EVALUATION INFRASTRUCTURE INFORMATION TECHNOLOGY IN HOTEL LE MERIDIEN JAKARTA USING FRAMEWORK COBIT 4.1

Sabar Rudiarto
Faculty of Computer Science, MercuBuana University, Indonesia
sabar.rudiarto@mercubuana.ac.id

Arief Setiyawan
Faculty of Computer Science, MercuBuana University, Indonesia
41513110155@student.mercubuana.ac.id

Diky Firdaus
Faculty of Computer Science, MercuBuana University, Indonesia
diky.firdaus@mercubuana.ac.id

ABSTRACT--The development of information technology and internet is influencing all industry sectors including hotel industry. To support the sustainability of business, the hotel has implemented information technology such as: online booking system, Wi-fi in the public area, and information system for internal hotel needs. This information technology is run in the IT infrastructure and connected with local network and internet. To support this technology, the hotel has been doing the procurement of IT devices such as: Server, network devices (switches, routers, etc.) and IT security devices (firewall, antivirus). There is currently no evaluation of how effective and efficient the use of server devices, network devices and security devices IT. Therefore it is necessary to evaluate the information technology implementation at Le Meridien Hotel Jakarta. This evaluation uses the COBIT 4.1 framework. By evaluating the information technology infrastructure at Le Meridien Hotel Jakarta, it is expected to provide input on the effectiveness and efficiency of the use of devices that currently used in the hotel.

I. INTRODUCTION
Technology today has a very rapid development; it resulted in many changes that occur to human life. With the development of this technology every work will be completed more efficiently and effectively. Before the improvement of computer information system technology, in running the activity takes a lot of time. With the information system technology, it can speed up all activities that will be done with a faster period. It also affects all business sectors, such as business in the field of Hotel. Likewise with technology with the hospitality industry is also evolving in terms of technology this must be done to maintain the continuity of a hotel business to keep running. One of the facilities that must be there is an online booking system where the first must come to the hotel for reservations, as well as Wi-fi facilities in the public area becomes a necessity of a hotel in the present era. To support operations, the hotel has been doing procurement in the field of Information Technology such as servers, switches, routers, and security devices (firewall, antivirus).
But until now there has been no evaluation of information technology infrastructure at Le Meridien hotel. Therefore, the evaluation of Information Technology Infrastructure becomes very important to do.

II RELATED STUDIES

1. System
System is a collection or set of elements, components, or variables that are organized, interacted, interdependent and integrated.[5]

2. Information System
Information system is a system within the organization that brings daily processing needs yng support organizational operational functions that are managerial with strategic activities of an organization to be able to provide to certain outsiders with reports required reports.[5]

3. Evaluation
Evaluation is "research to populate, analyze, and present useful information about value of object, assess it and compare to valuation indicator and the result will use for decision making about the object of evaluation.[9]

4. COBIT
COBIT (Control Objectives for Information and Related Technologies) is a good-practice framework created by international professional association ISACA for information technology (IT) management and IT governance. COBIT provides an implementable "set of controls over information technology and organizes them around a logical framework of IT-related processes and enablers. [10].

III.METHOD
In every event of IT evaluation, will be applied a decent framework of IT audit which appointed by IT Assurance Guide: Using COBIT, because COBIT is the most complete Audit framework. In auditing process, not every domain will be use for specific scope reason. This also enable to avoid repetition of activities and based on common rule which stated by IT Assurance Guide.

A. Communication (Project Initiation & Requirements Gathering)
Before starting a technical work, it is necessary to communicate with customers to understand and achieve the goals to be achieved. The results of such communications are project initialization, such as analyzing the problems encountered and collecting the necessary data, as well as helping to define the features and functions of the software. At this stage several methods are performed, including:

a. Observation
At this stage the authors conduct a direct survey to the field to get the real results and the full picture before going to the next stage.

b. Interview
At this stage do a question and answer to IT Manager or IT supervisor in order to get concrete and clear data for evaluation.

c. Literature review
In this method the authors collect materials from the internet and libraries by using the books and learn it as a guide that can help in making the evaluation.

