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PIECES ANALYSIS IN THE INFLUENCE OF THE DESIGNING DIGITAL SIGNATURE CERTIFICATE SYSTEM

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ABSTRACT

Correspondence is an inseparable part of an agency, both private and government. The administration of correspondence has often utilized information system technology in assisting business processes carried out by parties within the organization itself. For example, the Institute for Innovation and Creativity Development (LPIK) of the Indonesian Institute of Business and Technology (INSTIKI) has implemented a correspondence information system, but there is a weakness in the system, namely that there is no digital signature process so that it is not optimal in facilitating the management of correspondence. This study aims to analyze the business processes of the system that is already running using the PIECES (Performance, Information, Economy, Control, Efficiency, Service) method. The benefits of the research are obtained from the analysis of the problems based on the previously running system seen from the use case diagram design, activity diagrams and system interfaces. This results in an analysis of the proposed system to complete system features and system functionality based on the results of the analysis of 6 aspects of PIECES which can assist LPIK institutions in facilitating the mailing business process.

1. Introduction

In an institution, both private and government carrying out its activities, can not be separated from correspondence activities. Letters are one of the most important communication media in a government and corporate institution as well as other forms of organization, both to communicate with parties outside the organization (external) and to communicate within the organization itself (internally) [1]. The Institute for Innovation and Creativity Development (LPIK) of the Indonesian Institute of Business and Technology (INSTIKI) is one of the institutions located on the INSTIKI Campus. LPIK's goal is to facilitate products resulting from innovation and creativity from the INSTIKI Academic Community. To assist in the administrative process of correspondence required by LPIK STIKI which includes Laboratory, Human Resources, and Project needs, it is managed by the LPIK secretary. The correspondence managed by the Secretary of LPIK includes the Decree on the Appointment of the Head of the Laboratory, Utilization of Laboratory Products, Creativity of INSTIKI Lecturers, Laboratory Assistants, and Laboratory Assistants [2].

In its application, the correspondence administration system at LPIK INSTIKI already uses a computerized system. The correspondence information system at LPIK STIKI can facilitate the management of mail archives, letter index numbering is done automatically, print letters directly to the printer, or save in pdf format[2]. However, this correspondence information system still has drawbacks, namely the unavailability of an electronic signature facility (digital signature) and the letter signing process still using the conventional signature method. This certainly has an impact on the administrative process at the institution, because if an electronic signature can be applied it can help facilitate and support the work-from-home policy during the covid pandemic. A digital signature is one way of cryptography for authentication of a message or document [3][4]. The digital signature is a cryptographic value that depends on the message and the sender of

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the message so that with a digital signature, authentication and the identity of the author of the message can be conceptually guaranteed [5]. Document digitization is needed to obtain capabilities and optimization in many ways, including storage capacity and optimization, security from various forms of harm, and increased resolution, of images and files to keep them constant. The change in digitizing documents from manual to computerized has many positive impacts such as ease of filling out, printing, and recording data, thereby reducing the use of hardcopy documents and the legality of intact documents such as electronic certificates [6]. Document digitization is expected to be a substitute for securing archives in the long term [7] [8].

Based on the explanation above, it can be concluded that the current correspondence information system is not equipped with a digital signature feature that can assist the LPIK institution in expediting the administrative process. Therefore, the authors conducted a study that aims to analyze the existing correspondence system and propose a proposed new system as an alternative that can be applied by the institution. The problems of the information system business process that have been implemented can be evaluated and analyzed so that they become input for the next new system features [9]. The system analysis method that can be applied in analyzing current and proposed system problems is the PIECES (Performance, Information, Economy, Control, Efficiency, Service analysis method) [10].

PIECES analysis is an analytical method consisting of 6 assessment indicators, namely Performance, Information, Economy, Control, Efficiency, and Service. This analysis is a way to identify and solve problems that occur in a running system. As in existing research, namely applying PIECES analysis in analyzing the performance of E-Market [11], this analysis will result in the identification of the main problems of a system and provide solutions to these problems [12]. Other studies apply PIECES analysis to analyze government websites [13][10][14]. This analysis is carried out to see the weaknesses in the system that has been implemented and to analyze the system requirements that will be developed using the 6 PIECES indicator approach, namely in terms of Performance, Information, Economy, Control, Efficiency and Service. This analysis will help design a better system and information will be obtained more quickly [11].

2. Method

2.1 System

A system is a business unit, consisting of parts that are interrelated regularly and try to achieve goals in a complex environment. This understanding reflects the existence of several parts and the relationship between parts. This shows the complexity of the system, including cooperation between interdependent parts with each other[15][16]. Information systems can facilitate the use of data and processing to facilitate the integration of data in an organization[6].

