ISSN 2085-4579

Evaluating IT Capabilities in The Success of Pipe Manufacturing Company

Jason Nathanael Holman[1], Ririn Ikana Desanti[2]
[1,2] Information Systems Study Program, Universitas Multimedia Nusantara, Tangerang, Indonesia
[2]ririn.desanti@umn.ac.id

Accepted on January 11th, 2024
Approved on January 31st, 2024

***Abstract*—*Information technology (IT) management is a process that a corporation or organization must carry out, particularly in terms of data management. The research employs a case study of a pipe manufacturer that has implemented a human resources system to manage employee information. To avoid problems in the data management process that can impede company performance, the company must have good information technology governance capabilities in the data management process. This research will focus on measuring and evaluating the capability of information technology governance at the company, as well as making recommendations to improve the company's existing IT governance. The COBIT 2019 framework will be used to assess the company's IT governance capabilities using qualitative data collected from collaborative interviews with the company and supported by previous research literature. The measurement focus will be on IT infrastructure for data management and operations management to support the data management process. APO01 - Managed I&T Management Framework, APO14 - Managed Data, and DSS01 - Managed Operations are the COBIT 2019 processes to be monitored. The study's findings include the realization of IT governance capabilities in the APO01 domain and a lack of IT governance capabilities in the other two domains, namely APO14 and DSS01. The capability level is stopped at level 2 for the APO14 and DSS01 domains, which is one level below the declared aim of level 3. The recommendations will center on enhancing the IT governance skills of the two domains that fail to meet the company's capability targets*.

***Index Terms*—cobit 2019; data management; IT capabilities; IT governance; recommendation.**

I. INTRODUCTION

In today's technology-driven world, the importance of IT governance, particularly in the areas of data science and data governance, cannot be overstated. It ensures that a company's business processes are not disrupted due to data-related issues or ineffective data management. Implementing IT governance, such as the COBIT (Control Objectives for Information and Related Technologies) framework, is crucial for both private and government organizations (including state-owned enterprises) [1]. COBIT provides a comprehensive framework for managing IT effectively, optimizing technology usage, and enhancing overall company performance [2].

This research focus on the evaluation and measurement of a pipe manufacturing company known as PT. XV. The research process will evaluate the IT infrastructure readiness in data management and operational data handling within the company. The chosen domain from COBIT 2019 framework namely APO01 – Managed IT Management Framework, APO14 – Managed Data, and DSS01 – Managed Operations, serve as guidelines to assess and provide recommendations for IT governance. PT. XV with its implementation of Human Resource Information System (HRIS) as part of Human Resource Management System (HRMS), makes it an ideal subject for this research. The HRMS aligns with the selected domains, as it plays a crucial role in collecting, storing, managing, delivering, retrieving, and manipulating data for effective HR management [3].

The goal of this research is to enhance the efficiency and effectiveness of data management at PT. XV and optimize the utilization of IT to gain a competitive advantage. By implementing robust IT governance practices, the company can mitigate operational disruptions caused by data issues and improve overall performance.

II. THEORETICAL BASIS

A. Literature Review

The literature review will use descriptive analysis methodology to support the qualitative methodology approach which is conducted primarily in the form of interviews. It will analyze the electronic book "COBIT 2019 Framework: Governance and Management Objectives" published by ISACA and IT Governance Institute, along with relevant journal articles related to the research topic.

Control Objectives for Information and Related Technology (COBIT) is a framework or reference developed by ISACA (Information System Audit and Control Association) and ITG (IT Governance Institute) with the primary objective of enhancing information technology governance. It aims to assess the capability level of IT governance and provides

comprehensive guidance for enterprises and institutions to align their business objectives with those of information technology [4].

COBIT 2019 represents the latest iteration of the COBIT framework that is more flexible and adaptable for use by institutions or organizations of any size, be it large or small. It focuses on the implementation of Enterprise Governance of Information and Technology (EGIT) which contributes to the framework's adaptability and flexibility traits.

It comprises six fundamental principles that form an integral part of the governance system for a company or institution, which include [5]: provide stakeholder value; holistic approach; dynamic governance system; governance distinct from management; end-to-end governance system.

