

# Business process monitoring system in supporting information technology governance

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## Business process monitoring system in supporting information technology governance

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### ABSTRACT

Information technology (IT) is essential in supporting an organization's business sustainability and growth, making it critically dependent on IT. Therefore, a focus on IT Governance, consisting of leadership, organizational structure, and process ensuring that IT organization supports and expands the organizational strategies and goals is required. When the business supports the strategic significance of IT investment, the implementation of an IT strategy will lead to the adoption of an IT Governance model. It will support and help the description of the benefit roles and responsibilities from IT systems and infrastructure. This paper aims to develop a business process monitoring system to support IT Governance in improving user service and measuring organizational performance. The research method was the system development method with the Waterfall model. To measure the performance of the business process, the self-assessment method with performance matrix tools was applied. The study resulted in a business process monitoring system that can enhance the organization's primary business process in services, supporting the said organization's performance.

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## 1. INTRODUCTION

IT Governance is a commitment to awareness in the process of organizational management control<sup>5</sup> IT/IS resources, including software, hardware, brainware, databases, and communication networks. IT Governance is define<sup>5</sup> as a pattern of authority/policy on IT activities (IT Process) [1]. In that, the pattern is to develop policies and management of IT Infrastructure, the use of IT by end-users efficiently, effectively, and safely, as well as an effective IT Project Management process [2]. According to De Haes [3][4], several governments or private organizations have started to implement IT governance to achieve a combination of business and IT. The use of IT is very comprehensive in every aspect of the organization's efforts to support the organization [5][6]. Therefore, according to Nfuka [7][8], the use of technology causes a critical reliance on IT, requiring a particular focus on IT governance.

Ghildyal and Chang [9][10][11] point out that IT governance affects the IT business's alignment, and both affect the business value or organizational performance. The increase in demand for services and cost savings for the community, business, and organization causes the need for IT governance. On the other hand, it cannot be denied that IT increases the organization's business value, both in its main and supporting activities [12]. IT is used as a strategic tool for organizations to increase competitive advantages in times of increasing uncertainty, leading to higher dependence on the IT environment [13][14]. Hence, the effective management

of IT and its alignment with business goals is crucial for organizational success. Montilva [15][16] state that the success of implementing IT in an organization depends on the business processes used to manage the technology.

The business process monitoring system is built based on the organization's need for the significance of IT in supporting its business processes. There are many constraints on organizational performance, i.e., service to data users, measurement of employee performance, and planning of various improvements using business process improvement tools. Dumas and Luo [17][18][19] define business processes as the art and science of monitoring how work is done in an organization to ensure consistent results and take advantage of improvement opportunities. According to Vom [20], business processes can be understood as a set of integrated organizational capabilities related to strategic alignment, governance, methods, technology, people, and culture. The use of business processes has been instrumental to represent an organization's business and activities [21]. The increasing service for users, the increasing importance of information technology for process design, and the overall recognition that the process forms a critical organizational asset, have made this business process system indispensable. The compelling business processes facilitate the monitoring activity. This is possible because the processes or activities in an organization have clearly defined the owner of the process, the process completion time, the required inputs, the outputs produced, and the procedural references used in completing the process [17].

The use of the business process monitoring system in an organization is crucial to maintain and widen the organization's strategy and purpose. It is even more important considering the lack of system built without being based on the organization's need for the importance of analysis and design starting from the main, supporting, and developing business processes. It has been stated by Rahimi [22] that the importance of the business process and the improvement of IT centrality concerning the organization performance requires a particular focus on the business process governance and IT governance in the organization. This is also accompanied by the expansion of business processes that support IT in organizations and considering the impact of business processes and IT on organizational success [23][24][25][15]. This paper proposes the development of a business process monitoring system to support IT governance in improving user service and measuring organizational performance. It also presents that alignment between business process systems and ITG is needed. The study considers the need for alignment by building a business process monitoring system and IT governance to identify the organization's need for IT's importance in supporting its business processes.

## 2. RESEARCH METHOD

This research employed the waterfall system development method [26] with research stages, as shown in Figure 1. The study was conducted at the office of Statistics Indonesia (BPS) of Boalemo Regency.

