

# Analysis of the USM Lecturer PPKM application portal using COBIT 2019 Framework

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**Abstract:** The USM lecturer PPKM application portal information system provides services and information regarding the research and community service activities of USM lecturers. The services available in this application include PPKM proposals, PPKM assessments, PPKM evaluations, progress reports, contracts, assignment letters and presentation schedules. To improve the system services that have been used so far, analysis and evaluation are needed so that system performance can provide accurate information and according to needs. The purpose of this research is to analyze the performance of applications using the COBIT 2019 framework. The method used is a mix method, which combines data from interviews and observations and data from questionnaires. The research subjects consisted of 7 (seven) IT admins and 30 USM permanent lecturers. The COBIT 2019 framework used as the basis for analysis consists of 11 factors, namely: Enterprise strategy; Enterprise goals; Risk Profile; IT Related Issue; IT Threat Landscape; Compliance Requirement; Role Of IT; IT Sourcing Model; IT Implementation Method; Technology Adaptation Strategy; and Enterprise Strategy. The results showed that there are 2 (two) objectives that need to go to the core model evaluation stage, namely BAI03 and BAI07. The results of the maturity analysis on BAI03 are at level 2, which is 67.1%. While the results of the maturity analysis on BAI07 show results of 72.7%.

**Keywords:** Governance Analysis, PPKM Application Portal, COBIT 2019

## I. INTRODUCTION

Semarang University (USM) is a private university in Semarang City. USM has a centralized information system called the Information Technology Unit (SakTI). The information system provides a wide range to students and the entire USM academic community. These services include the student academic information system (Siska), Final Project / Thesis services, PMB, financial administration, KKN information, correspondence etc.

The research and community service services of USM lecturers before the portal was created were provided manually. The impact felt is that it is difficult to obtain data on the preparation, implementation and evaluation of PPKM activities of USM Lecturers. Currently, the SakTI information system has a research and community service (PPKM) portal application for USM lecturers.

This application contains information regarding PPKM proposals, progress reports, final reports, presentation schedules, assignment letters, etc. To support the Tri Dharma activities of university lecturers, this application is highly essential for both lecturers and university administrators. This application facilitates the provision of information on PPKM activities for USM lecturers. For lecturers, providing a record of PPKM activities undertaken facilitates the completion of their Professional Development Credits (BKD). For university administrators, it enables the provision of data on PPKM activities carried out by lecturers, facilitating the accreditation process.

The Information Technology Unit (SaKTI) is managed by the Head of the Information Center and seven IT administrators. The Information Technology (IT) Department of the University of Semarang continues to strive for optimal service improvement for lecturers. To achieve this goal, effective information technology management becomes the key. This success is also closely related to the availability of information technology facilities that can accelerate, simplify, and provide convenience in services, with a positive impact on the quality of research and community service (PPKM) for lecturers.

The interview and observation results with the IT team revealed several issues, including the absence of application development, resulting in the application's inability to accommodate needed information such as the integration of faculty and student research. Additionally, users show a lack of acceptance of changes and IT transitions. The PPKM application portal requires further analysis to assess its performance and identify areas for improvement. This analysis will be conducted through information system auditing, which involves assessing evidence to determine whether computer systems can maintain data integrity and protect assets, ultimately helping the organization achieve its goals. [1]

The analysis of the information system governance for the USM lecturer's PPKM application portal was conducted using the COBIT 2019 framework (Control Objectives for Information and Related Technology). COBIT 2019 is a framework that can assist in managing control objectives, technical issues, and business risks, and facilitate communication with application service users. The selection of

the COBIT 2019 framework was made due to its comprehensive coverage. The operational and technical standards outlined in COBIT 2019 were deemed superior to other analysis tools used.[2], [3].

