Evaluation Of Information Technology Governance Using BAI Domain In Hospital

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Abstract.

The governance of information technology in hospitals is a crucial component in facilitating the alignment of information technology initiatives with the strategic objectives of XYZ hospital, thereby contributing to the achievement of its organizational goals. XYZ hospital is currently facing a number of challenges, one of which pertains to the Information System utilized for delivering services to visitors. The resolution of this problem can be achieved through the implementation of an assessment using the Cobit 5 framework, specifically targeting the BAI domain. This approach aims to offer recommendations for enhancing the value of capability levels, thereby improving information technology governance within the hospital setting. The results of the investigation conducted on the evaluation of information technology governance utilizing the Cobit 5 framework at "XYZ" hospital demonstrate that the BAI Domain, particularly BAI Domain 05, has attained a maturity level of 3, whereas BAI Domain 08 has attained a maturity level of 2. The two domains in question demonstrate the least developed levels of maturity when compared to the remaining domains. In contrast, BAI Domains 02, 03, 06, 09, and 10 have attained a maturity level of 4, denoting a heightened level of maturity. Finally, BAI Domains 01, 04, and 07 have attained the intended maturity level.

Keywords: *COBIT 5, BAI Domain, Capability level, Information technology governance and Hospital.*

I. INTRODUCTION

In the contemporary era characterized by advanced technology, the proliferation of information technology has emerged as a crucial necessity within organizational contexts[1], [2]. Various strategies have been formulated in order to engage in competitive business endeavors. The advancement of the technological revolution is considered a fundamental requirement for enhancing organizational management[3], [4]. Furthermore, organizations compete to enhance the quality of their IT services to align with their mission and achieve their IT adoption objectives, specifically pertaining to efficiency and the fulfillment of organizational requirements.The function of hospitals is intricately linked to information technology (IT) processes. Presently, numerous healthcare facilities are leveraging information technology as a valuable asset to enhance, impact, and optimize the productivity of hospital personnel, progressively intensifying with each undertaking[5], [6]. One notable aspect is that XYZ hospital has already obtained comprehensive accreditation. According to the Information Technology Department, the hospital had already implemented orders and management systems in the field of information technology. However, to conduct a comprehensive evaluation of the current status of this procedure, it is impossible to report on the ongoing nature of this information technology as there has been no implementation of performance measurement and evaluation measures. Information technology, commonly referred to as IT, plays a significant role in various domains[7]–[9]. The formulation of this performance measure can be extended to encompass the level of technological process capability.

As per the statements made by the parties involved, they currently lack a means of quantifying this particular level of capability[10], [11]. The current state of knowledge regarding the quality of development and implementation of information technology, particularly in the domain of internet services, remains uncertain for hospitals.COBIT, also known as Control Objective for Information and related Technology, encompasses a comprehensive set of documentation and guidelines to facilitate IT Governance implementation [12], [13]. This framework serves as a means for auditors, management, and users to effectively address the disconnect between business risks, control requirements, and technical challenges[14], [15]. COBIT 5.0 facilitates the enhancement of IT value within enterprises by effectively

managing the equilibrium between benefit realization, risk optimization, and resource utilization[13], [14], [16]. The COBIT 5 framework facilitates the comprehensive management of information and associated technology across the entire enterprise, encompassing all business and functional domains. It considers the advantages of IT for both internal and external stakeholders.Hospitals are subject to research endeavors aimed at assessing their operational efficiency. The BAI COBIT 5 system's domain name is "XYZ hospital." This hospital utilizes information and communication technology as a means to facilitate business processes and deliver services to customers. The purpose of conducting research is to obtain measurement results and evaluate the effectiveness of the technical data process in optimizing the service information system for visitors at the "XYZ" hospital.

II. METHODS

An intellectual framework is characterized by including specific information regarding materials, tools, and a systematic and logical sequence of steps. This framework serves as a set of clear and easily understandable guidelines for problem-solving, result analysis, and the navigation of challenges. The design process is comprised of multiple distinct stages.

