



Evaluation of Governance and Management of Information Technology Services Using Cobit 2019 and ITIL 4

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Abstract

The IT utilization is ultimately alleged to provide services to the community, to generate opportunity, to encourage and actualize convenience in public services with more affordable costs, transparency and efficiency of performance. To achieve successful IT implementation in line with the organizational goals, the 4 components are required, including: technology, people, organization, and vendor. Evaluation of governance and service management at the Directorate of Institutional, Directorate General of Higher Education has been performed by implementing COBIT 2019 to reveal the satisfaction level of service application in users by using e-GovQual. The IT capability level comprises the 11 processes based on the priority recommendations from the design factor. The respondents (to measure the IT service satisfaction) include Chairman of the Foundation, Leaders of Higher Education, and Chief Executive amounting to 463 respondents. The results of the IT capability level assessment conveyed the 3 processes at level 0 (incomplete), 6 processes at level 1 (initial), 1 process level 2 (managed) and 1 process level 3 (define). Measurement of the level of service satisfaction indicates 3 attributes in quadrant A (need concentration), 13 attributes in quadrant B (keep up the good work), 12 attributes in quadrant C (low priority) and 3 attributes in quadrant D (possible overkill). The results of the improvements are analyzed by using the SWOT matrix to reveal the strengths, weaknesses, opportunities and threats, further compiled based on the recommendations (for improvement) from COBIT 2019 and ITIL 4. The results of the recommendations include: increasing human resource competence and integrating services with PDDIKTI.

Keywords: COBIT 2019, E-Government, ITIL 4, User Satisfaction Directorate of Institutional.

1. Introduction

The Directorate of Institutional is an organizational unit of the Directorate General of Higher Education, under the the Ministry of Education and Culture holding several functions and tasks, including the granting of higher education licenses organized by the public and representatives of foreign countries or foreign institutions.

In improving the quality of institutional services to the community, the Directorate of Institutional utilizes an E-Government (SPBE; *Sistem Pemerintahan Berbasis Elektronik*) For example, silemkerma.kemdikbud.go.id is the services such as proposing, evaluating, and managing portal information on institutional licensing services (conveying the establishment and modification of private tertiary education and launching of study programs at tertiary education institutions. Thus, specific links such as izinbelajar.kemdikbud.go.id aims at providing the routine service in issuing study permits for international students who will study in tertiary education institution (as a requirement for international students) to obtain immigration documents issued by the Directorate General of Immigration, the Ministry of Law and Human

Rights; and pppts.kemdikbud.go.id aims at providing registration, evaluation, and monitoring of facilities and infrastructure assistance for a private tertiary education institution. Each service is managed by the respective Coordinator or Sub Directorate.

The SPBE services of The Ministry of Directorate of Institutional still have limitations such as shortcomings and weaknesses in the delivery of services to the public [1], poor service security management, and disintegration with the Higher Education Database (pddikti.kemdikbud.go.id). PDDIKTI conveys a collection of data on the implementation of higher education in all tertiary institutions, integrated nationally [2]. The Directorate of Institutional has also likely evaluated governance and service management affecting the public services and generating problems such as increased operational and IT costs, non-optimal use of assets, inaccurate fixing priorities, and uncontrolled services. These problems are alleged to be resolved by evaluating the governance and management of IT services [3] [4]. This study evaluates governance and

service management by measuring the level of IT capabilities and the satisfaction level of IT service users.

Good IT governance leads directly to increased productivity, higher quality, and improved financial results. Poor IT governance, on the other hand, often leads to programmatic waste, bureaucracy, lower morale, and diminished overall financial performance [5]. Effective IT governance and management, that is closely aligned to the business needs and supported by a strong business partnership, is extremely vital to the success of the IT function [6]. IT assets that interact with good IT governance are believed to affect overall organizational performance [7].

Frameworks and standards supporting effective IT governance include COSO, COBIT, ISO 9001, ISO 27002, ISO 38500 and COSO ERM. COBIT 5 has been widely used to implement IT organizations (GEIT) [8]. COBIT 5 includes a process reference model that defines and explains several governance and management processes [9]. COBIT 5 further strengthens the security of organizational applications with strict policies and rules [10]. ITIL provides and offers IT governance structures and focuses on continuous assessment and improvement of the performance of IT services provided [11]. ITIL also contributes to improving processes, results, and better quality for organizations [12]. ITIL has been proven to improve the overall quality of IT services, reducing costs, increasing customer satisfaction, and increasing productivity [13]. The frameworks relevant to this research are COBIT (Control Objective for Information and related Technology) 2019 and ITIL (Information Technology Infrastructure Library) 4.

The IT Governance approach and management of information technology services in COBIT and ITIL mutually complete each other to maintain the achievement of organizational goals [14-18]. In terms of process management, utilizing COBIT 5 and ITIL v3 collectively will provide a powerful model [19].

Previously, COBIT 5 research was performed to determine improvement goals based on the Goal Cascade. Whereas, COBIT 2019 presented assessment for the improvement objectives used Goal Cascade as well as the design factor affecting the design of an enterprise's governance system and position in the use of IT. To determine the practicality in ITIL 4, conversion from ITIL v3 was administered, in accordance with guidance from ITIL v3.