2.2 Mailing System

The letter is a means or tool for communication in conveying information in written form from one party intended for another party in business or non-business activities. Incoming and outgoing mail management procedures are carried out in a predetermined procedure and also have a sequence, namely by managing, regulating, and administering things that can facilitate or facilitate an agency[2][17].

2.3 PIECES

PIECES analysis is an analysis that looks at the system from Performance, Information/Data, Economics, Control, Efficiency, and Service. Each of these categories can be further divided into several criteria [18][19].

1. Performance Analysis
   Performance problems occur when the tasks performed by the system reach the target. Performance is measured by the amount of production and response time. Total production is the amount of work carried out during a certain time. Response time is the average delay between a transaction and the response given to that transaction.
2. Information Analysis
   Information is an important commodity for end users. Because the information that will be generated can meet the wishes of the user and can also overcome the existing problems. This information can be used by internal or external parties.

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3. Economy Analysis
   Economics is the most common motivation for an institution. The cornerstone for most managers is low cost.
4. Control Analysis
   The tasks of an information system need to be monitored and corrected if substandard performance is found. Controls are installed to improve system performance, prevent or detect misuse of system errors and ensure data security.
5. Efficiency Analysis
   Efficiency relates to how resources are used with minimal waste. Therefore, the problem of efficiency requires an increase in output (results). Because the existing system has been able to produce output as expected.
6. Service Analysis
   Good service can reflect whether an institution is good or not, so service must also be taken into account properly

3. Result and Discussion

3.1 Problem Identification and Data Collection

The stages of data collection were carried out using interview and observation methods to identify and formulate problems [20]. Interviews were conducted with all stakeholders involved in the process of signing correspondence at LPIK. The stakeholders involved are the Head of LPIK, Human Resources Division, Project and Innovation Division, Infrastructure Sector, and LPIK Secretary. Then the observation process is carried out to observe the process of issuing the letter until the process of signing the letter.

3.2 Analysis Of The Running System

At the analysis and design stage of the system to be built based on the problems that have been formulated previously and there is a design of a correspondence information system that has previously been running at the LPIK institution but has not used a digital signature. System analysis and design is a stage to define system requirements and provide a clear and structured picture of the system being built. The analysis of the running system is described by use case diagrams can be seen in Figure 1 below.

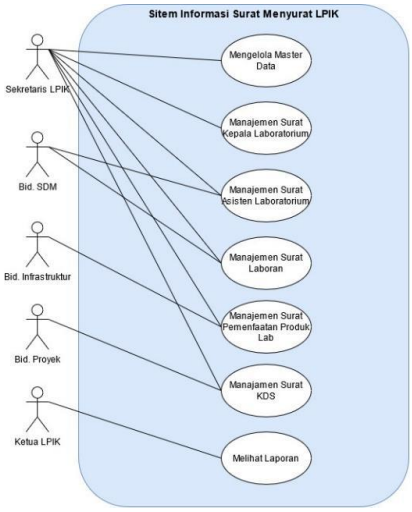

Figure 1. Usecase Diagram Of Mailing System

There are five actor entities (users) in which there is a use case diagram consisting of:

1. LPIK Secretary
   The LPIK secretary is the highest level user in the system who has full access to systems that interact with use cases: managing master data, laboratory head letter management, laboratory assistant letter

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management, laboratory assistant letter management, KDS letter management, and laboratory product utilization letter management.

2. Human Resources Field
   The Human Resources sector interacts with the laboratory assistant letter management use cases, and laboratory assistant letter management.
3. Infrastructure Field
   The infrastructure sector only interacts with use case management of laboratory product utilization letters.
4. Project Field
   The project field only interacts with the KDS mail management use case. e. Head of LPIK The head of LPIK only interacts with report use cases.
5. Head of LPIK
   Head of LPIK only interacts with use report case

The next analysis is the activity diagram of the correspondence process, this analysis is needed to find out the flow from the letter submission process until the letter is printed by the user. This analysis also obtained each stage of the submission of letters by users on the system.