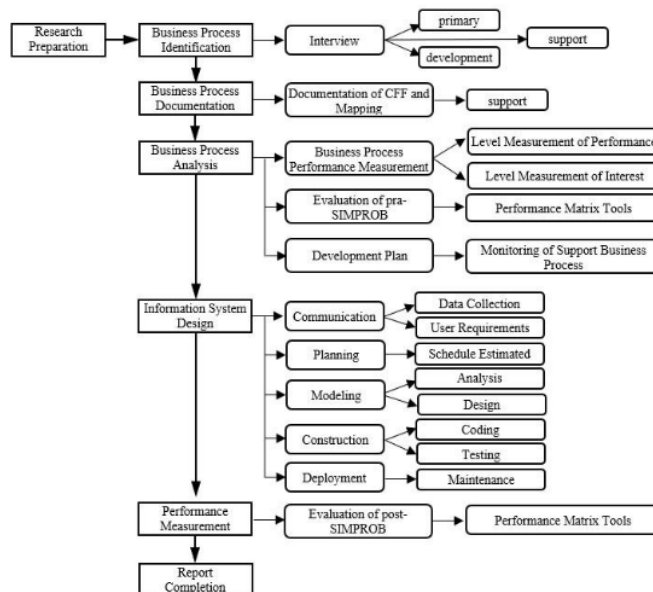


Figure 1. Research procedure

The next stage involved a business process analysis, which was performed in some stages [17][27][28]. Firstly, measure the performance of running business processes using modern performance measurement. The modern performance measurements included quality, speed, reliability, flexibility, and cost. Secondly, evaluate the performance through the self-assessment method using performance matrix tools. These tools divided business processes into four quadrants of performance measurement from unnecessary to necessary improvement. At this stage, the data were collected from a performance measurement questionnaire that produced the index value of performance and interest. Thirdly, develop plans, which served to provide a decision on whether or not to develop a business process.

Based on performance matrix tools, coordinates were set in each variable to determine the position of the business process performance variable in the performance matrix tools. Performance Index Values (NIK) of performance were the dots in the Y-axis, while Performance Index Values (NIK) of importance were the dots in the X-axis. After both NIK were obtained, the values were mapped in an Importance-Performance Matrix, as shown in Figure 2. The image shows the running business process that is divided into four quadrants. In quadrant I, an unimportant process unnecessary to be developed is found; the performance is also flawed. Quadrant II is a region that requires performance improvement because it is known that its processes are essential, which are the monitoring process and staff performance. Quadrant III is a region that has good performance, although unnecessary to be periodically developed. Finally, quadrant IV is a region with good performance and high importance; thus, it must be maintained. Based on the data mapping results and the analysis using performance matrix tools, the business process that are deemed as necessary to be improved exists in quadrant II.

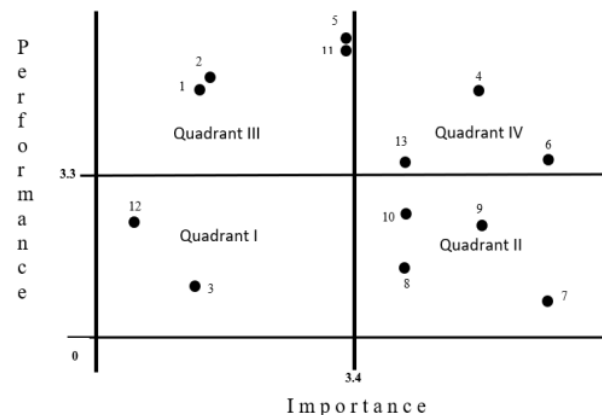


Figure 2. Performance matrix tools

The information system design relied on the waterfall method that comprised communication, planning, modeling, construction, and deployment.

- (1) Communication (Project Initiation & Requirements Gathering) by gathering all user needs in the design of the system to be built;
- (2) Planning (Estimating, Scheduling, Tracking) by establishing software work plan that included technical tasks to be performed, the results to be made, and the work schedule for the construction of a Monitoring Information System of Business Process;
- (3) Modeling (Analysis & Design). The process of translating the requirements specification into a design that focused on the analysis and design of data structure, software architecture, interface design, and database;
- (4) Construction (Codes & Tests). This stage included coding to translate modeling (Analysis & Design). This stage was done by making coding using the PHP programming language and testing the implementation system (TIS) using Black box and White box;
- (5) Deployment (Delivery, Support, Feedback). This stage functioned to maintain the developed system and was carried out periodically. This stage also introduced the use of the system to the user.