The satisfaction of service users on the website is analyzed by using the E-GovQual model to measure the quality services of website-based government systems [20]. One of the strategies to improve the quality of service and to evaluate the service quality in the context of e-Government is conducted by performing the measurement of the public service, through E-GovQual model [21].

The results of the recommendations in this study are based on the measurement results of the level of governance and service management capability levels as well as on the service user satisfaction. SWOT analysis is utilized in formulating improvement strategies based on strengths, weaknesses, opportunities, and threats for analysis at strategic planning, quality control while formulating government policies and legislations [22]. The results of the SWOT analysis are employed to prepare strategic recommendations that refer to the practical ITIL 4 and based on each of the evaluated COBIT 2019 capability processes. Thus, this research is expected to provide input and to determine priority improvements in IT services.

2. Research Method

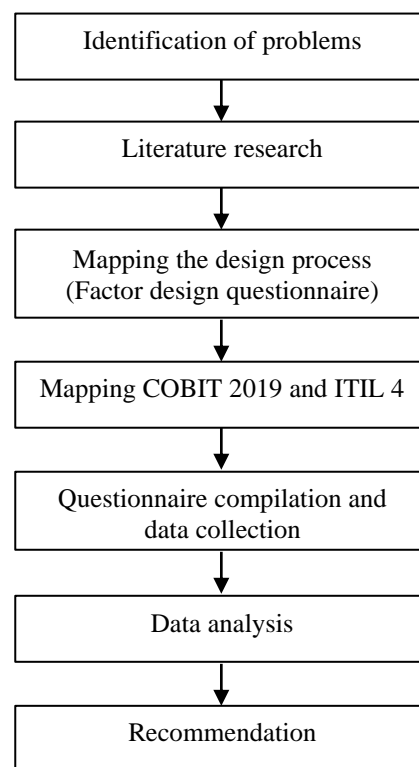


Figure 1. Research Methodology

2.1 Identification of Problem

From the introduction, it is concluded that IT managers face numerous problems such as technology (services, infrastructure and applications), people (skills and competencies), and organizations (principles, policies and procedures). To overcome this problem, it is thus necessary to evaluate IT service governance and management to provide recommendations for improvements by utilizing COBIT 2019 and ITIL 4.

2.2 Literature research

This study engages various theories and methods related to research topics, aiming to find out the theories and methods which are suitable in IT Governance, IT Service Management; to improve the quality of website services;

and to evaluate and recommend based on ITIL 4 by utilizing the SWOT method.

2.3 Mapping the Design Process

Determining governance and management objectives are priority improvements based on design factors [23] [24]. The first-factor design is granted to the related Director Institutions to:

1. Enterprise strategy, enterprises can have different strategies, which can be expressed as one or more of the archetypes.
2. Enterprise goals supporting the enterprise strategy—enterprise strategy is realized by the achievement of (a set of) enterprise goals. These goals are defined in the COBIT framework, structured along the balanced scorecard (BSC) dimensions, and include the elements.
3. Threat landscape, the threat landscape under which the enterprise operates can be classified.
4. Compliance requirements to classify based on compliance requirements towards regulations that must be adhered to by the organization.
5. Enterprise Size are identified for the design of an enterprise’s governance system [23].

The second design factor is granted to the Data and Information Coordination, Directorate General of Higher Education related to:

1. Risk profile of the enterprise and current issues in relation to IT—The risk profile identifies the sort of IT related risk to which the enterprise is currently exposed and indicates which areas of risk are exceeding the risk appetite.
2. IT-related issues—A related method for an IT risk assessment for the enterprise is to consider which I&T-related issues it currently faces, or, in other words, what IT-related risk has materialized.
3. Role of IT to classify the role of IT according to indications.
4. Sourcing model for IT to classify the IT model adopted/applied.
5. IT implementation methods to classify the often utilized development methods.
6. Technology adoption strategy of adopting technology to classify the organization's strategy in the use of technology [23].

In this study, the design factor recommendations applied sets a minimum value of 70 due to it is a priority for improvement as presented in Table 1.

Table 1. Design Process Mapping Table

| Area | Domain | Governance and Management Objectives | Value |
|------------|------------------------------------|--------------------------------------|-------|
| Governance | Evaluate, Direct and Monitor (EDM) | EDM03 Ensured Risk Optimization | 70 |
| Management | Align, Plan and | APO10 Managed Vendors | 70 |
| | | APO12 Managed Risk | 90 |

| Area | Domain | Governance and Management Objectives | Value |
|------|---|--|-------|
| | <i>Organize (APO)</i> | | |
| | | BAI02 Managed Requirements Definition | 70 |
| | <i>Build, Acquire and Implement (BAI)</i> | BAI03 Managed Solutions Identification and Build | 100 |
| | | BAI06 Managed IT Changes | 85 |
| | | BAI07 Managed IT Change Acceptance and Transitioning | 75 |
| | | BAI10 Managed Configuration | 70 |
| | <i>Deliver, Service and Support (DSS)</i> | | |
| | | DSS04 Managed Continuity | 80 |
| | | DSS05 Managed Security Services | 90 |
| | <i>Monitor, Evaluate and Assess (MEA)</i> | | |
| | | MEA01 Managed Performance and Conformance Monitoring | 75 |

2.4 Mapping COBIT 2019 and ITIL 4

To provide practice recommendations for ITIL management practices [25], to the researchers map the COBIT 2019 process with ITIL 4 by using the related guidance component of COBIT 2019 [26], continued by the conversing of ITIL v3 process and activities into ITIL 4 practice [27] as presented in Table 2.

