL V3 framework which previously has been mapped into COBIT 4.1</p>
[24]	<p>Universitas Mercu Buana Jakarta (2014).</p> <p>The instrument employed is interview to users, IT staff and management staff, process checking and document checking. The number of respondents is not stated.</p> <p>The documents investigated are documents for SOP, system development, activities in the logbook, help, <i>help desk log book</i> and <i>user manual</i>.</p>	<p>COBIT 4.1</p> <ul style="list-style-type: none"> PO (01, 02, 04, 05, 08, 10) AI (04, 07) ME (01, 04) DS (01-13, minus DS5, DS9, DS12) 	<p>For DS8 subdomain, the maturity level is 2 of the to-be condition of 3.</p> <p>Meanwhile, the maturity level from the overall 19 processes is 2, which means that there is only one of them reaches the target that is DS6 subdomain. It can be concluded that IT management in the university is still at the <i>starting phase</i>.</p>	<p>The objective of the study is to investigate the as is maturity level of UMB as well as to arrange the recommendation</p> <p>The recommendation is arranged based on the gap between the as is condition (level 2) and the to-be condition (level 3) and also by considering the priority of problem and available resources. It means that the recommendation is not addressed to all subdomains but to certain subdomains.</p>
[25]	<p>Private he Institution in Palembang city (2014). Not specified which are: the samples.</p> <p>The respondents for this study are 100 students as users of SIA. Gender is not considered.</p>	<p>COBIT 4.1</p> <ul style="list-style-type: none"> ME (01-04) DS (01-13) 	<p>The study has found that for DS8 subdomain, the maturity level is at 3 (<i>defined</i>).</p> <p>As a whole, both DS and ME are at the level 3 (<i>defined</i>), meaning that the academic processes related to academic information system in the institution has been through a fairly good conduct seen from the point of view of the users, thus the as is condition only requires minor correction to reach the to-be condition.</p>	<p>The recommendation arrangement is based on the current achievement, and presented gradually about how to make the level 3 into 4 and 5.</p>
[26]	<p>Universitas Dian Nuswantoro Semarang (2013)</p> <p>The interview is intended to analyze the IT services and the questionnaire is distributed to selected respondents referring to RACI <i>table</i> using <i>purposive sampling</i> method. It is not stated in detail the number of samples.</p>	<p>COBIT 4.1 Specific for DS08</p>	<p>The study findings show that the maturity level in the process of service desk and IT incidents management in Universitas Dian Nuswantoro is at the level 2, meaning that the management has possessed the awareness and care to the function of service desk and incident management, has not documented the standard procedure implemented in the management, and the support as well as accountability are still based on individual characteristic.</p>	<p>The strategy for repairmen is adjusted with the 6 (six) maturity attributes of COBIT.</p> <p>The recommendation is done gradually from a high level to the higher one, which is intended to reach level 3 and then 4.</p>
[27]	<p>STMIK Lombok (2015)</p> <p>Identification of <i>business goals</i>, identification of <i>business goals</i> with IT <i>process</i> (generating 3 key domains as the bases for selecting the domains)</p>	<p>COBIT 4.1</p> <ul style="list-style-type: none"> PO (02-08) AI (02-07) DS (01-13, minus 09 and 11) 	<p>The objective control used in the measurement of DS8 is: service desk, registration for customer demands, escalation incidents, closing incidents, report and analysis of incidents.</p> <p>The study reveals that the mean of maturity level is 2 (<i>Repeatable</i>) which mean that the subjects of the study have a repetitive pattern</p>	<p>The lowest objective score is used as the standard for arranging the recommendation, within which there are three levels of recommendation.</p>

			for handling processes based on the previous experience. They have implemented the procedure which applies to all employees, however it is found that there has not been any training and formal communication of the standard procedure to all employees.	
[28]	Academic Information System (SIA) of Universitas Negeri Padang (2013) A direct observation, a questionnaire corresponding to the diagram mapping of RACI for 31 respondents.	COBIT 4.0 Specific for DS (<i>Delivery and Support</i>) DS04, DS08, DS 1	The findings of the study show that the maturity level in DS8 is 2.5656 (defined). It means that the settlement of the user's problem is not measured, thus often times the incidents happened to users are not settled. Overall, the means of the maturity level is at 3 (Defined).	The recommendation is specifically addressed for each domain, by directing the current level, which is <i>defined</i> , to the higher level which is managed by observing the gap.