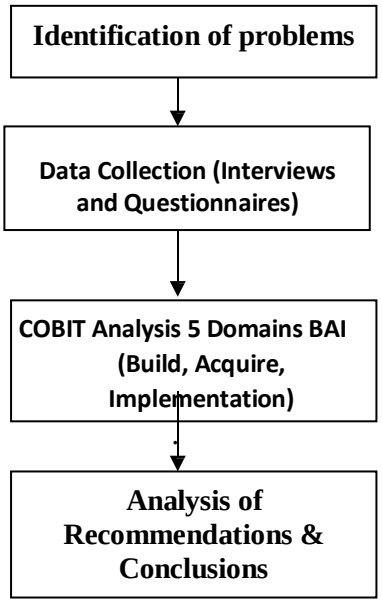

Fig 1. Research Design

1. Identify the Problem

This stage reviews the Information Technology Governance of hospital "XYZ" as the object to be researched. Literature studies are carried out by collecting data from sources and findings from previous researchers. Data collection through interviews is carried out to complete the data and is also a process for identifying problems in the agency in the research steps. The identification obtained is:

- Evaluating information technology governance at "XYZ" hospital based on the maturity level figures in the BAI domain COBIT framework.
- Provide suitable recommendations to improve IT governance at “XYZ” hospital.

2. Data Collection

This stage, interviews were carried out using the interview method where the author asked questions and the informant provided answers, and the author recorded each answer which would later be used as material to create a report on the results of the interview. Data collection is through a questionnaire where respondents must complete a series of questions written in the questionnaire as a way for researchers to obtain information. In this research, it is known that the number of respondents was 3 people, all of whom distributed questionnaires.

3. Data Analysis

The steps for determining the maturity level value are as follows: :

a. Componen BAI

1. BAI 01 Manage Programs/Projects

This process aims for all IT programs and projects from the agreed investment portfolio. This includes planning, planning, implementation and project planning.

2. BAI 02 Manage Requirements Definitions

This process aims to identify solutions and analyze them before testing or creation to ensure that the solution is feasible and aligned with the organization's strategic requirements.

3. BAI 03 Manage Identification and Solution Creation.

This process aims to search for and build identified solutions in line with organizational requirements that include design, development, and resources.

4. BAI 04 Manage Availability and Capacity

The goal of the COBIT 5 process is to ensure current and future needs, performance and capacity are impacted by providing cost-effective services.

5. BAI 05 Manage Organizational Change Empowerment,

This process aims to ensure rapid implementation of organizational change and lower risk - including stakeholders within the organization and IT.

6. BAI O6 Manage Change

This process aims to service all changes in a controlled manner, including changes to standards and changes that impact organizational processes and IT.

7. BAI 07 Manage Acceptance and Transition changes

This process aims to formally accept and operate the new solution, including implementation planning, system and data conversion, testing, communications, release management, early life support, and post-implementation review.

8. BAI 08 Manage Knowledge,

The aim of this process is to maintain the availability of knowledge to support all activity processes and facilitate decision making.

9. BAI 09 Manage Assets,

The goal of this process is to manage IT assets through their lifecycle ensuring their use provides maximum value to the organization

10. BAI 10 Manage Configuration

This process aims to determine and maintain the description and relationships between key resources and capabilities required to deliver IT-enabled services, including collecting configuration information, establishing baselines, verifying and auditing configuration information, and updating configuration repositories.

4. Data Analysis

The steps for determining the maturity level value are as follows:

a. Questionnaire Conversion

In this case, the scoring is determined using the ordinal method. Each ordinal data has a certain level which can be sorted from lowest to highest or vice versa. A data is said to have an ordinal scale, if the numbers in the measurement scale range not only indicate certain categories, but also indicate certain quantity relationships, namely in the form of levels (gradations). In this research, an assessment was carried out by giving points following a table of the order of points given to be used as weighting scores.