Furthermore, it introduces three new domains (measurement) in COBIT 2019, namely APO14 - "Managed Data", BAI11 - "Managed Projects", and MEA04 - "Managed Assurance" [6].

Capability level is a way to measure performance and is an integral part of the COBIT 2019 framework. It helps evaluate how well a company or institution implements IT governance systems and aligns them with their business processes. The capability level is closely linked to predefined Process Reference Models or Domains within COBIT. For Indonesian state-owned enterprises (BUMN), the government has set a benchmark (target) capability level of 3 [7]. This serves as a guideline for this research, enabling the assessed company that have implemented information technology to aim for a specific level of capability. In COBIT 2019, there are six defined levels that provide a comprehensive assessment of capability levels [4].

This level correlates with the level of maturity that can be assessed. While capability level refers to how well a company able to perform specific IT processes effectively, maturity level assess the company overall capability to manage and govern the related IT processes [8]. Therefore, maturity level will be used as the basis of measurement for assessing the capability of IT processes on PT. XV.

The Responsibility Assignment Matrix, also known as the RACI Chart, is a COBIT 2019 tool that provides a clear overview of the roles and responsibilities of individuals involved in activities or projects within a company or institution. RACI represents four key roles or responsibilities that can arise in a project or activity [2][4].

B. Previous Research

This research is based on several previous research related to evaluating IT governance in companies using COBIT framework. Table 1 details 4 previous research used as referenced.

Table 1 Previous Research

No.	Journal Article	Point of View
1	The Measurement of maturity Level of Information Technology Service Based on COBIT 5 Framework [9] *Author:* Lanto Ningrayati Amali, Muhammad Rifai Katili, Sitti Suhada, Lillyan Hadjaratie Published at TELKOMNIKA, Telecommunication, Computing, Electronics and Control Vol. 18, No. 1, February 2020, pp. 133-139	Problem statement: Measurement of Maturity Level of IT System at Universitas Negeri Gorontalo Method used: Quantitative method using questionnaires based on COBIT 5 Result: The institution has obtained a fairly good capability level as well as maturity level and there are indications that the IT service process has been well implemented and documented.
2	Evaluation Of IT Project Management Governance Using Cobit 5 Framework In Financing Company [10] Author: Rahmigina Rooswati, Nilo Legowo Published at 2018 International Conference on Information Management and Technology (ICIMTech)	Problem statement: It is necessary to measure maturity levels in the company's project management environment Method used: Quantitative method by interviews and observations using the COBIT 5 framework as a reference Result: There is still a gap in the minimum maturity level standard in the company which at that time was at maturity level 1 while the minimum standard required was level 3.
3	COBIT 5.0: Capability Level of Information Technology Directorate General of Treasury [2] Author: Dian Utami Setya, Wella Published at IJNMT, Vol. V, No. 1 | June 2018	Problem statement: It is necessary to measure capability level at the Directorate General of Treasury, Ministry of Finance of The Republic of Indonesia Method used: Qualitative method by interviews and observations as well as quantitative method by questionnaires using COBIT 5 framework as a reference Result: The domain that is focus of measurement has exceeded capability level 3 but has not been

No.	Journal Article	Point of View
		able to rise to level 5 due to deficiencies in supervision restriction related to the performance of the setting and maintenance process
4	Measurement of Capability Level Using COBIT 5 Framework (Case Study: PT. Andalan Bunda Bijak) [11] Author: Dicky Sanjaya, Melissa Indah Fianty Publihed at Ultima Infosys, Vol 13, No. 2, December 2022	Problem statement: The company needs to conduct an audit of the IT governance that exists in the company using the assistance from the COBIT 5 framework to prepare the business strategy of the company. Method used: Quantitative method is implemented in this research using the audit stages of Gallegos (Planning, Field work, Reporting, Follow up). Result: There are 4 IT processes selected from COBIT 5 framework namely EDM03, APO12, APO13, and DSS05. There are 28 recommendations given to the company.

III. Research Methodology

A. Research Phases

The research that are conducted will refer to 7 phases as seen at figure 1, that has been determined and are made to support the current scope of this research.

