Audit of Provincial Library Information System based on COBIT 4.1

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***Abstract*— Current technological developments cannot be damp again. Progress in every field cannot be separate from technology as its support, especially information technology. Likewise, the Bangka Belitung Islands Provincial Library and Archive has implemented an information system in managing book data, visitors, and the process of returning and borrowing books. However, a system is said to be good if it meets the needs and is able to solve problems. However, this must be balanced with an evaluation of the information system so that threats or losses can be avoided or prevented. This study purposes to determine the extent of the performance of the information system of the Provincial Bangka Belitung Islands Library and Archive based on the Control Objectives for Information and Related Technology Standards (COBIT 4.1). Since this system is already in the implementation stage, the audit process will use a subdomain of DS (Delivery and Support) domains, DS4 (Ensure Continuous Service), DS5 (Ensure System Security), DS10 (Manage Problems), DS11 (Manage Data) and DS12 (Manage the Physical Environment). The five subdomains were chosen because they had the greatest influence in the use of information systems in the Bangka Belitung Islands Provincial Library and Archive. From the results of audit analysis, it can be concluding that the quality of information systems services in the DPAD of Bangka Belitung Province is at maturity defined at level 3 which means the standard process in the development of a new product is documented. Besides, this process is based on the product development process that has been integrated.**

Keywords—information system audit, library, COBIT 4.1

I. INTRODUCTION

Technological developments have resulted in changes in data processing carried out by libraries from manual systems to mechanical, electromechanical, and then to electronic or computerized systems. Switching to an automated system allows complex data to be processed quickly and thoroughly, to produce information. In supporting the activities of an organization, information becomes an essential part of organizational development. In the case of processing data into knowledge, it is an activity in an organization that is repetitive so that it must carry out systematically and automatically.

DPAD or Regional Library and Archive Service of the Province of Bangka Belitung Islands has been establishing since 2008 or about ten years ago. The DPAD of the Belitung Islands Islands Province itself is addressing at Jalan Ahmad Yani No. 117 Taman Sari sub-district, Pangkalpinang Bangka Belitung. By utilizing information technology support, DPAD has implemented a library information system. The system is applied to manage book data, visitors and help the process of borrowing and returning books to the library. With the existence of the library information system, it is expected to be able to assist DPAD in managing data and providing excellent service. Even though it has built a library information system in several aspects, the use of the system is not optimal. Therefore, to ensure that the library information system support in the DPAD is currently running optimally, it is necessary to know the service quality of the system. To measuring those qualities, an audit process is a need.

In this study, the audit will be carried out using the COBIT 4.1 framework (Control Objective for Information and related Technology). The primary role of the library is as an information service center, so this study will use the Delivery and Support domain that is in the Cobit 4.1 framework to know the extent of services that the system has in the DPAD to its users. Since this system is already in the implementation stage, the audit process will use a subdomain of DS domains, DS4 (Ensure Continuous Service), DS5 (Ensure System Security), DS10 (Manage Problems), DS11 (Manage Data) and DS12 (Manage the Physical Environment). At the end of the study will be determined the results of the calculation analysis of the system maturity level (scale maturity) and conclusions from the implementation of the system that has been running now.

Based on the background above, it is founding that the identification of the problem is that the system utilization is now felt to be less than optimal, so it is necessary to know the service quality of the system. Based on the identification of the problems above, it can be determining the problem formulation is how to measure the quality of information system services in the DPAD of the Bangka Belitung Islands Province. The purposes of this study were to conduct an audit of the information system that is in the DPAD of the Bangka Belitung

Islands Province to find out the quality of service information systems that are currently running so that recommendations for improvements in the future can make.

II. Literature Review

A. The Concept of Library Information Systems

According to [1], he library is a work unit in the form of a place that is used to collect, store, manage and organize collections systematically so that they can be used by users as a source of information and as a fun learning tool. The library can be interpreted as a center for information that is scientific, entertainment, business, worship, and recreation, all of which are human needs. Based on these reasons the library is also defined as a place to access information in all formats. Both information formats are stored in the library room in the form of books, data, or softcopy files. Information system (SI) is a collection of resources and network procedures that are interrelated in an integrated manner, integrated with a specific hierarchical relationship and aims to process data into information. So that the information system can bring together the needs of daily transaction processing, support operations, are managerial, and provide certain outside parties with the necessary reports. Library Information is a system consisting of a series of information subsystems incorporated from software, hardware, and brain-ware to systematically store, manage, and organize library material collections to be used by users as a source of information.

According to [2], Information systems (IS) involve a variety of information technologies (IT) such as computers, software, databases, communication systems, the Internet, mobile devices and much more, to perform specific tasks, interact with and inform various actors in different organizational or social contexts.