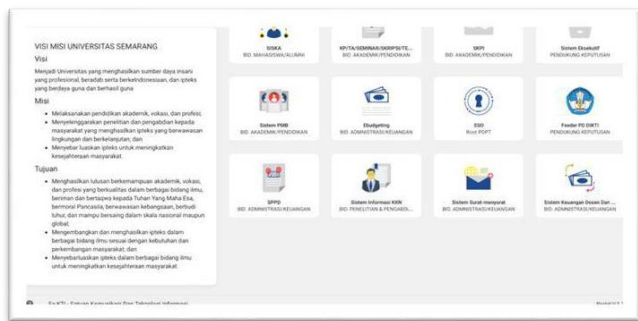


Fig 1. Display of the USM portal application

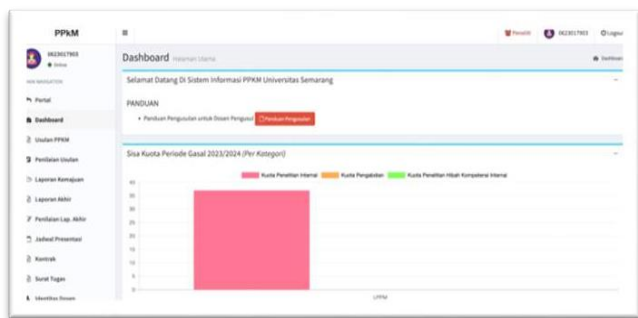


Fig 2. Display of the PPKM application

The first research conducted by Sukanto in 2021, titled 'Information Technology Governance Using COBIT 2019 Framework (Case Study at Tanjungpura University's IT Department in Pontianak),' found that the achievement level in the APO08 process is at the maximum level 5. However, the achievement level in the APO09 process is only at level 1, and in the APO11 process, it is at level 2. There is a gap of 2% and 8% in the APO09 and APO11 processes, respectively [4]. According to Fadhilah's 2021 research titled 'Information Technology Audit Plan Using COBIT 2019 at the ISTI Unit of Telkom University,' the analysis of BAI05 management practices needs improvement. The IT Infrastructure unit should focus on APO11, APO12, APO08, and DSS05. APO11, APO12, BAI08, and DSS05 have scores of 40, 22, 30, and 66, respectively, with low and moderate risks. In the previous research [5] conducted by Darmawan & Wijaya in 2022, titled 'Analysis of Information Technology Governance Design Using COBIT 2019 at PT XYZ by Identifying the APO08, APO12, DSS04, DSS05 processes,' they analyzed the APO08, APO12, DSS04, and DSS05 processes. To achieve the company's goals more effectively through the utilization of information technology, some processes require high-priority auditing and prioritization [6].

According to Wabang's 2021 research titled 'Information Technology Governance at PSI UMK Kudus Using COBIT 2019,' the average of the 11 domains is 3.37, which is at level

3. However, the current gap value compared to the expected one is 1.63. To enhance and optimize existing IT governance, it is recommended to make improvements according to COBIT 2019 standards [7]. In a previous study conducted by Mambu Yuan et al. in 2023, titled 'Identification of IT Governance Capability Level Using COBIT 2019 Framework at PT. Icon+', after analyzing the 11 COBIT 2019 objective factors, three priority objectives were identified with a capability level of 4 and a value of 75%: EDM01, APO04, and BAI02 [8]. The sixth previous research, conducted by Intan et al., in 2023 with the title 'The Role and Benefits of COBIT 2019 in Information Technology Governance in Indonesia, mentions that COBIT 2019 is a framework that has the highest flexibility and comprehensiveness.

COBIT 2019 assist companies and organizations in setting priorities for information technology governance goals and play a key role in information technology audits [9]. Based on the results of the previous literature search, COBIT is a standard for implementing IT management and is an evolved version of its predecessor. COBIT 2019 measures performance through maturity and capability [10], [11]. COBIT 2019 is the best framework in terms of IT management development and more flexible[12]. Domains in COBIT 2019 are grouped into 5 namely: EDM (Evaluate, Direct and Monitor), this domain describes how the company evaluates, directs and assesses strategic plans, this domain has a total of 5 processes; APO (Align, Plan and Organize), this domain discusses the overall organization, strategy, and activities that support the company's technology and information, this domain has 14 processes; BAI (Build, Acquire, and Implement), this domain addresses the design, acquisition and implementation of IT solutions, this domain has 11 processes; DSS (Deliver, Service and Support), this domain addresses the operational support and service support of T&I, this domain has 6 processes; MEA (Monitor, Evaluate and Assess), this domain addresses the monitoring of T&I performance and conformance to performance targets as well as internal and external control objectives, this domain has 4 processes; MEA (Monitor, Evaluate and Assess), this domain addresses the monitoring of T&I performance and conformance to performance targets and internal and external control objectives, this domain has 4 processes [13], [14]. Performance Management in COBIT 2019 is based on the CMMI (Capability Maturity Model Integration) Performance Management Scheme, where the level of capability and maturity is measured between 0 and 5. Capability Model is an assessment process based on the level of ability of an organization in carrying out processes that have been defined in the assessment model. While the scale used in COBIT 5 is based on the International Organization for Standardization (ISO) / International Electrotechnical Commission (IEC) ISO / IEC 33000 - Software Process Improvement [15], [16]