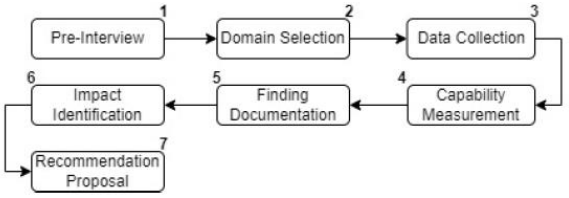

Fig. 1. Phases of Research Conducted

The first phase (pre-interview) aims to identify the company's issues related to the governance of information technology (IT) as well as to gather more in-depth information that will be used to determine the domains to be measured in the study. There will be three domains that will be selected and measured. Data collection will involve an interview with an employee that acts as a super-user of the HRIS application. Measurement will focus on finding the capability level of each domain's activity, which can then be used to measure the maturity level of said domain and finding the gap between the desired level and the level that has been attained based on the measurement conducted. Identification of possible impacts based on the findings from the previous phases will be conducted with the goal of giving recommendations to the company to help them align their business objectives with those of information technology.

B. Data Collection

Interviews will be used as a method to collect the necessary data for reviewing and assessing the information technology infrastructure capabilities of the company, specifically in data management. This method will involve interviewing a senior member of the Human Resources and Development department at PT. XV who serves as a superuser and stakeholder of the HRIS application used by the company for data management.

The interviews will be conducted within predefined domains, namely APO01 - Managed I&T Management Framework, APO14 - Managed Data, and DSS01 - Managed Operations, to obtain the required data for the research.

IV. Result And Discussion

A. Pre-Interview Phase

The research starts with a pre-interview phase to identify existing IT governance issues in the company. The HRD Manager will be involved as the main source to review the company's challenges. The results of the pre-interview indicate that the company has not been able to identify problems related to enterprise goals (EG) based on the COBIT 2019 Framework used in this research, hindering the determination of specific domains to be measured based on enterprise goals. However, issues were discovered in the HRD division concerning the HRIS application used for employee data processing, including payroll and taxation.

To address these issues, the research will focus on domains related to data management, infrastructure, and operational management that support data governance. The objective is to identify the company's priority enterprise goals and measure its IT governance capabilities in the specified domains.

B. Domain Selection

The chosen measurement domains align with predefined The chosen measurement domains align with predefined Alignment Goals (AG) and Enterprise Goals (EG) in COBIT 2019. However, the company's limited awareness of potential challenges within their enterprise goals hinders the conventional approach to measuring IT capability in PT. XV. Reverse-mapping the enterprise goals through predetermined domains offers a solution. This assessment focuses solely on primary objectives within the evaluated alignment goals and enterprise goals to unveil undisclosed issues.

The domains, namely APO01 - Managed I&T Management Framework, APO14 - Managed Data, and DSS01 - Managed Operations, will be used in this research following the issues obtained during the pre-

interview phase to determine the enterprise goals that the company should prioritize.

For APO01, the alignment goals are AG03 - Realized benefits from I&T-enabled investments and services portfolio and AG11 - I&T compliance with internal policies. APO14 relates to AG10 - Quality of I&T management information, and DSS01 is connected to AG05 - Delivery of I&T services in line with business requirements. These mappings yield six enterprise goals as seen in Table 1.

TABLE 1. MAPPED ENTERPRISE GOALS

EG Reference	Goal Description
EG01	Portfolio of competitive products and services
EG03	Compliance with external laws and regulations
EG04	Quality of financial information
EG07	Quality of management information
EG11	Compliance with internal policies
EG12	Managed digital transformation programs

C. Data Collection

The data collection process involves classifying individuals based on their roles and responsibilities in specific domains through the interview conducted with the senior member of the Human Resources and Development department. In this research, there will be three created RACI tables, each for the APO01, APO14, and DSS01 domains. These tables will outline the activities from the COBIT 2019 framework and the corresponding individuals and their roles in those activities:

TABLE 2. RACI CHART APO01

Activities	HRD Head	HRD Manager	IT General Manager	IT Support System Head
APO01.01	R/C	I	A	R/C
APO01.02	A	R/I	R/C	I
APO01.03	R/I	I	A/C	R/I
APO01.04	R	I	A/C	I
APO01.05	A	R	C	I
APO01.06	C/I	C	A/I	R
APO01.07	C/I	I	R/A	R/I
APO01.08	A/C	R	I/C	I
APO01.09	A	R	C	I
APO01.10	I	C	R/C	R/A
APO01.11	C/I	I	A/C	R

Table 2, 3, and 4 detailed the result of RACI chart for each domain APO01, APO14, and DSS01.