B. System Audit and Information Technology

According to [3], information system audit is the process of collecting and evaluating evidence in determining whether an information system has been build to maintain data integrity, safeguard assets, make organizational goals can be achieved effectively, and use adequate resources. Information system audit as a separate audit and not part of a financial report audit needs to be done to check the level of maturity or readiness of an organization in carrying out information technology management (IT governance). The level of sophistication (level of maturity) could see from the information management, the level of concern of all stakeholders about the current position and the desired direction in the future. So that information technology planning should be done without ignoring the applicable standards.

Historically, according to [4] said that auditing of information systems is relatively new discipline intending to become a multi-discipline scientific field that links organizational, strategic and IT aspects of the company's business. The audit itself is generally carried out by the auditor to check several tests by the existing information system control [5]. In previous studies, research has been conducted on evaluating open source software in ITSM (IT Service Management) using the Fuzzy SIR (Superiority and Inferiority Ranking) method. From the evaluation results show that OTRS is the best software [13]. Furthermore, ontology was carried out at an ITSM with incident cases in the field of management. To get the results of ontology, ITILv.3 framework is used [14].

The purpose of an information system audit is broadly divided into 4 stages, namely [3]:

a. Improve the security of company assets

   Information assets of a company such as hardware, software, human resources, data files must be maintained by a good internal control system to avoid misuse of assets.

b. Improve data integrity

   Data integrity (data integrity) is one of the basic concepts of information systems. Data has certain attributes such as: completeness, truth, and accuracy.

c. Improve system effectivity

   The effectiveness of corporate information systems has an important role in the decision-making process. An information system can be said to be effective if the information system is in accordance with user needs.

d. Increase system efficiency

   Efficiency is very important when a computer no longer has adequate capacity.

The identification of audits can be seen in Fig. 1.

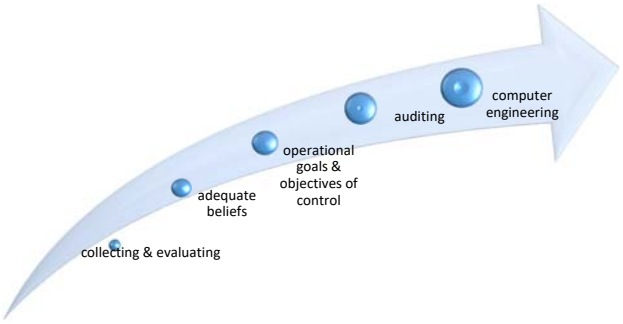

Fig. 1. The identification of audits workflow

C. COBIT 4.1

According to [6], COBIT is a framework that combines modern thinking in corporate management and management techniques and presents concepts that are globally acceptable, the practice of using analytical and modeling tools to increase the value and trust of an information system.

Meanwhile, [7] said that Control Objectives for Information and Related Technology (COBIT) is a set of general guidelines (best practice) for IT management made by the Information System Audit and Control Association (ISACA), and IT Governance Institute (ITGI) in 1996.

COBIT is a framework for build IT Governance. By referring to the COBIT framework, an organization is expected to be able to implement IT governance in achieving its objectives IT governance integrates the optimal way of planning and organizing processes, implementing, supporting and monitoring Information Technology performance processes. COBIT has functions including according to [8]:

a. Improve audit approach or program.
b. Support work audits with detailed audit directions
c. Guide IT governance.
d. As a benchmark assessment for Information Systems or Information Technology controls

e. Improve control of Information Systems or Information Technology.
f. As standardization of audit approaches or programs.

In the previous framework, the domain was identified using the management structure that will be using in the daily activities of the organization. Then four broader fields are classified as four main domains, namely:

a. Planning and Organization (PO)

This domain has a range of strategies and tactics. More than that is also attention to identify how information technology (IT) can contribute maximally to achieve a business goal. In addition, the implementation of a strategic vision needs to go through several stages, namely planned, communicated and managed for a variety of different perspectives. Finally, good technological and organizational infrastructure must be placed in the right place.

b. Acquisition and Implementation (AI)

To realize the strategy outlined in point a, it must first be identified, developed, implemented, and integrated from IT solutions into business processes. In addition, to ensure that the life cycle will continue on this system, it is necessary to change and maintain the system that must be included in this domain.

c. Delivery and Support (DS)

This domain focuses on aspects of IT delivery. This domain includes several other fields, such as the operation of applications in IT systems, their results, and also the support processes that enable the operation of IT systems effectively and efficiently. This support process also covers security issues and even training.

d. Monitoring and Evaluation (ME)

To maintain quality and fulfill control requirements, the entire IT process needs to be assessed regularly from time to time. In this domain refers to the importance of management oversight of the control process in the organization accompanied by independent assessments conducted by internal and external auditors or obtained from other alternative sources.