5. Summary

The IT can help improve the effective and efficiency of achieving the goals, and it also gives hands for business purposes. Principally, the framework of COBIT is the provider of information required to achieve the vision, mission, objectives and targets of a HE institution. With a measured incident handling, the investment and IT application under management can have a maximum value which eventually may be used as the standard for achieving the vision, mission, and objectives and as a medium to develop/ compete with other HE institutions. IT is known of being capable of helping improve efficiency and effective from organizational business processes for achieving its goals. IT utilization can also have an implication for a HE institution whose business process requires IT supports to facilitate it in managing the business process to be more effective and efficient. The summary are drawn which are related to the objectives of this paper writing are comprised in the following points:

- A review has been done concerning the IT management in several HE institutions in Indonesia which is measured based on the framework of COBIT using *DS08 (Delivery and Support)* and *DSS002 (Deliver, Service and Support)* subdomains, those are related with IT incident handling. The study reveals that the condition of maturity level found in many studies have not reached he standard value as expected by the corresponding researchers, that above 3 (*defined*) is considered good, 4 even better. The maturity level is found at 2 meaning that in the campus environment there has not been any SOP or technical guide determined containing the procedure of incident handling. Such condition leads to a recommendation for improving it to the higher level.
- It has been observed that the technique of proposing the recommendation for more optimal management in using IT in the future is done by two ways, first is that the recommendation refers to the as is maturity level (like 2 or 3), the target of the to-be maturity level is higher (like 4 or 5). The gap is observed in the comparison of the as is maturity level and the targeted to-be maturity level. Second, the lowest objective is made as the standard. The

recommendation is proposed gradually (in the short or long term) or directly to the highest expectation (maturity level = 5).

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References

- [1] A. Setiawan, "Pengaruh Kematangan, Kinerja dan Perkembangan Teknologi Informasi di Perguruan Tinggi Swasta Yogyakarta dengan Model COBIT Framework," *Proc. of Seminar Nasional Informatika (semnasIF)*, pp. 18-26, May 2010.
- [2] S.B. Kristianto dan E. Putro, "Tata Kelola Teknologi Informasi di Universitas Kristen Krida Wacana: Perencanaan dan Organisasi," *Proc. of Seminar Nasional Sistem Informasi Indonesia (SESINDO)*, pp. 361-365. 2010.
- [3] R. Yonasky & J. McCredie, "Process and Politics: IT Governance in Higher Education," ECAR, 2008.
- [4] R. Yunis & K. Telaumbanua, "Identifikasi Awal Komponen IT Governance Perguruan Tinggi," *Proc. of Seminar Nasional Informatika (semnasIF)*, pp. 131-137, August 2014.
- [5] D. Ciptaningrum, E. Nugroho, D. Adhipta. "COBIT 5 sebagai Metode Alternatif bagi Audit Keamanan Sistem Informasi (Sebuah Usulan untuk diterapkan di Pemerintah Kota Yogyakarta)," *Proc. of Seminar Nasional Teknologi Informasi dan Multimedia*, February 2016.
- [6] S. Winardi. "Penerapan COBIT Framework untuk Menilai Pengelolaan Teknologi Informasi dan Tingkat Kepuasan Pelayanan (Studi Kasus pada Klinik "XYZ" Yogyakarta)," *Proc. of Seminar Nasional Teknologi Informasi dan Multimedia*. pp. 13-17, 6-7 February 2016.
- [7] N. Sasongko "Pengukuran Kinerja Teknologi Informasi Menggunakan Framework Cobit Versi. 4.1, Ping Test dan Caat Pada Pt.Bank X Tbk. Di Bandung," *Proc. of Seminar Nasional Aplikasi Teknologi Informasi (SNATI)*, pp. 108-113, June 2009.
- [8] H. Setiawan, "IT Governance & Penggunaan COBIT Framework," *J. Sistem Informasi (JSI)*, Vol.2 (2), pp. 219-237, October 2010.
- [9] Noorhasanah, W.W. Winarno, D. Adhipta, "Evaluasi Tata Kelola Teknologi Informasi Berbasis Framework COBIT