Capability indicators are ways to achieve the capabilities addressed by process attributes. Evidence from process capability indicators supports the assessment of the level of achievement of process attributes. The Capability Level dimension of the process assessment model consists of six

capability levels. This section describes the process capability indicators for the nine process attributes included in the capability dimensions for levels 1 through 5. Level 0 does not include any type of indicator. Level 0 reflects processes that are not implemented or processes that fail, even partially, to achieve their outcomes [17], [18]

Based on the observation and interviews, along with the findings from previous research, the uniqueness and difference of this study lie in the case study object, specifically the USM portal application system in the field of research and community service for USM lecturers. The goal is to evaluate the system's performance using the COBIT 2019 framework's design factors.

## II. METHODOLOGY RESEARCH

This study employs a mixed-method approach, which includes both qualitative and quantitative research methods. Qualitative data is obtained through observations and interviews, while quantitative data is collected using questionnaires analyzed through Guttman scale calculations and capability levels. Research design and method should be clearly defined [19].

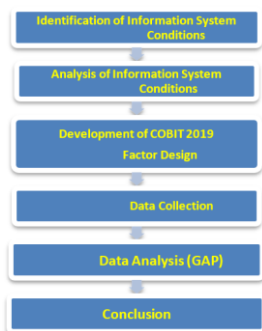


Fig 3. Research Flow

The researcher identified the condition of the information system in the PPKM application portal for USM lecturers and analyzed it based on the identified issues. Subsequently, the researcher developed a questionnaire based on the COBIT 2019 factor design. Research data was obtained from observations, interviews, and questionnaires. The results of mapping needs based on the COBIT 2019 factor design were then analyzed to examine the activities and gaps identified in the factors.

Furthermore, the researcher concludes the analysis results and provides necessary follow-up recommendations. In determining the COBIT 2019 process objective domains, the researcher conducts a core model analysis by understanding the company's context and strategy. The researcher conducts an analysis using the factor design to determine the initial control system scope (DF 1-4) and improve the control system scope (DF 5-11).

Afterward, the researcher selects domains deemed important for further evaluation [20]. COBIT 2019 consists of 5 process domains related to governance objectives, namely Evaluate, Direct and Monitor (EDM), and four other process

domains related to management objectives, namely Align, Plan, and Organize (APO), Build, Acquire, and Implement (BAI), Deliver, Service, and Support (DSS), and Monitor, Evaluate, and Assess (MEA) [18].

Data collection in this research involves observation and interviews with 7 IT administrators, as well as questionnaire responses from 30 permanent lecturers at Universitas Semarang (USM). Data from the questionnaire were collected offline based on the COBIT 2019 application factor design from ISACA, which includes 11 factors: 1) Enterprise Strategy, 2) Enterprise Goals, 3) Risk Profile, 4) I T -related I s s u e s , 5 ) T h r e a t Landscape, 6) Compliance Requirements, 7) Role of IT, 8) IT Sourcing Model, 9) IT Implementation Method, 10) Technology Adaptation Strategy, and 11) Enterprise Metrics [15]

## III. DATA ANALYSIS

### A. Scale Analysis

The summary of respondent answers from the Guttman measurement questionnaire is analyzed by assigning a value of 1 for "yes" responses and 0 for "no" responses [21], [22]

### B. Capability Level Analysis

This analysis is performed to obtain the calculation values from the questionnaire using the Guttman scale. Capability levels are adjusted based on the factor analysis results from the COBIT 2019 framework to determine the governance level of the research and community service application portal USM lecturers [23], [24]

### C. Gap Analysis

This analysis aims to determine the current capability level compared to the expected capability level. Gap analysis is also used to identify improvements and developments in the application that have been implemented, allowing for continuous improvement [1], [25] [26]

## IV. RESULT AND DISSCUSSION

The analysis of the determination of objective processes carried out on the USM portal application in the field of research and community service based on the 11 factors of the COBIT 2019 framework resulted in the following findings:

### 1. Enterprise Strategy

The Enterprise Strategy in the USM portal application for PPKM is shown after surveying the first design factor. The highest score, which is 5 for user stability service, indicates that the provision of Information Technology services has high stability. This can be observed through the high level of satisfaction in using the application. Three factors require review, namely: APO11 Quality Management: Involving the establishment of a quality management system, focusing on customer satisfaction, managing quality standards, practices and procedures, integrating quality management into processes and key solutions, monitoring, control, quality review, and continuous improvement maintenance.