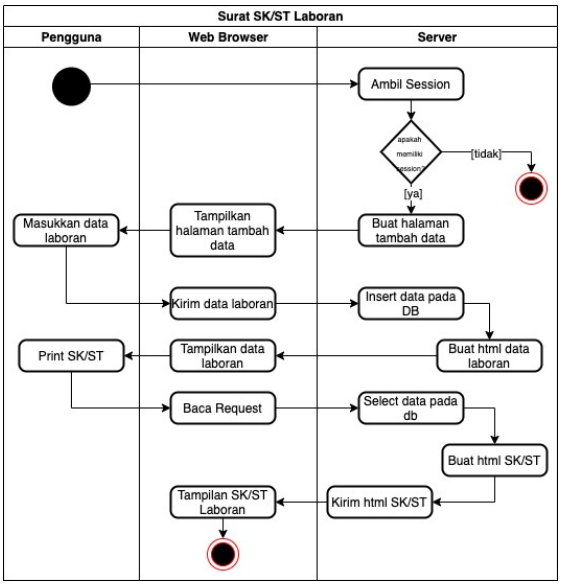

Figure 2. Activity Diagram Of Mailing System

The activity of the SK/ST letter of the Laboratory Assistant is an activity that describes the process flow of how the user enters laboratory data and prints the SK/ST from the inputted laboratory data. In this activity, the user's session will be validated first. If you have a session, you can perform the process of entering laboratory data and printing SK/ST, and vice versa. The laboratory data that has been entered by the user will then be sent by the web browser to the server for insertion into the database. After successful insertion, the server will create Html data for the laboratory assistant to be displayed in a web browser. In this activity the user can also print SK/ST, the web browser will read the request to select data on the server. The server will create and send the laboratory SK/ST Html to be displayed in a web browser. In general, the other activity diagrams in this study are almost the same as the activity diagrams of the Laboratory Assistant's SK/ST Letter.

3.3 PIECES Analysis Results

Based on the analysis of the current system, an analysis of the corresponding business process that has been applied to the LPIK institution was carried out, the analysis was carried out by paying attention to the assessment aspects of the PIECES method, namely Performance, Information, Economy, Control, Efficiency,

and Service. The results of the analysis on each aspect of PIECES explain the problems found in the previous system so that a solution can be given to the proposed system, along with an explanation.

3.3.1 Performance Analysis

1. In the current system, there is a problem, namely that it still takes additional time when it requires a signed letter file in the form of a softcopy because it has to go through a letter printing process, letter signature, and letter scanner.
2. In the proposed system with a digital signature for correspondence, the correspondence process does not require a print process, and a letter scanner to make a softcopy file of a signed letter.

3.3.2 Information Analysis

1. In the current system, there are problems, namely the difficulty of distinguishing the original letters issued by LPIK from letters that have been modified by irresponsible parties.
2. In the proposed system, facilities are made the system to validate the issued letters

3.3.3 Economic Analysis

1. In the current system there are problems, namely, Requires paper costs to print letters that will be signed before being issued.
2. In the proposed system By using system, there is no need to print a letter before it is signed.

3.3.4 Control Analysis

1. In the current system there are problems. Stamps and signatures cannot be controlled and there is still the possibility that someone who is not responsible for falsifying signatures or re-creating a stamp.
2. In the proposed system, the signing process uses a digital signature in the form of a private key and a public key so that it will be difficult to duplicate

3.3.5 Eficiency Analysis

1. On the current system there are problems. The letter signing process is not efficient because it has to print the letter before it is signed.
2. In the proposed system, the user signing the letter can sign the letter directly using the system.

3.3.6 Service Analysis

1. There is a problem with the running system. The system cannot accommodate the electronic signature process.
2. In the proposed system the letter document will be signed electronically.

3.4 Proposed System

Based on the analysis of the system that has been running and the results of the PIECES analysis, an analysis is obtained that the problem with the previous system is that there is no digital signature feature in the correspondence process, especially in the business process of printing letters. So that the proposed system section of this study provides an overview of the digital signature system that was built to complement the system that has been running previously. In the proposed system section, a general description of the system from designing a digital signature system in the LPIK INSTIKI correspondence process is explained. In this study, the digital signing process on the LPIK STIKI correspondence information system uses the RSA cryptographic algorithm. The encryption results from the RSA algorithm produce a fairly long ciphertext code. To facilitate the insertion of ciphertext as an electronic signature in a letter document, this research uses a QR-code scheme as a solution. It can be seen in Figure 3 below.

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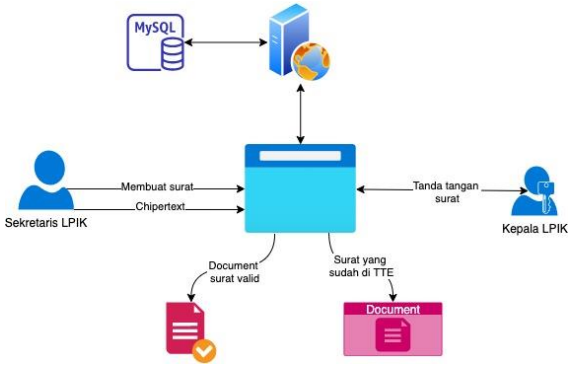

Figure 3. Overview of the Proposed System

Figure 3 is an overview of the system architecture of the proposed system design. Broadly speaking, there are two processes in the electronic signature system architecture in the LPIK STIKI correspondence system, namely the process of making electronic signatures and the process of validating letters that have been signed electronically.