Table 1. Value Weighting Points

Poin	Information
0	Very Not Good
1	Not good
2	Enough
3	Pretty good
4	Good

b. Calculation of Average Score per domain

The calculation for each domain BAI 1 to BAI 10 was carried out because each question and answer from the resource person had a different weight so they had to be averaged to get the right results and would later be included in the maturity level measurement formula. Here's the formula.

$$\text{Attribute Maturity Index} = \frac{\sum(\text{Total Answers x Weight})}{\text{JNumber of Respondents}} \quad \ldots\ldots(1)$$

c. Calculation of Maturity Index / Maturity Level

Maturity level is obtained from the total average per domain from BAI 01 – BAI 10 and then divided by the number of questions asked by each respondent. The formula for calculating the maturity level :

$$\text{Maturity Index} = \frac{\sum(\text{Attribute Maturity Index})}{\sum\text{Activity}} \quad \ldots\ldots\ldots\ldots\ldots(2)$$

d. Determination of the Maturity Index level

The results of the maturity level / maturity index value are used as a reference for assigning levels to the BAI 01 – BAI 10 domain. The following is a table of maturity levels.

Table 2. Maturity Level Index Scale

Scale	Index	Maturity Level
0 – 0,5	0	Incomplete Process
0,51 – 1,5	1	Performed Process
1,51 – 2,5	2	Managed Process
2,51 – 3,5	3	Established Process
3,51 – 4,5	4	Predictable Process
4,51 – 5,0	5	Optimising Process

III. RESULT AND DISCUSSION

1. Calculation of Questionnaire Results

In this case, the results of the questionnaire are calculated first and produce a point award for each answer given in each questionnaire, along with the recap of the points awarded for the questionnaires that have been answered.

Table 3. Questionnaire Point Recap Results

Domain	Question	Point Recap Results		
		Respondent 1	Respondent 2	Respondent 3
BAI01	Question 1	5	5	4
	Question 2	5	4	5
BAI02	Question 1	3	4	4
	Question 2	4	4	5
BAI03	Question 1	4	5	4
	Question 2	3	3	4
BAI04	Question 1	3	5	5
	Question 2	5	5	3
BAI05	Question 1	4	5	5
	Question 2	3	3	3
BAI06	Question 1	3	4	3
	Question 2	4	4	5
BAI07	Question 1	4	5	5
	Question 2	5	5	4
BAI08	Question 1	4	4	5
	Question 2	3	5	3

Domain	Question	Point Recap Results		
		Respondent 1	Respondent 2	Respondent 3
BAI09	Question 1	3	4	5
	Question 2	3	5	5
BAI10	Question 1	5	5	4
	Question 2	5	3	4

2. Average calculation per domain

After recapping the points for each domain, an average calculation of the number of points for each domain is calculated to obtain a value that will later be included in the maturity or maturity level calculation:

Table 4. Average Results Per Domain

Domain	Question	Point Recap Results			Average
		Respondent 1	Respondent 2	Respondent 3	
BAI01	Question 1	5	5	4	4,66
	Question 2	5	4	5	4,66
BAI02	Question 1	5	4	4	4.33
	Question 2	4	4	5	4.33
BAI03	Question 1	4	5	4	4.33
	Question 2	4	5	4	4.33
BAI04	Question 1	4	5	5	4.66
	Question 2	5	5	4	4.66
BAI05	Question 1	3	3	3	3
	Question 2	3	3	3	3
BAI06	Question 1	5	4	3	4
	Question 2	4	4	5	4.33
BAI07	Question 1	4	5	5	4,66
	Question 2	5	5	4	4,66
BAI08	Question 1	2	3	3	2,66
	Question 2	3	3	1	2,33
BAI09	Question 1	4	4	5	4.33
	Question 2	3	5	5	4.33
BAI10	Question 1	5	5	4	4,66
	Question 2	5	4	4	4,33

3. Calculation of maturity level

The results of measuring the maturity level of Information Technology Governance at XYZ hospital in the Recapitulation Table of data on maturity level results and the results.

Table 5. Measurements of Maturity Levels

Domain	Indeks maturity level	Maturity level	Maturity Level	Expected
BAI01	4,66	5	Optimising Process	5
BAI02	4,33	4	Predictable Process	5
BAI03	4,33	4	Predictable Process	5
BAI04	4,66	5	Optimising Process	5
BAI05	3	3	Established Process	5
BAI06	4,16	4	Predictable Process	5
BAI07	4,66	5	Optimising Process	5
BAI08	2,49	2	Managed Process	5
BAI09	4,33	4	Predictable Process	5
BAI10	4,49	4	Predictable Process	5
Maturity Domain BAI	4,11	4	Predictable Process	

The results of the recapitulation can be depicted in a form like the image below. Domain Maturity Level Diagram BAI 01 - BAI 10. Domain maturity level diagram BAI 01- BAI 10. The blue line is the current maturity level, while the red line is the target level of maturity that must be achieved by “XYZ” hospital.