DSS02 Managed Service Request and Incident: Involves handling requests and incidents related to managed services. DSS04 Continuity Management: Involves strategies and actions related to continuity management, ensuring the sustainability and optimal availability of services.

## 2. Enterprise Goals

Five factors require review, namely: APO12 - Enterprise Risk Management: Aiming to integrate corporate risk management to enhance understanding and handling of potential risks. APO13 - Information Security: Aiming to mitigate the impact of information security incidents, including preventive measures and recovery. DSS02 - Managed Service Request and Incidents: Involves handling requests and incidents related to managed services. DSS03 - Productivity Improvement: Aiming to enhance productivity and minimize disruptions in IT operations. DSS04 - Continuity Management: Aiming to maintain and manage the operational continuity of the system, ensuring optimal service sustainability.

## 3. Risk Profile

The risk profile for the USM portal application in the PPKM section is visible in Table 3. Four factors require review, namely: APO11 - Consistency of Technology Solutions and Services: Aiming to ensure consistent delivery of technology solutions and services. BAI06 - Rapid and Reliable Business Change: Aiming to provide swift and reliable delivery of changes to business processes. BAI08 - Knowledge and Information: Aiming to provide the necessary knowledge and information to support operations and decision-making. DSS06 - Information Integrity and Information Asset Security: Aiming to maintain the integrity of information and the security of information assets, including protection against data loss and information security breaches.

## 4. IT Related Issue

IT-related issues in the USM portal application for the PPKM field, as observed during the survey conducted on the fourth design factor. The results of the risk profile analysis of the USM portal are depicted. Four factors require review, namely: BAI10 - Adequate Information about Service Assets: Aimed at providing sufficient information about service assets so that their management and supervision can be effectively carried out. DSS02 - Increased Productivity and Disruption Reduction:

Aiming to achieve increased productivity and minimize disruptions in IT operations, ensuring smooth service delivery. DSS04 - Rapid Adaptation Capability and Operational Continuity: Aiming to have the ability to adapt quickly, continue business operations, and maintain the availability of resources and information. DSS05 - Minimize Business Impact from Vulnerabilities and Information Security Incidents: Aiming to minimize the business impact of vulnerabilities and information security incidents through effective prevention and response actions.

## 5. IT Threat Landscape

The IT Threat Landscape of the USM portal application in the PPKM field is visible in Figure 8. This is observed after surveying the fifth design factor. According to Figure 8, threats that are considered normal have a value of 90%. This is because the IT team at USM can control them by regularly updating the existing system in the USM portal application for the PPKM field. Frequent threats that arise include network connection instability, data loss, and user errors in operating the application. Additionally, Figure 8 shows that no Governance Management Objectives (GMO) requiring an audit were identified.

## 6. COMPLIANCE REQUIREMENT

The compliance requirement has a low value of 10% because USM consistently improves organizational management in line with good corporate governance principles. The normal compliance requirement value is 80%. This text indicates that USM has fulfilled all the necessary regulations and requirements in its business sector, including the deed of establishment, tax identification number (NPWP), operational permit for higher education institutions, and the university's strategic plan. The high compliance requirement value is 10% because USM has been conducting its business processes following legal regulations and government rules concerning higher education. However, based on Figure 9, it is recommended to perform an audit of DSS05. This standard aims to safeguard company information, manage information security risks following security policies, and minimize the impact of vulnerabilities and information security incidents.

## 7. ROLE OF IT

The support section has a value of 4 because USM has utilized the portal application to provide support for the smooth running of business processes and integrated academic services with other information systems. A value of 1 for the Factory section indicates the absence of direct or significant impacts that disrupt the flow of business processes and academic services. The role of IT in supporting innovation at USM is reflected in a value of 4 (four) for the Turnaround section. Additionally, a value of 4 (four) for the Strategic section indicates that the use of IT at USM significantly facilitates the organization in carrying out business processes. Based on Figure 10, it is recommended to focus on auditing within the APO04 domain. This domain aims to achieve competitive excellence, business innovation, improve customer experience, and enhance operational effectiveness and efficiency by leveraging the latest advancements in IT technology.