Table 2. Design Process Mapping [27]

| COBIT 2019 | ITIL v3 | ITIL4 |
|--|---|--|
| APO10.03 Manage vendor relationships and contracts | Service design, 4.8 supplier management | General management practices, 5.1.13 supplier |
| BAI02.01 Define, and maintain business functional and technical requirements | Service design, 5.1 requirement engineering | Service management practices, 5.2.2 business analysis |
| BAI03.03 Develop solution components | Service strategy, 5.5 service strategy, and application development | Technical management practices, 5.3.3 Software development and |
| BAI06.01 Evaluate, prioritize and authorize change requests | Service transition, 4.2 change management | Service management practices, 5.2.4 change control |
| BAI07.01 Establish an implementation plan | Service transition, 4.1 transition planning, and support | |
| BAI07.02 Plan business process, system, and data conversion | | |
| BAI07.05 Perform acceptance tests | Service transition, 4.5 service validation, and testing | Service management practices, 5.2.17 service validation, and testing |

| COBIT 2019 | ITIL v3 | ITIL4 |
|---|--|--|
| BAI07.06 Promote to production and manage releases | Service transition, 4.4 release and deployment management | Service management practices, 5.2.9 release management Technical management practices, 5.3.1 deployment management |
| BAI07.08 Perform a post-implementation review | Service transition, 4.6 change evaluation | Service management practices, 5.2.4 change control |
| BAI10.01 Establish and maintain a configuration model | Service transition, 4.3 service asset and configuration management | Service management practices, 5.2.11 Service configuration management Service management practices, 5.2.6 IT asset management |
| DSS04.02 Maintain business resilience | Service design, 4.6 IT continuity management | Service management practices, 5.2.12 Service continuity management |
| DSS05.04 Manage user identity and logical access | Service Operation, 4.5 Access Management | General management practices, 5.1.3 Information security management |

2.5. Questionnaire Compilation and Data Collection

The drafting of the questionnaire was utilized to obtain an overview related to IT implementation divided into two parts. The first questionnaire was prepared based on the COBIT 2019 activity process, presented to stakeholders to measure the level of capability and expectations of stakeholders.

The drafting of a questionnaire was undertaken to obtain an overview of IT implementation. The first questionnaire was based on the 2019 COBIT activity process and given to stakeholders according to component such as organizational structures to measure the level of capabilities and expectations of stakeholders.

The second questionnaire was compiled by using the dimensions of E-GovQual and given to service users to determine user satisfaction and expectations of services. The sampling method was regarded as random sample, employing Slovin formula as follows [28]:

$$n = \frac{N}{1 + Ne^2} \quad (1)$$

Description:

- n : Number of required sample
- N : Number of population
- e : Margin error

The population was 2379 based on State tertiary education institutions and Private tertiary education institutions under the Ministry of Education and Culture who utilized services at the Directorate of Institutional. If the error rate is 5%, then the minimum sample required is 342. Data collection was carried out in February - March 2020 through the surveilayanan.id website. The questionnaire implements a Likert scale to reveal the performance appraisal and expectations with intervals of 1 to 5. The questionnaire sample involved as many as 463 respondents consisting of 16 Heads of Foundations, 213 Higher Education Leaders, 234 Head of Activities/Programs.

2.5. Data Analysis

2.5.1 Capability Level

The level of achievement activities and capability process expectations for each component of governance and management was measured by using CMMI (Capability Maturity Model Integration) [23] [29] as depicted in Table 3.

Table 3. Capability Levels for Processes [23][29]

| Level | Information |
|-------|---|
| 0 | Lack of any basic capability. Incomplete approach to address governance and management purpose. May or may not be meeting the intent of any process practices. Inconsistent performance. |
| 1 | The process more or less achieves its purpose through the application of an incomplete set of activities that can be characterized as initial or intuitive—not very organized. Addresses performance issues. |
| 2 | The process achieves its purpose through the application of a basic, yet complete, set of activities that can be characterized as performed. Identifies and monitor progress toward project performance objectives. |
| 3 | The process achieves its purpose in a much more organized way using organizational assets. Processes typically are well defined. Focuses on achieving both project and organizational performance objectives. |
| 4 | The process achieves its purpose, is well defined, and its performance is (quantitatively) measured. Identifies and understands variation, and predicts and improves the ability to achieve quality and process performance objectives. |
| 5 | The process achieves its purpose, is well defined, its performance is measured to improve performance and continuous improvement is pursued. |

The Guttman scale assesses each activity of the components of the governance and management process. If the activity has been performed, then it is granted a score of 1 if otherwise, it is granted a score of 0 [18]. The determination of the evaluation applies to Equation 2.

$$CC = \frac{\Sigma CLa}{\Sigma Po} \times 100\% \quad (2)$$

Description:

- CC : The achievement value of governance and management capability levels
- ΣCLa : The total value of governance and management
- ΣPo : Total number of governance and management activities

ISO 33004: 2015 consisting of four scales was used to determine the capability level in the activity ranking process as can be seen in Table 4 [23].