B. COBIT Method

![COBIT Method](image)

In implementing the IT evaluation an IT audit methodology is applied that is in line with the methodology proposed by the IT Assurance Guide: Using COBIT. Also that COBIT framework is the most complete audit framework.
C. The Running System

Annotation:
1) If accessibility of system information is not good yet, then need addition of server which mean server procurement is required.
2) If Internet access is no good yet, then need addition of bandwidth or new access point for cover blindspot, then procurement is required.
3) If management of internal data is not good yet, then need patching of software or software upgrading.
4) Therefore need an evaluation to know how effective and efficient of current system.

V RESULT AND DISCUSSION

A. Planing Stage.

Audit Background
Evaluation of infrastructure and system information in Hotel Le Meridien Jakarta is important to do because there is no assessment yet regarding of how effective and efficiency of IT procurement which budgeted every year in Hotel Le Meridien. This assessment will be a begin process for better IT procurement in Le Meridien in order to support effectiviness and efficiency of IT in Hotel Le Meridien.

Audit Framework
The framework which use for evaluation of IT Infrastructure and system at Hotel Le Meridien Jakarta is COBIT 4.1 framework. COBIT use 34 control objective which describe in 210 detailed control objective. In research there is 2 domain COBIT which suitable to the research, domain AI3 and AI5.

Risk Analisys
In the risk analysis, have tried some guidance of IT Assurance guide: using COBIT 4.1. Risk analysis of Hotel Le Meridien Jakarta divided into determine of asset protection, risk and threat if the asset didn't have control. Those are:
1. Strategic Plan of System Information
2. Organization Structure
3. Cyber Unit at human resource
4. Center of Development system of human resource
5. Software Application
6. Password Management
7. Usage of Application procedure
8. Databases
9. Organization Portal
10. Computer Network
11. Service to user

B. Restrictions Scope IT Assurance

Selection Control Objective
Control objective use is detailed control objective from 34 control objective in framework COBIT.
And 34 control objectives is:

**Plan and Organize**

- PO1 Define a Strategic IT Plan
- PO2 Define the Information Architecture
- PO3 Determine Technological Direction
- PO4 Define the IT Organization and Relationships
- PO5 Manage the IT Investment
- PO6 Communication Management Aims and Direction
- PO7 Manage Human Resources
- PO8 Ensure Compliance with External Requirements
- PO9 Acces and managed risks
- PO10 Manage Project

**Acquire and implement**

- AI1 Identified automatic solution
- AI2 Acquire and Maintain Application Software
- AI3 Acquire and Maintain Technology Infrastructure
- AI4 Develop and Maintain Procedures
- AI5 Install and Accredit Systems
- AI6 Manage Changes
- AI7 Install and accredit solutions and changes

**Delivery and Support**

- DS1 Define and Manage Service Levels
- DS2 Manage Third Party Services
- DS3 Manage Performance and Capacity
- DS4 Ensure Continuous Service
- DS5 Ensure Systems Security
- DS6 Indentify and Allocate Costs
- DS7 Educate and Train Users
- DS8 Assist and Advise Customers
- DS9 Manage the Configuration
- DS10 Manage Problems and Incidents
- DS11 Manage data
- DS12 Manage the physical environtmen
- DS13 Mengelola operation

**Monitor and Evaluate**

- ME1 Monitor and evaluated IT performance
- ME2 Monitor and Evaluated Internal Control
- ME3 Ensure regulatory Compliance
- ME4 Provide IT Governance

Control objective choosen for evaluation in Hotel LememriyenJakartais AI3dan AI5

**C. Documenting the existing architecture at Le Meridien Hotel Jakarta**

It’s do by interviewing the main personnel of Le Meridien Hotel, IT Manager, IT Supervisor and some existing IT staff.
D. Identifying of COBIT 4.1 Subdomain.

In this assessment, IT Audit will use the subdomain AI3 and AI5.

The AI3 subdomain will describe on those following sentences:

AI3.1 Technological Infrastructure Acquisition Plan: Produce a plan for the acquisition, implementation, and maintenance of the technological infrastructure that meets established business functional and technical requirements and is in accord with the organization's technology direction. The plan should consider future flexibility for capacity additions, transition costs, technical risks and the lifetime of the investment for technology upgrades. Assess the complexity costs and the commercial viability of the vendor and product when adding new technical capability.