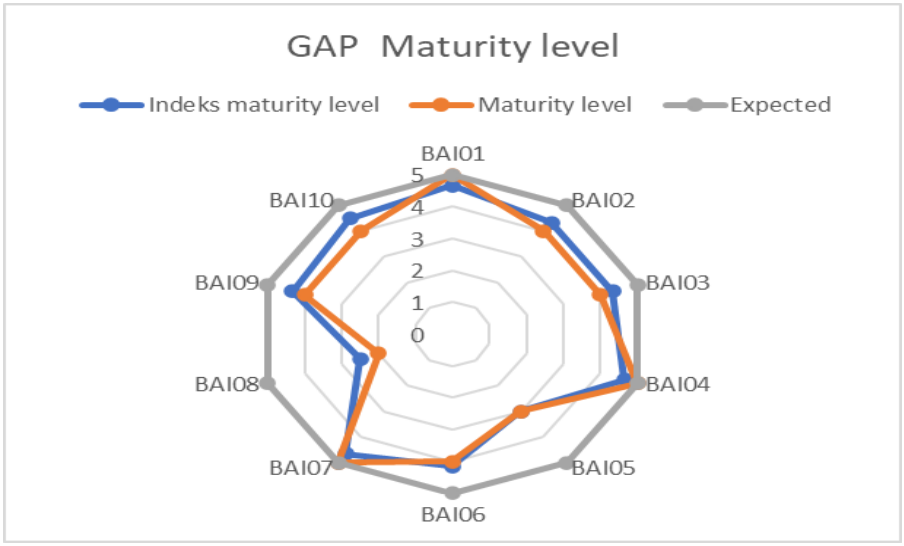

Fig 2. GAP Maturity level

Based on the results of collection and research, the maturity level of "XYZ" hospital is at level 4 predictable process, which means that the previously implemented processes are now operating within the specified limits. "XYZ" hospital maturity level is at level 4 predictable process, which means that the previously implemented processes are now operating within the specified limits.

4. Recommendations

Based on the maturity level measurement obtained from the desired level, the BAI05 domain gets level 3 and the BAI08 domain gets level 2, and the recommendations that can be given are: BAI05, there is a need to explain empowerment in the human resources sector, the benefits and impact of these changes, and provide more trust in organizational leaders. BAI08, increasing competency in terms of human resources, both newly recruited employees and existing employees in order to be able to balance the hospital's needs, especially in the field of service information systems.

Based on the maturity level measurements obtained by BAI domains 02, 03, 06, 09, and 10, the maturity level reaches level 4, meaning the recommendation given is BAI02, carried out a series of feasibility studies and increased the feasibility value. BAI03, Carry out analytical actions on the work results of service process and Governance activities. BAI06, making improvements in documentation to make the process run easily and smoothly. BAI09, improves management such as the software used to get the desired placement. BAI10, coordinates and carries out all service procedures at the "XYZ" hospital.Recommendations BAI01, 04, and 07 were not given because the desired level had already reached what was expected.

IV. CONCLUSION

The findings of the study on the assessment of information technology governance utilizing the Cobit 5 framework at "XYZ" hospital indicate that the BAI Domain, specifically BAI Domain 05, has achieved a maturity level of 3, while BAI Domain 08 has attained a maturity level of 2. These two domains exhibit the lowest levels of maturity compared to the other domains. On the other hand, BAI Domains 02, 03, 06, 09, and 10 have achieved a maturity level of 4, indicating a higher level of maturity. Lastly, BAI Domains 01, 04, and 07 have achieved the desired level of maturity. The "XYZ" Hospital can provide recommendations and it is anticipated that future research will be able to apply the findings of the IT Governance design to enhance IT optimization at the hospital. Additionally, research efforts should focus on examining all IT processes within the COBIT 5 domain to enhance IT Governance in the context of healthcare institutions.

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