Table 4. Rating Process Activities

| Scale | Information | Achievement (%) |
|-------|---------------------------|-----------------|
| N | <i>Not Achieved</i> | 0 -14 |
| P | <i>Partially Achieved</i> | 15 - 49 |
| L | <i>Largely Achieved</i> | 50 – 84 |
| F | <i>Fully Achieved</i> | 85 - 100 |

2.5.2 Expectation and Gap Analysis

Capability expectation analysis explains the level to be achieved from governance and management objectives. Gap analysis is derived from the capability expectation level value reduced by the current capability level value. These results are significant in improving governance and service performance at the Directorate of Institutional, Directorate General of Higher Education.

2.5.3 Validity and Reliability Analysis

In this step the refining of the sample of items takes place—in order to come up with an initial scale—deciding on such operational issues as question types and question sequence [20]. Reliability as an assessment of the degree of consistency between multiple measurements of a variable. This study assesses the consistency of the entire scale with Cronbach’s alpha and its overall reliability of each factor of productivity values [30].

2.5.4 Importance Performance Analysis

Importance Performance Analysis (IPA) method aims to measure the relationship between consumer perceptions and product/service quality improvement priorities which is also known as quadrant analysis [18].

2.6 Recommendation

Recommendations are based on the evaluation of COBIT 2019 and the mapping of COBIT 2019 with ITIL 4. The results of these recommendations constructed an analysis based on the SWOT matrix.

3. Result and Discussion

3.1. User Satisfaction of IT Services

Most respondents were from tertiary education institution in the Higher Education Service Institution (LLDIKTI) in Region IX of Sulawesi with 67 respondents, LLDIKTI in Region V of Yogyakarta with 54 respondents, LLDIKTI in Region IV of West Java and Banten and in LLDIKTI in Region VI of Central Java with 49 respondents.

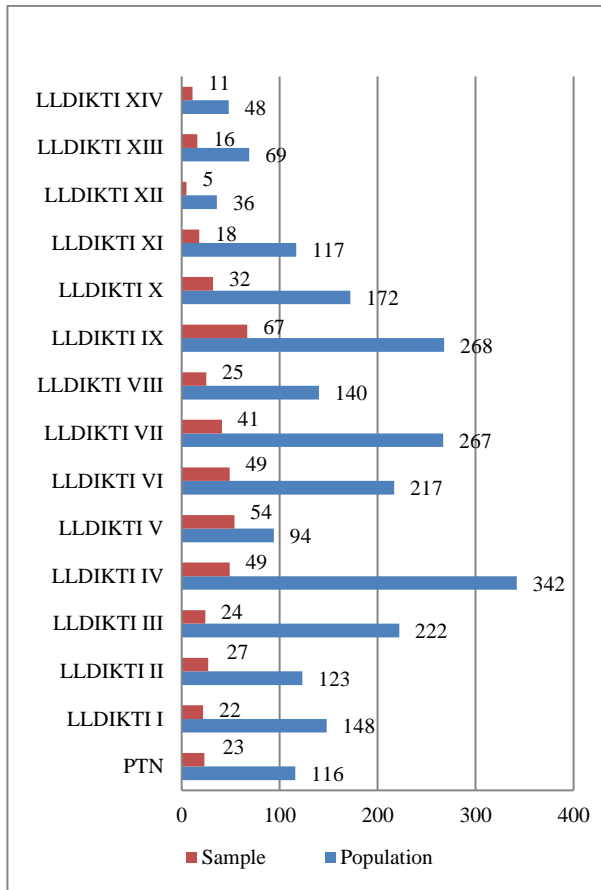


Figure 2. Total Population and Sample

To discover the distribution of respondents, the results of the questionnaire employing descriptive statistical processing were based on the work area and the form of the respondent's tertiary institutions as presented in Table 5. The figure presents the distribution of respondents based on the form of tertiary education. The respondents of each tertiary education form were: Tertiary Institutions by 194 respondents, Universities by 124 respondents, Academy by 88 respondents, Polytechnic by 45 respondents, and Institute by 12 respondents.

Table 5. Distribution Table of Respondents Based On Work Area and Forms of Tertiary Education

| Working Area | Univer sities | Institutes | Advanced schools | Poly tech nic | Acade my |
|---|------------------|------------|---------------------|---------------------|-------------|
| State Tertiary Education Institutions (PTN) | 10 | 1 | - | 12 | - |
| LLDIKTI I (North Sumatera) | 8 | 1 | 5 | 2 | 6 |
| LLDIKTI II (South Sumatera, Lampung, Bengkulu, and Bangka-Belitung) | 5 | - | 15 | 1 | 6 |
| LLDIKTI III (Special Capital Region of Jakarta) | 8 | 3 | 5 | 1 | 7 |