3.5 System Interface

In the implementation of the system interface, several views can be explained to accommodate the correspondence process from the system that is already running as well as the proposed system. The display of the laboratory product utilization letter management page is an example of an interface for submitting a letter complaint. It can be seen in Figure 4 below:

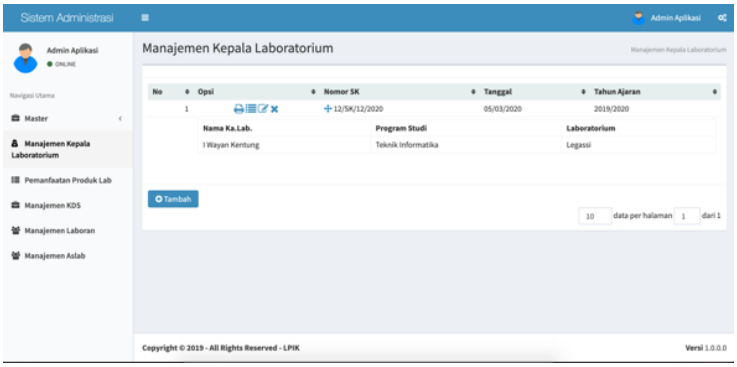

Figure 4. Head of Laboratory Letter Management Interface Page

The laboratory product utilization letter management page is a page that functions to manage letters if there are students who will make use of laboratory products which will then be validated by the Infrastructure Field.

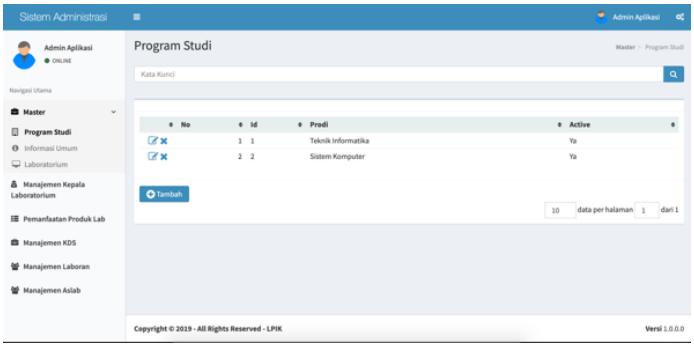

Figure 5. Master Data Interface Page

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The master data page is intended for the LPIK Secretary to manage master data such as study programs, general information, and laboratory information. In general, all master data pages have the same features, namely, displaying data, adding data, changing data, and deleting data.

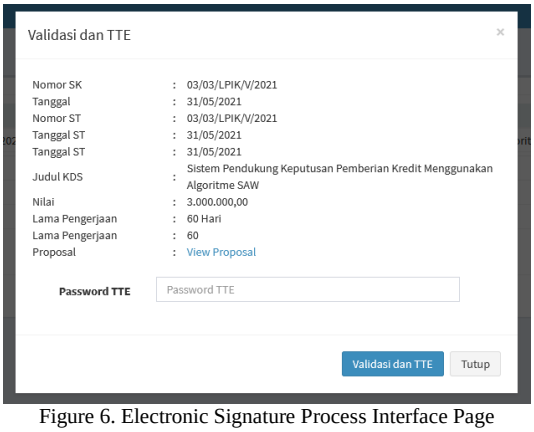

Figure 6. Electronic Signature Process Interface Page

Figure 6 describes the digital signature feature that is part of the proposed system to assist in the process of affixing electronic signatures to LPIK STIKI letter documents. The Head of LPIK will validate the letter documents that have been inputted by the Secretary of LPIK. In the process of affixing an electronic signature, the Head of LPIK must enter a password to perform an electronic signature, this aims to ensure that it is indeed the Head of LPIK who did the electronic signature.

From the proposed system interface, several system functionalities can be completed, namely encrypting electronic signatures, being able to generate ciphertext into QR-Codes, and being able to insert QR-Codes into mail documents.

4. Conclusion

The mailing administration system at LPIK STIKI already uses a computerized system to facilitate the management of mail filing. However, the correspondence information system currently in use still has drawbacks, namely the unavailability of electronic signature facilities (digital signature) and the letter signing process still using the conventional signature method. The PIECES analysis was carried out to find out the weaknesses and problems of the business processes of the previously running system, from the Performance, Information, Economy, Control, Efficiency, and Service aspects, it was found that the analysis of digital signatures greatly affects the problems in the current correspondence system business processes. , so based on the PIECES analysis in this study, it is proposed to add an electronic signature feature to simplify and assist the correspondence administration process from the submission process to the letter printing process.

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