## 8. IT SOURCING MODEL

The IT Sourcing Model applied at USM reveals that the outsourcing component accounts for 15% of the total, indicating that USM still relies on third-party providers for some services. In terms of providing IT services for the USM portal application, such as internet services, the cloud component represents 15% of the total, as USM only uses

Microsoft Office 365 and Zoom as Software as a Service (SaaS) offerings. Meanwhile, in the insourced section, the value is 70% because the Communication and Information Technology Unit (SaKTI) handles all application and information system management at USM. According to Figure 11, an audit is not recommended since the IT Sourcing model has been fulfilled.

9. IT IMPLEMENTATION METHODS

The IT Implementation Methods applied at USM, with agile methodology accounting for 40% of the total. This is because, during the software application portal design at USM, an agile method was employed, consisting of several phases, including 1) Planning, 2) Needs Analysis, 3) Design, 4) Implementation, 5) Testing, and 6) Deployment. However, the development of the USM portal application has shifted to the more efficient DevOps methodology, which holds a value of 60%. According to Figure 12, an audit is required for the BAI02, BAI03, BAI06, and BAI07 domains.

10. TECHNOLOGY ADOPTION STRATEGY

USM's Technology Adoption Strategy is categorized as a follower, with a percentage value of 60%. This indicates that USM waits until the latest technology becomes established and effective before adopting it. This approach has a positive impact on reducing the risk of technological errors and leveraging the experiences of early adopters. Meanwhile, first movers account for 40% of the total, as USM adopts new technologies early on to gain a competitive advantage. Slow adopters, on the other hand, only make up 10% of the total, as USM remains consistent with its development. Based on the analysis results presented in Figure 13, an audit of the APO03, APO07, and APO08 domains is necessary.

11. ENTERPRISE SIZE

In the process of designing IT governance, the factor of enterprise size, or the magnitude of an organization, is required. Generally, this can be measured by the number of employees and assets of a company. USM falls under the category of a large organization, with a permanent staff exceeding 500 people.

Based on the conclusion from the analysis of design factors, the process objectives with values > 75 are BAI03, which is solution identification and development management, and BAI07, which is IT change acceptance and transition. BAI03 and BAI07 are the process objectives that will be continued to the core model evaluation stage

In conducting activity analysis, the questionnaire is carried out in stages according to the level of activity proficiency obtained based on the rating of process activities. Activities that achieve full proficiency can then be further analyzed by assessing the next level to determine the company's activity capability level. The following are the process activity ratings used to determine process capability levels [14], [18], [27].

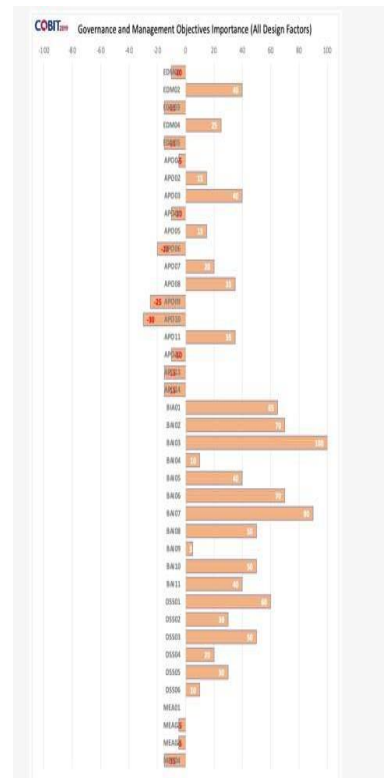


Fig 4. Enterprise Size

TABLE I. CAPABILITY LEVELS

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

The Guttman scale formula is used to calculate and process questionnaire data to determine the capability level of each activity. The process capability level of the BAI03 research and community portal application for USM faculty is evaluated in stages to determine its level of capability. The results of the questionnaire data calculations from seven IT Heads and IT Administrators indicate that Capability Level 2 of Objective BAI03 was only largely achieved, with a score of 67.1%.

However, the evaluation status was not achieved, which means that BAI03 cannot proceed to Capability Level 3 calculations. The capability level score for Objective BAI03 falls within Level 2. The evaluation status for Capability Level 2 of Objective BAI07 is 'not achieved', with a calculation result of 72.7% (Largely Achieved). As a result, BAI07 cannot proceed to the next stage.

I. CONCLUSION

The capability level assessment results for the USM research and community service portal application on Objective BAI03 indicate a Level 2 capability with an achievement score of 67.1%. To reach the desired capability level, improvements are needed in maintenance and security enhancement. The maturity test results for BAI07 achieved a score of 72.7% on the largely achieved scale, indicating a Level 2 capability. Achieving maturity at Level 3 requires support from relevant parties.

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