| Working Area | Univer sities | Institut es | Advanced schools | Poly tech nic | Acade my | Website's reliability | 0.683 | 0.747 | 3.84 | 4.57 | C |
|--|------------------|----------------|---------------------|---------------------|-------------|--|-------|-------|------|------|---|
| LLDIKTI IV (West Java and Banten) | 10 | 4 | 29 | 4 | 5 | Protecting anonymity | 0.688 | 0.701 | 4.06 | 4.67 | B |
| LLDIKTI V (Special Region of Yogyakarta) | 12 | 4 | 17 | 6 | 15 | Secure archiving of personal data | 0.670 | 0.725 | 4.08 | 4.63 | B |
| LLDIKTI VI (Central Java) | 15 | - | 17 | 6 | 11 | Providing security guidelines | 0.712 | 0.764 | 3.83 | 4.57 | C |
| LLDIKTI VII (East Java) | 19 | - | 18 | 2 | 2 | User Authentication | 0.620 | 0.708 | 4.14 | 4.64 | B |
| LLDIKTI VIII (Bali, East Nusa Tenggara, and West Nusa Tenggara) | 8 | 1 | 10 | 4 | 2 | Procedure of acquiring username and password | 0.642 | 0.714 | 4.17 | 4.67 | B |
| LLDIKTI IX (Sulawesi Island) | 11 | 1 | 34 | 4 | 17 | Encrypted messages | 0.717 | 0.741 | 3.96 | 4.55 | C |
| LLDIKTI X (West Sumatera, Riau, Jambi, and Riau islands) | 5 | - | 21 | - | 6 | Access control | 0.713 | 0.642 | 3.89 | 4.47 | C |
| LLDIKTI XI (Kalimantan Island) | 4 | - | 9 | 1 | 4 | Functionality of the interaction environment | | | | | |
| LLDIKTI XII (Maluku, and North Maluku) | 1 | - | 2 | - | 2 | Existence of online help in forms | 0.716 | 0.780 | 3.94 | 4.57 | C |
| LLDIKTI XIII (Special Region of Aceh) | 5 | - | 7 | 1 | 3 | Adequate response format | 0.737 | 0.767 | 3.95 | 4.58 | C |
| LLDIKTI XIV (Special Region of Papua and Special Region of West Papua) | 3 | - | 5 | 1 | 2 | Reliability | | | | | |
| Total | 124 | 12 | 194 | 45 | 88 | Document download requires time | 0.722 | 0.756 | 4.01 | 4.65 | B |
| | | | | | | Document upload requires time | 0.723 | 0.784 | 3.97 | 4.65 | A |
| | | | | | | Accessibility of site | 0.692 | 0.769 | 4.14 | 4.69 | B |
| | | | | | | Browser- system compatibility | 0.666 | 0.804 | 4.23 | 4.70 | B |
| | | | | | | Ability to perform the promised service accurately | 0.732 | 0.770 | 4.03 | 4.63 | B |

3.2. Validity Test of Performance and Service Expectations

The 463 respondents followed the validity test of service performance and user expectations. By correlating between item scores and their total scores (if each question correlates with score count > 0.098 (r-table)), each question is declared valid.

Table 6. Validity Test Table of Performance and Service Expectations

| Attributes | r – perfor mance | r – expec tations | Perfor mance | Expec tations | Quad rant | Economical of Website | 0.695 | 0.773 | 4.21 | 4.67 | B |
|-----------------------------|------------------------|-------------------------|-----------------|------------------|--------------|--|-------|-------|------|------|---|
| Ease of Use | | | | | | Content and appearance of information | | | | | |
| Website's Structure | 0.720 | 0.669 | 4.09 | 4.67 | B | Availability of guidelines | 0.738 | 0.782 | 4.13 | 4.67 | B |
| Sitemap | 0.739 | 0.700 | 3.99 | 4.63 | A | The fill-in form is concise and easy to complete | 0.811 | 0.841 | 4.10 | 4.66 | B |
| Easy to remember URL | 0.590 | 0.642 | 4.17 | 4.64 | B | Conformity requirements | 0.760 | 0.809 | 4.04 | 4.60 | D |
| Ability of customization | 0.638 | 0.674 | 4.03 | 4.52 | D | Punctuality according to schedule | 0.636 | 0.748 | 3.76 | 4.55 | C |
| Trust | | | | | | Information and issues are updated regularly | 0.686 | 0.755 | 3.83 | 4.58 | C |
| | | | | | | All links are active | 0.677 | 0.757 | 3.92 | 4.58 | C |

| | | | | | |
|----------------------------|-------|-------|------|------|---|
| Graphics and color | 0.687 | 0.741 | 3.92 | 4.55 | C |
| Size of web pages | 0.703 | 0.783 | 4.03 | 4.58 | D |
| Citizen support | | | | | |
| User friendly guidelines | 0.728 | 0.776 | 3.93 | 4.57 | C |
| Frequently Asked Questions | 0.630 | 0.622 | 3.79 | 4.45 | C |
| Knowledge of operator | 0.702 | 0.686 | 3.92 | 4.63 | A |

3.3. Reliability Test

This test is conducted to measure the reliability of answers to consistent questions by utilizing the formula of "Alpha Cronbach. If the Cronbach's Alpha value is > 0.90 then the reliability is declared to be perfect [31]. The results of the reliability test for each variable are presented in Table 7.