AI3.2 Infrastructure Resource Protection and Availability: Implement internal control, security and auditability measures during configuration, integration and maintenance of hardware and infrastructural software to protect resources and ensure availability and integrity. Responsibilities for using sensitive infrastructure components should be clearly defined and understood by those who develop and integrate infrastructure components. Their use should be monitored and evaluated.

AI3.3 Infrastructure Maintenance: Develop a strategy and plan for infrastructure maintenance and ensure that changes are controlled in line with the organization's change management procedure. Include periodic review against business needs, patch management and upgrade strategies, risks, vulnerabilities assessment and security requirements.

AI3.4 Feasibility Test Environment: Establish development and test environments to support effective and efficient feasibility and integration testing of applications and infrastructure in the early stages of the acquisition and development process. Consider functionality, hardware and software configuration, integration and performance testing, migration between environments, version control, test data and tools, and security.

The AI5 subdomain will describe on those following sentences:

AI5 Procure IT Resources:

AI5.1 Procurement Control: Develop and follow a set of procedures and standards that is consistent with the business organization's overall procurement process and acquisition strategy to ensure that the acquisition of IT related infrastructure, facilities, hardware, software and services satisfies business requirements.

AI5.2 Supplier Contract Management: Set up a procedure for establishing, modifying and terminating contracts for all suppliers. The procedure should cover, at a minimum, legal, financial, organisational, documentary, performance, security, intellectual property and termination responsibilities and liabilities (including penalty clauses). All contracts and contract changes should be reviewed by legal advisors.

AI5.3 Supplier Selection: Select suppliers according to a fair and formal practice to ensure a viable best fit based on requirements that have been developed with input from the potential suppliers and agreed between the customer and the supplier(s).

AI5.4 Software Acquisition: Ensure that the organisation's interests are protected in all acquisition contractual agreements. Include and enforce the rights and obligations of all parties in the contractual terms for the acquisition of software involved in the supply and ongoing use of software. These rights and obligations may include ownership and licensing of intellectual property, maintenance, warranties, arbitration procedures, upgrade terms, and fitness for purpose including security, escrow and access rights.

AI5.5 Acquisition of Development Resources: Ensure that the organisation’s interests are protected in all acquisition contractual agreements. Include and enforce the rights and obligations of all parties in the contractual terms for the acquisition of development resources. These rights and obligations may include ownership and licensing of intellectual property.
Fitness for purpose including development methodologies, languages, testing, quality management processes including required performance criteria, performance review, basis for payment, warranties, arbitration procedures, human resource management and compliance with the organisation’s policies.

**AI5.6 Acquisition of Infrastructure**: Facilities and Related Services Include and enforce the rights and obligations of all parties in the contractual terms, including acceptance criteria, for the acquisition of infrastructure, facilities and related services. These rights and obligations may include service levels, maintenance procedures, access controls, security, and performance review, basis for payment and arbitration procedures.

**Identified IT Component of Hotel Le Meridien.**
The component of IT Infrastructure in Hotel Le Meridien is:
- Server devices (13 pcs)
- Network devices switch 56 psc dan acces point 171 pcs
- Computer devices (102 pcs)

**E. Assessment Stage**
For supporting analysis, data must be populated from quisionary and will be do:
1. Assessment of maturity level of AI3 and AI5 Processes which get from average value, either of current condition (as-is) or the expected condition (to-be).
2. Gap analysis which gather from comparison of expected maturity level with current maturity level (as-is).

Formula of maturity level of AI3 and AI5 processes are describe on the following formula:

![Picture 5 Maturity Formula](image)

Where quality of quisioner answer has maturity level as describe in the following table.