TABLE 3. RACI CHART APO14

Activities	HRD Head	HRD Manager	IT General Manager	IT Support System Head
APO14.01	C/I	C/I	R/A	R
APO14.02	A/C	R	I	I
APO14.03	C	C	R/A	R
APO14.04	I	C	A	R
APO14.05	I	I	R/A	C
APO14.06	I	I	R/A	R/C
APO14.07	I	I	A/C	R
APO14.08	I	I	A	R/C
APO14.09	C/I	R	A	R
APO14.10	I	C/I	A	R

TABLE 4. RACI CHART DSS01

Activities	HRD Head	HRD Manager	IT General Manager	IT Support System Head
DSS01.01	C/I	C	R/A	R
DSS01.02	C	C	R/A	R
DSS01.03	C	C	R/A	R
DSS01.04	C	C/I	R/A	C/I
DSS01.05	I	I	R/A	C/I

D. Capability Measurement

The total scores for each domain's maturity level will be determined by initially calculating the scores for the sub-domains within that domain. Through this score, the capability level of each domain can be acquired, in which it will be used to acquire the maturity level of the measured domain. Equation (1) refers to the solution on acquiring the score of each activity in the measured domain.

$$Score = \frac{\sum Rating}{\sum Activities} \quad (1)$$

Once the score of each sub-domain are acquired, the domain's Capability Level can be obtained by using Equation (2) as a reference, in which it divides the total score on those sub-domains and dividing it with the total quantity of sub-domains that existed in the measured domain. The values representing the capability level of the measured domain, derived from this equation, will be expressed as a percentage (%). These percentages can be categorized according to ISACA's level categorization standard, as mentioned earlier [12].

$$Capability = \frac{\sum Score}{\sum Sub\text{-}domain} \quad (2)$$

Through analyzing the data acquired from interviews, applying the predefined equations, the

following assessment results for the capability levels of the measured domains are obtained.

TABLE 5. CAPABILITY LEVEL MEASUREMENT RESULTS

Sub-domain	Score (%)	Capability	Rating
APO01.01	92.50	3.56	*Fully Achieved*
APO01.02	76.25	2.93	*Largely Achieved*
APO01.03	61.67	2.37	*Largely Achieved*
APO01.04	93.75	3.61	*Fully Achieved*
APO01.05	95.00	3.65	*Fully Achieved*
APO01.06	95.00	3.65	*Fully Achieved*
APO01.07	88.33	3.40	*Fully Achieved*
APO01.08	95.00	3.65	*Fully Achieved*
APO01.09	88.33	3.40	*Fully Achieved*
APO01.10	85.00	3.27	*Largely Achieved*
APO01.11	91.67	3.53	*Fully Achieved*
APO14.01	41.78	1.61	*Partially Achieved*
APO14.02	61.50	2.37	*Largely Achieved*
APO14.03	14.00	0.54	*Not Achieved*
APO14.04	32.00	1.23	*Partially Achieved*
APO14.05	43.83	1.69	*Partially Achieved*
APO14.06	50.00	1.92	*Partially Achieved*
APO14.07	85.00	3.27	*Largely Achieved*
APO14.08	73.33	2.82	*Largely Achieved*
APO14.09	58.75	2.26	*Largely Achieved*
APO14.10	61.67	2.37	*Largely Achieved*
DSS01.01	82.00	3.15	*Largely Achieved*
DSS01.02	78.75	3.03	*Largely Achieved*
DSS01.03	75.00	2.88	*Largely Achieved*
DSS01.04	61.29	2.36	*Largely Achieved*
DSS01.05	49.73	1.91	*Partially Achieved*

Following the result of calculation on the domains Capability Level, the overall capability to govern and manage the predetermined domains or Maturity Level can be calculated using Equation (3) below:

$$Score = \frac{\sum capability}{\sum Sn} \quad (3)$$

In Equation (3), Sn refers to the total number of sub-domains within the measured domain. Through this equation, the following assessment result can be used to determine the overall capability of PT. XV on executing the activities within the measured domain in this research.