Table 7. Reliability Test

| Instrument | Alpha Cronbach's | Result |
|-------------|------------------|----------|
| Performance | 0.964 | Reliable |
| Expectation | 0.972 | Reliable |

3.4 Quadrant Analysis

The average value of service performance and user expectations in Table 6 is later utilized in the intersection of the Cartesian diagram based on Importance Performance Analysis (IPA). The level of user satisfaction with the services provided becomes an evaluation material for improvements in indicators to maintain improve the good services. The axis (X) of the Cartesian diagram represents the average range of service performance assessment scores with a score of = 4.00 and the axis (Y) of the Cartesian diagram represents the average range of service expectation assessment scores with a score of = 4.61

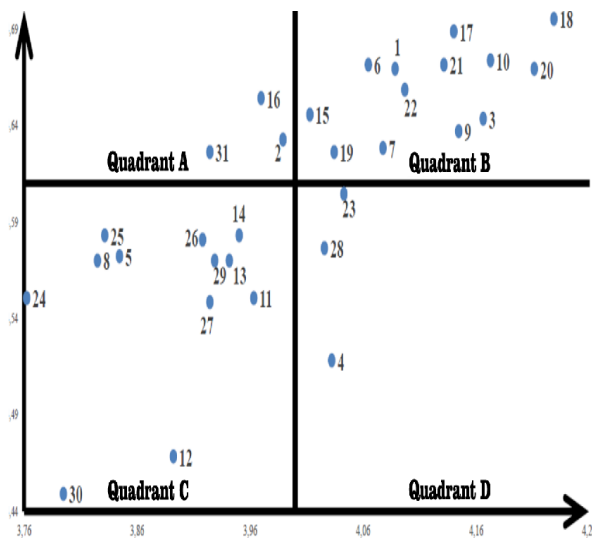


Figure 3. Analysis of the Quadrants for the e-GovQual Attributes

The result of attributes A in this diagram reveals the priority variables for improvement. The results of attributes B in the diagram exhibits the variables that should be maintained, due to the terms of high quality, and the level of importance or users satisfaction is also high. The result of attributes C in the diagram describes the variables that are less priority due to in terms of quality is low, and diagram D displays the variables that can be considered excessive due to the quality is considered high, though less expected.

3.5 Level of Achievement in Governance and Management of IT Services

In comparison, the value of 3 APO10 indicates that the activities and processes are organized and well defined. All processes still have gaps between capabilities or current achievements (As is) and desired expectations (To be); therefore, it needs to be followed through to improve what is expected.

Table 8. Achievement Expectation Level

| Governance/Management Process | | Achievement | Hope | Gap |
|-------------------------------|--|-------------|------|-----|
| EDM03 | Ensured risk optimization | 0 | 4 | 4 |
| APO10 | Managed vendors | 3 | 5 | 2 |
| APO12 | Managed risk | 2 | 4 | 2 |
| BAI02 | Managed requirements definition | 1 | 5 | 4 |
| BAI03 | Managed solutions identification and build | 1 | 4 | 3 |
| BAI06 | Managed IT changes | 0 | 4 | 4 |
| BAI07 | Managed IT change acceptance and transitioning | 1 | 4 | 3 |
| BAI10 | Managed configuration | 1 | 4 | 3 |
| DSS04 | Managed continuity | 0 | 4 | 4 |
| DSS05 | Managed security services | 1 | 5 | 4 |
| MEA01 | Managed Performance and Conformance Monitoring | 1 | 4 | 3 |

The assessment results of the capabilities of the governance and management process using equation (1). The capability process has a value of 0 at EDM03, BAI06, and DSS04, this is prompted due to there are still many governance and management process activities that have not been executed. For values, one on BAI02, BAI03, BAI07, BAI10, DSS05, and MEA01 prove that in achieving the objectives through the implementation of incomplete or not organized activities. For value two on APO12 shows, there has been an improvement in achieving goals through an approach that can be characterized as performance. Specific process is deemed essential to achieve the expected goals; thus, the improvement of IT service governance and management

is managed and conducted in stages according to the priority of improvement and continuity.

3.6 Recommendation Results

Recommendations for improvement of IT services by the Directorate of Institutional are carried out based on ITIL 4, before drafting a strategy recommendation first done SWOT analysis. SWOT analysis is used to separate the strengths, weaknesses, opportunities and threats to IT services. Generally obtained as follows:

3.6.1 Analysis of SWOT

1. Strengths: functional organizational structure, support from the leader of the organization, proper supplier management, adequate IT infrastructure, management of IT frameworks and resources commenced to be improved, configuration management, and problems with IT services commenced to be improved, asset management initiated to be improved.
2. Weakness: human resource competency improvement, periodic performance evaluation has not been performed, HR understanding of IT security is not sufficient, SOP/technical guidelines/service standards are not optimized, risk and change, as well as problems management, are not optimal, service applications are still not integrated with PDDIKTI.
3. Opportunities: punctual vision and mission accomplishment, increasing organizational culture and ethical behavior, increasing effectiveness and efficiency of the budget, improving user services, appreciation from the government, the implementation of processes or activities accurately, and as needed.
4. Threats: the possibility of natural disasters, the possibility of malware attacks, physical and data, as well as information security threats, the possibility of a budget reduction.