<table>
<thead>
<tr>
<th>Maturity</th>
<th>Maturity Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 – 0.49</td>
<td>0-(none)</td>
</tr>
<tr>
<td>0.50 – 1.49</td>
<td>1-(Initialization)</td>
</tr>
<tr>
<td>1.50 – 2.49</td>
<td>2-(Can be repeat)</td>
</tr>
<tr>
<td>2.50 - 3.49</td>
<td>3-(Established)</td>
</tr>
<tr>
<td>3.50 - 4.49</td>
<td>4-(Managed)</td>
</tr>
<tr>
<td>4.50 - 5.00</td>
<td>5-(Optimal)</td>
</tr>
</tbody>
</table>

Table 2: Deskription maturity AI3

<table>
<thead>
<tr>
<th>Level 0</th>
<th>Management of IT Infrastructure is not important for Management</th>
</tr>
</thead>
</table>
| Level 1 | 1. If there's any change of application, there is unplanned change of infrastructure.  
2. There's any awareness of IT Infrastructure development, but there's no consistency yet.  
3. Training activity for staff is interim as many as it required. |
| Level 2 | 1. There's slightly of consistency of IT Infrastructure maintenance.  
2. IT Infrastructure’s maintenance is not based on necessity.  
3. There's schedule of It infrastructure of maintenance, but not entirely is coordinated. |
| Level 3 | 1. The assignment of staff is officially do regarding to infrastructure maintenance  
2. Fullfill of IT Infrastructure necessity which support organization activity which not do consistenly  
3. IT Infrastructure maintenance has been planned, scheduled, and coordinated. |
| Level 4 | 1. Maintenance IT has been developed well.  
2. IT Infrastructure which support business application of organization  
3. There's budget of scalability for IT Infrastructure |
| Level 5 | 1. Maintenance process of IT Infrastructure has been proactive and aligne to IT Architecture of organization.  
2. IT Infrastructure cost has been match to standard ratio.  
3. IT Infrastructure has been viewed as the ky to support business process organization. |
Table 3: Description maturity level A15

<table>
<thead>
<tr>
<th>Level 0</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
</table>
| 1. There's no procurement process in IT  
2. Organization doesn't realize regarding policy and procedure of resources. | 1. Organization has requirement of documentation of policy and procedure regarding resource of IT.  
2. There's an ad hoc relation between IT supplier and Management of Hotel Le Meridien. | 1. There's a lack of organization which have policy and procedure regarding cooperation with third party.  
2. Policy and procedure has integrated to a part of organization entirely regarding about procurement of IT resources.  
3. Procurement in most just use for big project.  
4. Policy of contract with third party is determined of management based on IT manager experienced. | 1. Management has policy and procedure regarding cooperation with third party.  
2. Policy and procedure which directed by business organization entirely in the procurement process  
3. Procurement of IT is initiated into mechanism of management project in organization.  
4. IT Management communicates with contract management regarding to cooperation of necessity with third party. | 1. System of procurement in business resources entirely handling by third party  
2. Measurement of contract and procurement management which relevant to business case for acquisition.  
3. Reporting from third party regarding to support of business.  
4. Usually, management realizes exception in policies and procedure for acquisition.  
5. Management of IT empowers using acquisition contract and process management to get acquisition by assessment of performance assessment. | 1. Institute management of resources of procurement process entirely for acquisition.  
2. Align to policies and empower management and procedure for acquisition.  
3. 3 Measurement in contract and procurement is relevant for business case on acquisition.  
4. Good relationship is maintained with partner, and the quality of relationship and monitor.  
5. Procedure and policy for third party is managed strategic and measurable  
6. IT Management bring how important strategy with third party which suitable and contract management in entirely function. |

F. Evaluation Stage

In questioner survey of maturity level at Hotel Le Meridien, we get responded; next make a recapitulation of questioner result. Assumed that every attribute has contribution value or same weighting to maturity level of A13 and A15, then status (as-is and to-be), the maturity level described in the following table:

<table>
<thead>
<tr>
<th>Proses (subdomain)</th>
<th>Maturity level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>as-is</td>
</tr>
<tr>
<td>A13 : Acquire and Maintain Technology Infrastructure</td>
<td>3</td>
</tr>
<tr>
<td>A15 : Procure IT Resources</td>
<td>2</td>
</tr>
</tbody>
</table>

Then the result of valuation at Hotel Le Meridien from A13 perspective is those following points:
1) There's assignment of staff officially regarding to maintenance of infrastructure at Hotel Le Meridien  
2) Fullfill of IT Infrastructure necessity which support organization activity which not do consistently.  
3) IT Infrastructure maintenance has been planned, scheduled, and coordinated.