### 3. RESULTS AND DISCUSSION

The development of technology helps computers to produce large amounts of data, so it needs to be treated with great care to get its benefits [29]. The key to a business strategy to create a competitive advantage is to understand the data and information that an organization generates in its business. Therefore, information processing gradually becomes the basis for achieving a competitive advantage [30]. A business process monitoring system is built to obtain information regarding budget requests, achievements, and employee performance targets. This system is created to improve business processes in serving data users and measuring performance based on the data obtained. In this developed system, the IT's value must be in line with the business focus value and measured in a transparent way that shows the impact and contribution of IT investment in the value formation process of the organization.

In general, this system's development includes processes that indirectly generate value for the organization but are required to support the main processes (dissemination of accurate data, data integrity, and reliability for users). Figure 3 shows a level 0 diagram of all the input, process, and output flows of a business process monitoring system.

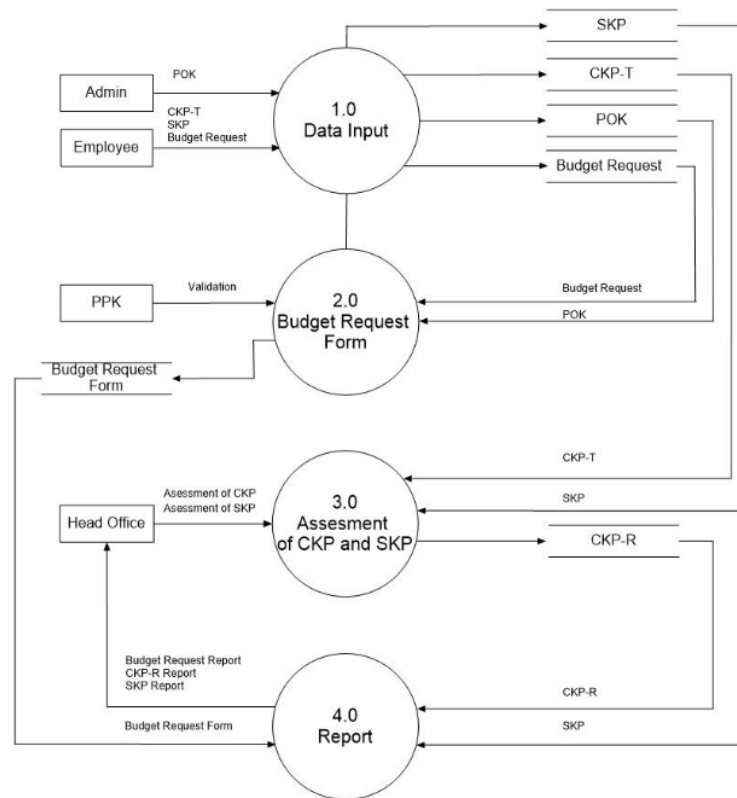


Figure 3. Diagram of input, process, and output

Figure 4 and Figure 5 illustrate the implemented design of the business process monitoring system. The system has a feature to create a budget request form, performance form, and employee performance targets form. This system can also monitor the process of submitting the future and the used budget request forms and indicators of achievement of employee performance assessments and targets. Furthermore, through this system, the Decision Making Officer (in Indonesian known as PPK) can verify the budget request form based on the budget request before submitting it to the treasurer (the one who will make a receipt from the budget for the disbursement process). In the process of evaluating employee achievement and performance targets, the system can monitor the presentation of targets and the realization of employee achievements and performance.