3.6.2 Strategy Recommendations

The SWOT analysis result is then compiled a strategy recommendation with reference to practice ITIL 4. Recommendations are obtained as follows:

- 1 Strengths – Opportunities strategy: compiling, controlling, implementing, monitoring, and evaluating every IT process on an ongoing basis; making documentation and report on activities and improvements of inputs, outputs, and constraints; optimization of supplier management; maintaining good relations with suppliers; applying inventory management methods.
- 2 Opportunities – Weaknesses strategy: a program to improve the quality and quantity of human resources, analyzing and documenting and reporting changes and risks, drafting short-term, medium-term and long-term change plans, implementing policies and procedures and standards, developing applications and management of integrated data

3 Strengths – Threats strategy: programs of controlling and evaluating IT security management, controlling and supervising operational activities, the existence of priority programs, optimizing the use of IT infrastructure, designing systems that are ready for all conditions.

- 4 Weaknesses – Threats strategy: documenting and reporting changes and security activities, determining the scope and limits as well as minimum program achievement standards, conducting monitoring and evaluation of change.

3.6.3 Recommendation COBIT 2019 and ITIL

Recommendations are presented based on the capability of COBIT 2019 activities and the mapping from COBIT 2019 to ITIL 4 as follows:

1. EDM03 activity has three processes, particularly to:
 - 1) evaluate risk management, 2) direct risk management, 3) monitor risk management. Based on the results of the EDM03 assessment at capability level 1 and expectations at capability level 4 with a 3-level gap, the recommended activities are as follows:
 - a. Ensuring that the organization's risk desire and risk tolerance are understood, articulated, and communicated.
 - b. Ensuring the sustainability of risk management evaluations.
 - c. Ensuring the direction of risk management not to exceed the acceptable risk.
 - d. Monitoring and evaluating the risk management process.
2. APO10 activity has five processes, specifically to: 1) identify and evaluate vendor relationships and contracts, 2) select vendors, 3) manage vendor relationships and contracts, 4) manage vendor risk, 5) monitor vendor performance and compliance. Based on the APO10 evaluation results are at capability level 3 and expectations at capability level 5 by having a gap of 2 levels, the recommended activities are provided as follows:
 - a. Identifying and managing risks related to supplier capabilities.
 - b. Monitoring and evaluating supplier performance and compliance.
 - c. For ITIL 4 recommendations, specifically: ensuring that supplier performance is appropriately managed in supporting the sustainability of programs and services.
3. APO12 activity has six processes, particularly to: 1) collect data, 2) analyze risk, 3) maintain a risk profile, 4) articulate risk, 5) define a risk management action portfolio, 6) respond to risk. Based on the evaluation results, APO12 are at capability level 2 and expectations at capability level 4 with a 2 level gap; the recommended activities are given as follows:
 - a. Identifying relevant risk event data.

- b. Possessing a risk profile related to information on occurred IT risk events.
 - c. Ensuring that the analysis of events, factors, and risk impacts has been validated.
 - d. Monitoring and evaluating risk management.
4. BAI02 activity has four processes, particularly to: 1) define and maintain business functional and technical requirements, 2) perform a feasibility study and formulate alternative solutions, 3) manage requirements risk, 4) obtain approval of requirements and solutions. Based on the evaluation results, the APO02 is at the capability level 1 and expectations is at the capability level 5 with a 4 level gap, the recommended activities are given as follows:
- a. Determining and defining IT business needs.
 - b. Ensuring cost optimization (the value received must be higher than the cost).
 - c. Monitoring and evaluating risk management needs.
 - d. Ensuring the availability of agreement/contract.
 - e. For ITIL 4 recommendation, which is determining the needs and requirements for resolving or solving business problems for value creation.
5. BAI03 activity has 12 processes, specifically to: 1) design high-level solutions, 2) design detailed solution components, 3) develop solution components, 4) procure solution components, 5) build solutions, 6) perform quality assurance (QA), 7) prepare for solution testing, 8) execute solution testing, 9) manage changes to requirements, 10) Maintain solutions, 11) define IT products and services and maintain the service portfolio, 12). design solutions based on the defined development methodology. Based on the results of the assessment, the BAI03 is at capability level 1 and expectations are at capability level 4 with a gap of 3 levels, the recommended activities are as follows:
- a. Ensuring the component of the solution is aligned with IT Strategy and organizational architecture.
 - b. Ensuring that development, resources, and quality assurance are aligned with quality management systems.
 - c. Defining the test plan and environment required to examine the solution component
 - d. for ITIL 4 recommendations, ensuring that each application development is carried out according to the needs of internal and external stakeholders in terms of functionality and reliability, and ensuring the selection of the application.
6. BAI06 activity has four processes, particularly to: 1) evaluate, prioritize and authorize change requests, 2) manage emergency changes, 3) track and report change status, 4) close and document the changes. Based on the evaluation results, BAI06 is at the level of capability 0 and expectations is at the level of capability 4 with a 3 level gap, the recommended activities are as follows:
- a. Determining and evaluating the impact of change requests on business processes and IT services.
 - b. Ensuring that change management procedures are controlled, monitored and reviewed.
 - c. For ITIL 4 recommendations, ensuring that risks have been assessed, authorization is available, and managing schedule changes.
7. BAI07 activity has eight processes, particularly to: 1) establish an implementation plan, 2) plan business process, system and data conversion, 3) plan acceptance tests, 4) establish a test environment, 5) perform acceptance tests, 6) promote to production and manage releases, 7) provide early production support, 8) perform a post-implementation review. Based on the evaluation results, the BAI07 is at capability level 0, and expectations are at capability level 4 with a gap of 3 levels, the recommended activities are as follows:
- a. Establishing an implementation plan for implementing changes and transitions.
 - b. Generating business processes, IT service data, and infrastructure migration designs.
 - c. Ensuring plans and tests change to suffice the quality assurance requirements and established testing plans.
 - d. Monitoring and evaluating the performance of new or modified services
 - e. For ITIL 4 recommendation, that is making a schedule for planning changes and assigning resources and ensuring new IT infrastructure and services (modified or updated) to suffice specified requirements and document service guarantee criteria on utilities and warranties and conducting documentation and training (for IT users or staff). Ensuring the deployment of hardware, software, documentation, processes, or other components can be used in the actual environment.
8. BAI10 activities have five processes, particularly to: 1) establish and maintain a configuration model, 2) establish and maintain a configuration repository and baseline, 3) maintain and control configuration items, 4). produce status and configuration reports, 5). verify and review integrity of the configuration repository. Based on the evaluation results, BAI10 is at capability level 1 and expectations is at capability level 4 with a gap of 3 levels, the recommended activities are as follows:
- a. Evaluating and improving configuration management.
 - b. Creating and managing configuration management and controlling configuration baselines.
 - c. Ensuring completeness, accuracy, and review of configuration items (CIs) changes according to the baseline.
 - d. For ITIL 4 recommendation, particularly Ensuring that information is accurate and reliable regarding the configuration management process.