TABLE 6. MATURITY LEVEL MEASUREMENT RESULTS

Domain	*Level*	*Indicator*
APO01	3.37	*Defined*
APO14	2.01	*Managed*
DSS01	2.67	*Managed*

E. Impact Identification

The result of previously conducted calculations to measure the maturity level of domains APO01, APO14, and DSS01 enables the execution of gap analysis, which involves comparing the desired level with the currently acquired level.

TABLE 7. MATURITY LEVEL MEASUREMENT RESULTS

Domain	Current Level	Target Level	GAP
APO01 – Managed IT Management Framework	3	3	0
APO14 – Managed Data	2	3	1
DSS01 – Managed Operations	2	3	1

Current results indicate that 2 out of 3 domains that were measured are unable to achieve the desired target level. Based on data collected and conducted calculations, domains APO14 and DSS01 lacks the necessary capability to accomplish activities predetermined by the COBIT 2019 Framework. Several key impacts based on the key findings acquired during the data collection phase can be identified, which can be referred to in the following tables.

TABLE 8. APO14 FINDINGS IMPACT IDENTIFICATION

Findings	
Code	Details
A14.1A	Lack of clear data management strategy and communication gaps between the IT Support System Head and the IT General Manager, resulting in a lack of user feedback and decision-making solely in the hands of the IT General Manager.
A14.4A	Occurrence of incidents where the salary calculation formula for head office employees can inadvertently change to match the formula used for factory workers, or vice versa. This issue is identified by the HRD Manager, who notices discrepancies between the data generated by the HRIS application and the expected results based on the appropriate calculation formulas.
Impact	
Code	Details
A14.1A	Potential data management errors, data misalignment, and recurring issues faced by users of the HRIS. This can hinder efficient data utilization and decision-making within the company.
A14.4A	HRIS users, such as the HRD Manager (as the source), needing to perform manual calculations and create manual salary reports to adjust salary calculations according to the latest tax formulas. This process hampers the monthly payroll process, adding complexity and increasing the workload for HRIS users. Moreover, it can lead to delays in payroll processing and potential errors, impeding the overall efficiency of the payroll workflow.

TABLE 9. DSS01 KEY FINDINGS IMPACT IDENTIFICATON

Findings	
Code	Details
D01.15A	Focus on comprehensive management of IT facilities, particularly cabling, is still lacking. However, there has been a notable emphasis on data storage facilities, such as server rooms
D01.5B	The company has yet to prioritize regular testing of power supply mechanisms to ensure uninterrupted power availability.
Impact	

Code	Details
D01.5A	Problems may arise when one of the cables used in the company encounters issues, and accessing that particular cable becomes challenging. This can result in obstacles to employees' performance when such situations occur.
D01.5A	Prolonged power limitations can disrupt company activities and lead to unexpected losses if the issue persists beyond a week as a result of natural disaster (floods, earthquake, etc.), it will require additional uncalculated resources expenses from the company..

F. Recommendation Proposal

Recommendations will be provided for domains APO14 and DSS01, based on the attached findings. In contrast, recommendations for APO01 are not required at present, as the desired level has been achieved in this study. However, for future measurements of the APO01 domain at PT. XV, if the desired level cannot be attained, a recommendation should be made. It is important to note that the future target level should exceed the current desired level (level 3), aiming for level 4 or higher for the APO01 domain.

The following are the assessed recommendations for domains APO14 and DSS01 and will be based primarily for the sub-domains with capability scores of below 2.00 as shown on Table (5). Improvement can be achieved by PT. XV by referring to these recommendations in order to achieve a higher capability and maturity level on both domains:

TABLE 10. RECOMMENDATIONS

#	Recommendations
Recommendations for APO14	
1	Implementing a strategy to manage data and enhance communication between the IT Support team and the IT General Manager.
2	Providing guidance on metadata and its impact on data quality. It is necessary to allocate responsibilities for the HRIS application within the IT division to avoid conflicting priorities in application development.
3	Consulting the vendor regarding the issue at hand, although it has been done by most employees using the HRIS, a permanent solution from the vendor is yet to be provided.
4	A review of the HRMS application vendor should be conducted to proactively prevent encountering similar issues in the future.
5	Implementing a focused data quality supervision on the HRIS application by the IT department while establishing a dedicated division responsible for data stewardship and evaluation is essential. This will effectively alleviate the workload of the IT General Manager and mitigate conflicting priorities between the JDE application and the HRIS application.
Recommendations for DSS01	
1	Conduct documentation and inspection of cabling within the company while ensuring that cables used in work areas are properly placed to minimize the potential for damage due to human error.
2	Conduct regular (weekly/monthly) testing and evaluation of the power supply mechanism, ensuring the backup power supply remains intact.

V. CONCLUSION

Referring to the results of measurements and analysis of the previous discussion, several conclusions can be drawn for this research:

- The conducted research has resulted in solutions to the problem formulation outlined in the initial stages of the study. Based on measurements using the COBIT 2019 framework, PT. XV's IT governance evaluation yielded Level 3 for APO01 and Level 2 for APO14 and DSS01 domains. Recommendations are needed to improve the Level 2 domains (APO14 and DSS01) based on observations and data collection, considering PT. XV's current situation.

- To achieve the desired level of capability, recommendations have been made for the company in order to improve their capabilities in the assessed domain.

REFERENCES

[1] K. Pratama Arthananda, "The Role of COBIT5 as a Reference for Quality Service Quality Improvement Case Study: Private Bank in Indonesia," *Ultima Infosys : Jurnal Ilmu Sistem Informasi*, vol. 12, no. 2, 2021.

[2] D. Utami Setya and W. Wella, "COBIT 5.0: Capability Level of Information Technology Directorate General of Treasury," vol. V, no. 1, 2018

[3] J. Abdul Hamid and S. Yacob, "The effectiveness of human resource information system through employee satisfaction and the system usage," 2022.

[4] Information Systems Audit and Control Association., *COBIT 2019 Framework Governance and Management Objectives*.

[5] A. Ishlahuddin, P.W. Handayani, K. Hammi, and F. Azzahro, "Analysing IT Governance Maturity Level using COBIT 2019 Framework: A Case Study of Small Size Higher Education Institute (XYZ-edu)," in proceeding of *2020 3rd International Conference on Computer and Informatics Engineering, IC2IE 2020*, Institute of Electrical and Electronics Engineers Inc., Sep 2020, pp. 236-241.

[6] A.K. Setiawan and J. Fernandes Andry, "IT Governance Evaluation Using COBIT 5 Framework on The National Librari," *Jurnal Sistem Informasi, Vol 15, No. 1, 2019*.

[7] Information Systems Audit and Control Association, *COBIT 2019 Framework Governance and Management Objectives*.

[8] C. A. I. 22301 L. I. 27001 L. I. 9001 L. S. S. G. B. Kumaragunta Harisaiprasad, "COBIT 2019 and COBIT 5 Comparison," Apr. 27, 2020

[9] L.N. Amali, M.R. Katili, S. Suhada, L. Hadjaratie, "The Measurement of maturity Level of Information Technology Service Based On COBIT 5 Framework." *TELKOMNIKA (Telecommunication Computing Electronics and Control), Vol 18, No. 1, 2020*.

[10] R. Rooswati and N. Leaowo, "Evaluation of IT Project management Govenrnance Using COBIT 5 Framework in Financial Company." in proceeding of *2018 International Conference on Information Management and Technology (ICIMTech 2018)*.

[11] D. Sanjaya and M.I. Fianty, "Measurement of Capability

Level Using COBIT 5 Framework (Case Study: PT. Andalan Bunda Bijak)," *Ultima Infosys : Jurnal Ilmu Sistem Informasi*, vol. 13, no. 2, 2022.

[12] MENTERI BADAN USAHA MILIK NEGARA REPUBLIK INDONESIA, "Aspirasi Pemegang Saham/Pemilik Modal untuk Penyusunan Rencana Kerja dan Anggaran Perusahaan Tahun 2021 ," Jakarta, Oct. 2020. Accessed: May 19, 2023. [Online]. Available: www.bumn.go.id.