A15 perspective is those following points:
1) There's awareness of organization which have policy and procedure regarding cooperation with third party.  
2) Policy and procedure has integrated to a part of organization entirely regarding about procurement of IT resources.  
3) Procurement of IT is initiated into mechanism of management project in organization.  
4) IT Management communicate with contract management regarding to cooperation of necessity with third party.
V. CONCLUSION AND FURTHER STUDIES

A. Conclusion
From research which done by author in Hotel Le Meridien Jakarta which concluded that Hotel Le Meridien Jakarta has maturity level -3 at domain AI3 and level maturity level-2 at domain AI5 with result:

From Domain AI3 perspective:
1) The assignment of staff is officially do regarding to infrastructure maintenance.
2) Fullfill of IT Infrastructure necessity which support organization activity which not do conistenly.
3) IT Infrastructure maintenance has been planned, scheduled, and coordinated.

From Domain AI5 perspective:
1. There's awareness of organization which have policy and procedure regarding cooperation with third party.
2. Policy and procedure has integrated to a part of organization entirely regarding about procurement of IT resources.
3. Procurement in most just use for big project.
4. Policy of contract with third prty is determined of management based on IT manager experienced.

B. Further Studies
To achieve Level 4 in subdomain AI3, there's several implementation plan which need:
1) Form IT Team which made maintenance to application, system, network and security of IT Le Meridien. (AI3 Lv 4 – Point Lv 4 – Point 1). This plan can be implemented on the first year.
2) Valuation IT to IT infrastructure of Le Meridiend did by IT Consultant who have many experience and certified (AI3 Lv 4 – Point 2). This can be implemented at the second year.
3) Le Meridien Management provide budget for IT Development at Le Meridien based on advice from IT Consultant who have many experience and certified.

For reaching Level 3 in subdomain AI5, there's implementation plan which required:
1. There's agreement to Vendor for doing IT development and IT standardization at Hotel Le Meridien. There's SOP in IT Management which developed (AI5 Lv 3 – Point 1) This can be implemented at first year.
2. Procurement involved independent auditor team to formulate IT and the decent based on Le Meridien demand, so it make minimum intervention or unhealthy prati cal in bidding of tender (AI5 Lv 3 – Point 2).
3. IT Procurement done for professionally and lead by a Project Manager which experience and certified to ensure project run fit to the plan (AI5 Lv 3 – Point 3). This can be done in the second year.
4. IT procurement has two big things, Technical IT and Commercial stuff. Procurement procest must involving both of procurement team and contrac review team to ensure from commerce, procurement IT fit to Le Meridien (AI5 Lv3 – Point 4). This will be implement ed on the third year.

Based on the evaluation results, within the next 3 years targeted for quality improvement on AI3 and AI5 domains (AI3 from level 3 to level 4) and (AI5 from level 2 to level 3)

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st</td>
</tr>
<tr>
<td>AI3</td>
<td></td>
</tr>
<tr>
<td>1. Maintenance IT has been developed well.</td>
<td>✔</td>
</tr>
<tr>
<td>2. IT Infrastructure which support business application of organization.</td>
<td></td>
</tr>
<tr>
<td>3. There's budget of scalability for IT Infrastructure.</td>
<td></td>
</tr>
<tr>
<td>AI5</td>
<td></td>
</tr>
<tr>
<td>1. Management has policy and procedure regarding cooperation with third party.</td>
<td>✔</td>
</tr>
<tr>
<td>2. Policy and procedure which directed by business organization entirely in the procurement process.</td>
<td>✔</td>
</tr>
<tr>
<td>3. Procurement of IT is initiated into mechanism of management project in organization.</td>
<td>✔</td>
</tr>
<tr>
<td>4. IT Management communicates with contract management regarding to cooperation of necessity with third party.</td>
<td>✔</td>
</tr>
</tbody>
</table>

REFERENCES


11. https://www.isaca.org