Establishing relationships among various component items managed and planned under the Service Asset and Configuration Management (SACM).

9. DSS04 activity has eight processes, particularly to:
 - 1) define the business continuity policy, objectives and scope,
 - 2) maintain business resilience,
 - 3) develop and implement a business continuity response,
 - 4) exercise, test and review the business continuity plan (BCP) and disaster response plan (DRP),
 - 5) review, maintain and improve the continuity plans,
 - 6) conduct continuity plan training,
 - 7) manage backup arrangements,
 - 8) conduct post-resumption review.Based on the assessment results, DSS04 is at level 0 capability, and expectations are at level 4 capability with a 4 level gap, the recommended activities are given as follows:
 - a. Identifying internal business processes, outsourcing, and service activities that support the organization's operations.
 - b. Conducting training or testing and evaluation of business resilience options and determining cost-effective and feasible strategies.
 - c. Creating and recording business continuity plan (BCP) and disaster recovery plan (DRP) procedures based on strategy.
 - d. Conducting backups of valuable information on a business basis.
 - e. For ITIL 4 recommendations, particularly ensuring business continuity management (BCM) and IT planning capabilities and services can be continued/operated within the timeframe required and agreed upon after a disaster.
10. DSS05 activity has seven processes, particularly to:
 - 1) protect against malicious software,
 - 2) manage network and connectivity security,
 - 3) manage endpoint security,
 - 4) manage user identity and logical access,
 - 5) manage physical access to I&T assets,
 - 6) manage sensitive documents and output devices
 - 7) manage vulnerabilities and monitor the infrastructure for security-related events.Based on the evaluation result, the DSS05 is at capability level 1 and expectations are at capability level 5 with a 4 level gap, the recommended activities are as follows:
 - a. Creating a portfolio of technology, services, and assets in identifying information security vulnerabilities.
 - b. Conducting outreach and training on information security, prevention procedures, and responsibilities.
 - c. Testing, reviewing, and evaluating information concerning the security system.
 - d. For ITIL 4 recommendations, specifically ensuring that they can protect the information, including understanding and managing risks toward confidentiality, integrity, availability of information, authentication, and non-repudiation.
11. MEA01 activity has five capability processes, specifically to: 1) establish a monitoring approach, 2)

set performance and conformance targets, 3) collect and process performance and conformance data, 4) analyze and report performance, 5) ensure the implementation of corrective actions. Based on the assessment results, MEA01 is at capability level 1 and expectations are at capability level 4 with a 3 level gap, the recommended activities are as follows:

- a. Monitoring the performance appraisal on the process determined and the suitability of organizational goals.
- b. Establishing and maintaining a monitoring approach to the determination of objectives, scope, and methods.
- c. Analyzing and reporting performance regularly

4. Conclusion

Capability assessment utilizes COBIT 2019 by measuring 11 processes and measuring user satisfaction with six dimensions and 31 criteria. The evaluation results of IT capability level (currently) indicate 3 levels of 0 process, six levels of 1 process, 1 level of 2 processes, and 1 level of 3 processes. The expected levels of IT capability are at levels 4 and 5. Measurement of the service satisfaction occupies: three attributes in quadrant A, 13 attributes in quadrant B, 12 attributes in quadrant C, and three attributes in quadrant D. The priority recommendations are presented to improve this study by utilizing SWOT analysis, emphasized to support IT governance and service management capabilities as well as implementation of SPBE (e-government) in the Directorate of Institutional.

Acknowledgements

The author would like to thank the Ministry of Education and Culture, Directorate General of Higher Education, and Directorate of Institutional.

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