According to [9], the maturity model is a method for measuring the level of development of process management, which means that it measures the extent of the management capability. How well development or management capabilities depend on achieving COBIT goals. Sometimes several main processes and systems require security management that is more stringent than other methods and systems [10], as you can see in Fig. 2.

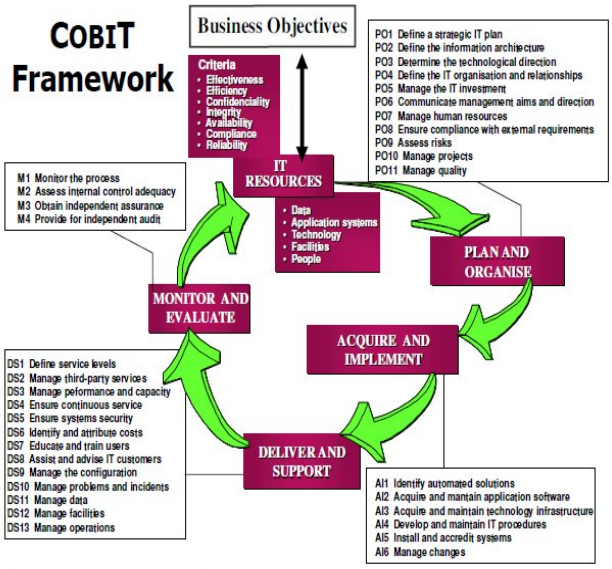

Fig. 2. COBIT framework 4.1.

Meanwhile, [11] said these processes also have the Control Objective of each Control defined as policies, procedures, practices and organizational structures designed to provide adequate assurance that business objectives will be achieving and unwanted events will be preventing or detected and corrected. So, it can be saying that COBIT is a perfect and straightforward framework for implementing IT Governance in an IT implementation [12].

III. Research Methodology

A. *Problems Analysis*

At the beginning of the study, the literature study process is carrying out, namely the search for the basics of theory and accompanying research that had been done previously related to IT Audit. Then the analysis of the system that has been running now is carried out to find out the problems and problems of the research.

B. *Questionnaires Design Process.*

To get more accurate measurement results, So, it is necessary to design a questionnaire that is right on target. The target is intended so that the respondent can provide an objective and independent assessment of the questions given. In this study, the questionnaire was designed based on the DS (Delivery and Support) domain in the Cobit 4.1 framework, DS4 (Ensure Continuous Service), DS5 (Ensure System Security), DS10 (Manage Problems), DS11 (Manage Data) and DS12 (Manage the Physical Environment). Furthermore, the Cobit 4.1 framework is describing as a statement of a statement following field conditions.

C. *Data Gathering*

To test the effectiveness of the questionnaire, the design that has been making must be fit; it is necessary to prove it in the field.

D. *Maturity Analysis*

After the data has been collecting, the next step is to analyze the calculation of the maturity level. There are three steps taken in this analysis process, namely:

a. Analysis of calculation of maturity level based on majority vote.
b. Analysis of calculation of maturity level based on average value.
c. Next is presenting data in table form, to simplify data analysis.

The entire process of this research can see in Fig. 3.

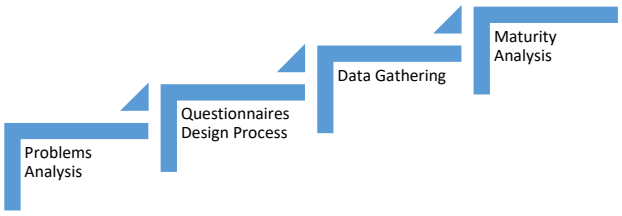

Fig. 3. Entire process of research

IV. Results

A. Questionnaires Design

The questionnaire design that will distribute to as many as 15 correspondents can see in Table I.