- 5,” *Proc. of Seminar Nasional Teknologi Informasi dan Multimedia*. February 2015.
- [10] A.P. Utomo & N. Mariana, “Analisis Tata Kelola Teknologi Informasi (IT Governance) pada Bidang Akademik dengan COBIT Framework. Studi Kasus pada Universitas STIKUBANK Semarang. *J. of Information Technology DINAMIK*. Vol 16(2), 139 – 149, July 2011.
- [11] A.A. Hendriadi, M. Jajuly dan K. Siwi, “Pengukuran Kinerja Sistem Informasi Akademik dengan Menggunakan Kerangka Kerja COBIT 4.1 pada Domain *Plan and Organise* di Universitas Singaperbangsa Karawang,” *Majalah Ilmiah Solusi Unsiska*, Vol.10(2), Ed. March-May 2012.
- [12] ISACA. “COBIT 5 A Business Framework for the Governance and Management of Enterprise IT,” Rolling Meadow: ISACA. 2012.
- [13] R. Daley, “Operationalizing the Coordinated Incident Handling Model,” *Laurel: IEEE*. pp. 287-294. 2011.
- [14] F.Adikara, “Implementasi Tata Kelola Teknologi Informasi Perguruan Tinggi berdasarkan Cobit 5 pada Laboratorium Rekayasa Perangkat Lunak Universitas Esa Unggul,” *Proc. of Seminar Nasional Sistem Informasi Indonesia (SNSII)*, pp. 131-136, December 2013.
- [15] IT Governance Institute, “COBIT 4.1,” Illinois: IT Governance Institute, 2007.
- [16] R.K. Candra, I. Atastina, Y. Firdaus, “Audit Teknologi Informasi menggunakan *Framework* COBIT 5 pada Domain DSS (*Delivery, Service, and Support*) (Studi Kasus: iGracias Telkom University),” A Sarjana’s Thesis of Informatics Engineering of Universtas Telkom 2015. Available at <https://repository.telkomuniversity.ac.id/pustaka/100647/audit-teknologi-informasi-menggunakan-framework-cobit-5-pada-domain-dss-deliver-service-and-support-studi-kasus-igracias-telkom-university-.html>
- [17] F. Agustin, “Analisis Perbandingan Tingkat Maturity Level Sistem Otomasi Perpustakaan Berbasis Opensource dan Proprietary Menggunakan Framework COBIT 5.0 (Study Kasus : Perpustakaan STMIK Potensi Utama),” *Proc. of Seminar Nasional Informatika*, pp. 209-215, 2014
- [18] F. Purwaningtias, M.I. Hardiansyah, S. Rizal, “Audit Tata Kelola IT (*IT Governance*) pada Politeknik Sekayu Menggunakan COBIT 5,” August 2013. [Online] available at <http://eprints.binadarma.ac.id/2785/>.
- [19] A. P. Utomo dan N. Mariana, “Analisis Tata Kelola Teknologi Informasi (*IT Governance*) pada Bidang Akademik dengan COBIT Frame Work Studi Kasus pada Universitas Stikubank Semarang,” *J. of Information Technology DINAMIK*, Vol. 16 (2), pp. 139-149, July 2011.
- [20] B. Supradono, “Tingkat Kematangan Tata Kelola Teknologi Informasi (IT Governance) pada Layanan dan Dukungan Teknologi Informasi (Kasus: Perguruan Tinggi Swasta di Kota Semarang),” *Proc. of Seminar Nasional Teknologi Informasi & Komunikasi Terapan (Semantik)*, 2011
- [21] P. Sulistyorini, W. T. Pudji, R. D. Syamsu, “Evaluasi Tata Kelola Teknologi Informasi Menggunakan Kerangka Kerja Cobit dalam Mendukung Layanan Sistem Informasi Akademik (Studi Kasus: STMIK Widya Pratama Pekalongan),” *A Scientific J. ICTech*, pp. 20-28, 2016.
- [22] L. Ernawati, H. B. Santoso, “Audit Tata Kelola Sistem Informasi Menggunakan Kerangka Kerja Control Objective for Information and Related Technology (COBIT),” *Proc. of Seminar Nasional Teknologi Informasi dan Multimedia*, pp. 157-162, February 2016.
- [23] D. H. Satyareni dan F. Mahanani, “Audit Sistem Informasi Akademik Perguruan Tinggi (PT) XYZ Menggunakan Kerangka Kerja COBIT 4.1,” *Proc. of Seminar Nasional Aplikasi Teknologi Informasi (SNATI)*, pp. D1-D6, June 2014.
- [24] M. Sadikin, H. Hardi, dan W. H. Haji, “IT Governance Self-Assessment in Higher Education Based on COBIT Case Study: University of Mercu Buana,” *J. of Advanced Management Science*, Vol. 2 (2), pp.83-87, June 2014.
- [25] V. Sahfitri, Marlindawati, “Analisis Tata Kelola Sistem Informasi Akademik di Perguruan Tinggi Swasta di Kota Palembang Menggunakan COBIT Frame Work,” *Proc.of Seminar Nasional Inovasi dan Tren (SNIT)*, pp. 1-7, 2014.
- [26] E. Susanto, “Analisis Pengelolaan Service Desk dan Insiden Teknologi Informasi dan Komunikasi (DS8) Universitas Dian Nuswantoro Berdasarkan Framework COBIT 4.1,” A Sarjana’s Thesis of the Faculty of Computer Sciences 2013, [Online] available at <http://eprints.dinus.ac.id/11792/>.
- [27] A. S. Pardiansyah, “Audit Tata Kelola Teknologi Informasi Program Studi Sistem Informasi Sekolah Tinggi Manajemen Informatika Dan Komputer (STMIK) Lombok Menggunakan Framework Cobit,” *Indonesian J. on Software Engineering (IJSE)*, Vol.1 (1), pp. 17-25, 2015.
- [28] Syukhri, “Evaluasi Tingkat Kematangan Proses *Delivery and Support* pada Implementasi Sistem Informasi Akademik Universitas Negeri Padang Berdasarkan Kerangka Kerja COBIT 4.0,” Thesis of Postgraduate Program of Faculty of Engineering Universitas Negeri Padang, June 2013.
- [29] S. Fuada, “Studi Literatur tentang Status Tata Kelola Insiden TI pada PTN/PTS di Indonesia berdasarkan Framework COBIT (Subdomain DS08 dan DSS02),” 2016.