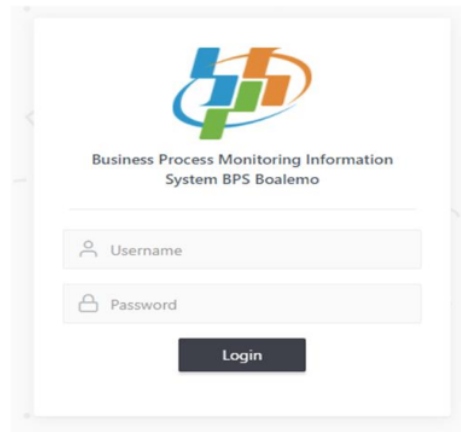


Figure 4. Login page

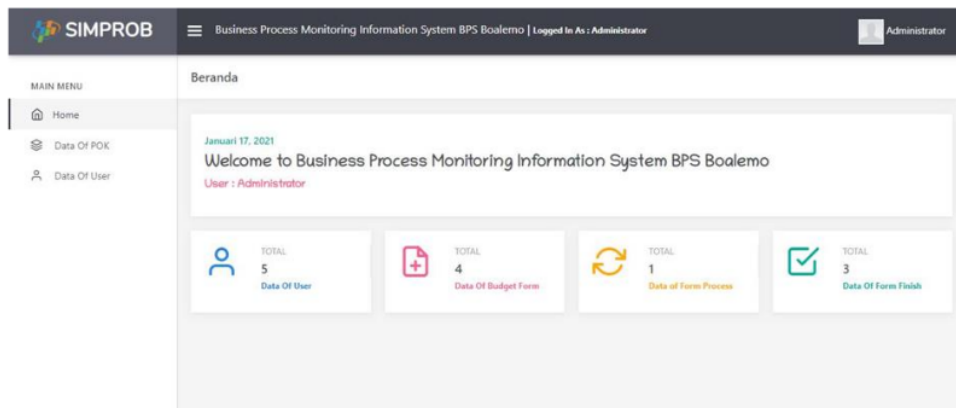


Figure 5. Admin home page

In the system testing process, white box testing was carried out by testing one of the source codes in making the request form. The selected file was the implementation of the transaction part of the supporting business process monitoring information system. Figure 6 shows Flow graph on the white box test of request data process file. Figure 6, is followed by a measurement of cyclomatic complexity which measures a quantitative measure of the logic complexity of a program, as in Table 1. The results of this measurement can determine whether a program is a simple or complex program based on the logic applied to the program.

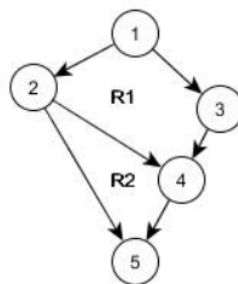


Figure 6. Flow graph



3  
Table 1. Cyclomatic complexity

$V(G) = E - N + 2$	$E = \text{the number of arcs in the flow graph is } 6$
$= 6 - 5 + 2$	$N = \text{Number of vertices in flow graph } 5$
$= 3$	

Number 3 the results of the calculation of cyclomatic complexity, shows the number of independent paths from the basis of path testing, which means that it shows the number of tests that must be run to ensure that all statements in the program are executed at least once (all statements have been tested) as in Table 2. The independent path results in Figure 6 described as follows:

Table 2. Independent path flow graph notation

Flow	Independent Path
Path 1	1-2-5
Path 2	1-2-4-5
Path 3	1-3-4-5

According to the performance measurement results that used the self-assessment method to measure the performance NIK and importance of NIK found on quadrant II, the lack of monitoring of the business process and the inflexible template will decrease the performance of the business process. In this measurement, questionnaires were distributed to 19 respondents who are the staff of Statistics Indonesia (BPS) of Boalemo. Based on the questionnaires, the value of the performance measurement obtained in the NIK performance is 3.3, and the value of NIK importance is 3.4. After this system was implemented and self-assessment was carried out using performance matrix tools, the variables in the system were considered important by respondents and were in accordance with what they had perceived. As a result, the level of satisfaction was relatively higher. The variables included in this system must be maintained since all these variables make the system superior in the organization.

To ascertain the quality of the software made—on whether the system is as hoped—System Usability Scale (SUS) measurement was used. The software is deemed to have a good quality if it is above the score  $\geq 70$ . The samples in this method are not many [31]. The questionnaire shows that out of the average score of 19 respondents (the staff of BPS Boalemo), who underwent a recording process and filled the questionnaire, 84 for the SUS were acquired. It is considered A-grade (80-90). The SUS score graphic of score 84 is shown in Figure 7. The results show that the quality of the system is very good.

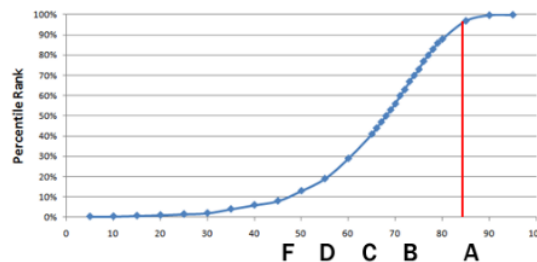


Figure 7. Graph of SUS score results

The system makes the monitoring of the organizational business process easier and more effective. Moreover, this system can monitor and control the IT capability decisions to confirm the delivery of value to key stakeholders in an organization. It is expected that the system can improve the performance of the organizational business process.

#### 4. CONCLUSION

Central to the advancement of and support towards the organizational business process are the roles of IT. A close attention of organizational leaders to the roles of IT is proven by system development and monitoring process to the IT field that belongs to the organization. This is due to the fact that IT stores all data related to the business process and the continuity of organizational activities.

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