TABLE I. QUESTIONNAIRES LIST

No	Statement	Answers					
		0	1	2	3	4	5
DS4	***Ensure Continuous Service***						
1	The library holds regular training to deal with disasters or disturbances that may occur.						
2	The library has storage media backing up outside the library environment.						
3	The library has and reviews the procedures carried out after successfully recovering from a disaster or disturbance.						
DS5	***Ensure Manage Security***						
1	The library has procedures and policies regarding security in services, personnel, software, and hardware.						
2	There are authentication and authorization that applies to all library employees (for example, using a user and password for each employee).						
3	The library conducts tests on IT Security.						
4	There is protection against security and network technology.						
5	The library protects IT security by preventing and controlling physical IT or destructive software.						
DS10	***Manage Problem***						
1	The library identifies and classifies problems based on categories, impacts, necessary conditions and priorities so that it can immediately overcome the issues that arise.						
2	The library has procedures for solving problems.						
3	The library takes precautionary measures to reduce problems with service.						
D11	***Manage Data***						
1	The library has good data management, including proven data/back up filing procedures.						
2	The library has procedures to ensure its storage media can always be used and integrated.						
3	There are security procedures in managing data.						
D12	***Manage the Physical Environment***						
1	The library has a unique design/network topology that has been adapted to IT tools to reduce the occurrence of real incidents.						
2	The library applies access rights so that security for server space is control.						
3	There are additional tools used to monitor and control the physical environment (for example CCTV).						
4	There is regular maintenance of IT facilities.						

Information :
0: Not at all
1: Do it occasionally
2: Carry out regularly, but there are no formal rules
3: Have official rules, implemented according to procedures and documented
4: Implemented, recorded, managed and carried out measurements
5: Already at the stage of optimizing all methods and management.

B. Questionnaires Scoring

In assessing the score (value) of each respondent, the author uses a Likert scale that reflects the answer patterns of 0, 1, 2, 3, 4 and 5. Furthermore, the data is obtaining through the distribution of the questionnaire through each answer given value with a Likert scale. For the answers can be scored with data as shown in Table II.

TABLE II. CRITERIAS SCORING

Description	Score
Not at all	0
Do it occasionally	1
Carry out regularly, but there are no formal rules	2
Have official rules, implemented according to procedures and documented	3
Implemented, recorded, managed and carried out measurements	4
Already at the stage of optimizing all methods and management	5

In measuring the maturity level, a questionnaire is using as a data collection method that will have an index value of each criterion in the measurements taken, namely by using the following equation:

$$Index = \frac{\sum(Number\ of\ answers\ values)}{\sum(Questionnaires\ Questions)} \quad (1)$$

After getting the index of each of the last criteria, the Maturity level of each measure and also the system will be determined by mapping in Table III.

TABLE III. MATURITY LEVEL MAPPING

Scale	*Maturity Level*
0,00 – 0,49	*Non-Existent*
0,50 – 1,49	*Initial/Ad Hoc*
1,50 – 2,49	*Repeatable*
2,50 – 3,49	*Defined*
3,50 – 4,49	*Managed*
4,50 – 5,00	*Optimised*

C. Questionnaires Measurement

Fifteen questionnaires distributed were only filled with 33 correspondents with calculations as in Table IV.

TABLE IV. RESULTS OF QUESTIONNAIRE ASSESSMENT AND CALCULATION.

No	Assessment Criteria	Total Value of Answers (Answer options *x* Weight)
1	DS4 (*Ensure Continuous Service)*	295
2	DS5 *(Ensure System Security)*	456
3	DS10 *(Manage Problems)*	293
4	DS11 *(Manage Data)*	271
5	DS12 (*Manage the Physical Environment)*	372

After the questionnaire calculation process is carried out, the calculation results for each number of questionnaire scores from the total questions that have been filled in by 33 respondents, for calculations in determining the index of each managed domain process, see Table V.

TABLE V. MATURITY LEVEL

No	Assessment Criteria	Questions Amount	Respondent Amount	Questionnaires Amount	Assessment of Questionnaire Results	Index
1	DS4	3	33	99	295	2,97
2	DS5	5	33	165	456	2,76
3	DS10	3	33	99	293	2,95
4	DS11	3	33	99	271	2,73
5	DS12	4	33	132	372	2,81
Total						**14,22**
Index Mean						**2,84**

From Table V it can be seen that the maturity level of the library information system in the DPAD of the Bangka Belitung Islands Province is 2.84 at the Defined level. That is mean the standard process in the development of a new product is documented. However, this process is based on the product development process that has been integrated.

V. CONCLUSIONS

From the research that has been done using the Cobit 4.1, the framework using the Delivery and Service domains that are DS4 (Ensure Continuous Service), DS5 (Ensure System Security), DS10 (Manage Problems), DS11 (Manage Data) and DS12 (Manage the Physical Environment). From the results of the study, it can be concluded that the quality of information system services in the DPAD of Bangka Belitung Province is at the Defined level, which means that it is within the coverage level of maturity 3. This means that the implementation of standard processes in developing new products has been documented. In addition, the process carried out is based on an integrated product development process.

For the future work, the official rules and procedures need to be made in monitoring and evaluating governance activities in the DPAD of Bangka Belitung Province so that the existing service process can runs to the objectives of the information system. All improvements made are expected to increase the level of maturity in the order.

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