

Business Process Improvement in Medical Registration Process in XYZ Hospital

Gandha Vikri Pranata*¹

Abdul Barir Hakim*²

^{1,2}Institution/affiliation; address, tel/fax of institution/affiliation

e-mail: *² abdulbarir.h@esqbs.ac.id, *¹

Abstract: Profit organizations stand with the aim of gaining maximum profits. In order to achieve these objectives, the business processes carried out are required to be effective and efficient. BPI can be done according to the theory presented by H.J Harrington.

Hospital is one of the profit organizations in the field of health services. The hospital serves patients who come for treatment. Along with the high number of patient visits that come, there are some obstacles that are experienced by patients. This also happened at XYZ Hospital. One of the obstacles experienced is the medical registration process, which is a relatively long waiting time for treatment. This study has the aim to find out how to improve business processes in the registration process at XYZ Hospital. The research method used was an experiment by presenting a web-based system. System development is carried out by applying the Scrum framework. By using a web-based medical registration system, waiting time for patient treatment can be more effective.

Keywords: Business Process Improvement, Scrum, Hospital

1. INTRODUCTION

1.1. Background

Companies or also known as profit organizations were established with the aim of getting the maximum benefit from the activities carried out [1]. In order to obtain maximum results, the business processes carried out must be effective and efficient. Besides being able to maximize profits, it can also provide satisfaction to customers. Business process improvement can be done according to the theory presented by H.J Harrington in 1991 [2]. Business Process Improvement (BPI) is a method to help organizations make significant improvements in their business processes.

The hospital is one type of profit organization in the field of health services. Customers from hospitals are patients who come in sick and

hope to get medical services immediately. Along with the high number of patient visits to the hospital, there are several obstacles experienced by patients, including causing long queues so that patients are less comfortable waiting because the waiting room is crowded [3]. In addition, the waiting time to get health services is still quite long. Waiting time is calculated from the time the patient is at the registration site until he enters the doctor's examination room [4]. In fact, in a study that was conducted at a hospital in Indonesia regarding the length of waiting time for health services, patients had been at the registration desk since 5 am, while the registration counter was only opened at 8 am. This is done by patients in order to get an initial queue number for treatment [5].

In this study, preliminary research was conducted by means of observation and

interviews with several patients at XYZ Hospital. The results of the observation showed that there were long queues that snaked at the hospital in the morning because patients were trying to get the initial queue number for treatment. Then from the results of the interview, the patient admitted that the waiting time for treatment was quite long. For treatment at XYZ Hospital, patients can spend up to half a day from arriving to leaving the hospital. There are even patients who come to the hospital early in the morning even though registration only opened at 7 am.

Seeing this problem, YuCare was moved to help overcome it by presenting solutions through the use of technology. YuCare is a platform that accompanies patients to seek treatment like their own family because many other people actually care [6]. This is where the researcher's desire emerged to create a website-based information system for YuCare. This system helps make the waiting time for patients to go to the hospital more efficient.

1.2. Problem Statements

Based on the background above, a problem formulation can be made. In this study, there is 1 (one) problem formulation, namely how to improve business processes at XYZ Hospital so that patient waiting times become more efficient?

1.3. Research Objectives

From the formulation of the problem that has been made, it can be determined the objectives of the research to be achieved. The objective of this research is to find out how to improve business processes at XYZ Hospital so that patient waiting times become more efficient.

1.4. Scope of Problems

Based on these problems, it is necessary to limit the analysis of application development plans so that the goal of this research can be achieved effectively and efficiently as follows:

1. The waiting time for the registration process for treatment is only for old patients who use BPJS. Existing patients are patients who have been registered and have made at least one visit to XYZ Hospital. Meanwhile, BPJS patients are patients who use BPJS facilities in financing their treatment.
2. XYZ Hospital was chosen as the research site and located in Jakarta. XYZ Hospital is a type A hospital that is a national referral center.
3. The information system built in this research is website-based and uses the HTML, PHP, CSS, MySQL programming languages, as well as the design modeling using the Unified Modeling Language (UML).

1.5. Benefit

Benefits of this research can be viewed from two perspectives. There are benefits from academic perspective and benefits from practical perspective:

1. Academic Benefits
This study combines the application of the BPI steps described by H.J Harrington with the Scrum framework in the development of information systems. Thus, the BPI theory issued in 1991 can be said to be still relevant to use and can be combined with Scrum.
2. Practical Benefits
 - The results of the study can be further developed to be used as recommendations for 5th grade mathematics teachers.

2. LITURATURE STUDIES

This research uses the BPI theory presented by H.J Harrington in 1991 as the main theory to present solutions to the problems described in the previous chapter. In addition to the BPI theory, theories regarding the development of information systems as instruments in this research are also used,

including information systems, websites, scrum, and Unified Modeling Language (UML).

2.1. Business Process Improvement (BPI)

BPI is a systematic methodology that is presented to organizations in order to help them make significant progress in the business processes they run. With a system that changes business operations to be shorter and simpler, can make customers receive very good results. In its implementation, BPI focuses on suppressing possible losses and reducing bureaucracy [2]. The objectives of BPI include reducing errors in business processes carried out, minimizing delays, maximizing asset use, easy to use by consumers, friendly to consumers, adapting to changing consumer needs, and providing a competitive advantage to the organization and reducing excess employees. So that BPI provides benefits to both parties at once, namely consumers and companies that carry out business processes. According to H.J Harrington, there are five stages through which BPI is carried out, namely [2]:

- a. Organizing for Improvement
At this stage, a team is formed to carry out BPI and decide on critical processes to be improved.
- b. Understanding the Process
Understand the business processes that are currently running. Activities carried out include collecting data, making flowcharts for running processes, analyzing processes, and determining process boundaries.
- c. Streamlining
This stage aims to improve the efficiency, effectiveness, and adaptability of business processes. Things that can be done to achieve better business processes are eliminating bureaucracy, eliminating activities that do not directly contribute to meeting consumer expectations and do not support business processes (non-value-added activities), simplifying processes, reducing processing time, automation, and process standardization.

- d. Measurements and Controls
Measure and control the improvement process that has been carried out. This can be done by measuring the goals to be achieved and collecting feedback on the new process.
- e. Continuous Improvement
Pay attention to the processes implemented so that improvements can always be made.

2.2. Information System

An information system is a set of components consisting of humans or people, work procedures, data, information and information technology that are useful for decision making in organizations [7]. The information system according to Leitch and Davis is a system within the organization that brings together the daily transaction processing needs of a managerial nature, supports operational activities and strategic activities of an organization and provides the reports needed for decision making to certain outside parties [8]. So it can be concluded that the information system is a set of components consisting of humans, work procedures, data, information, and technology that exist within an organization. The system can support managerial needs, operational activities and organizational strategy activities. Information systems also provide information needed in decision making. In relation to this research, the business process improvement was realised by developing an information system.

2.3. Website

Rohi Abdulloh (2015) explains that a website is a collection of pages that contain information in the form of digital data (text, images, video, audio, and other animations) available through an internet connection [9]. Thus, the website can be interpreted as a digital page that contains documents or information and is connected via hyperlinks and can be accessed with an internet connection. The solution to achieve business process improvement goals of this research

were realized in the form of website that can be accessed by internet.

2.4. Hospital

According to the Kamus Besar Bahasa Indonesia (KBBI), a hospital is a building where people care for the sick and also a building where the provision and delivery of health services covers various health problems. The definition of a hospital in the Law of the Republic of Indonesia number 44 of 2009 concerning a hospital is a health service institution that provides complete individual health services and provides inpatient, outpatient and emergency services. From these definitions, it can be concluded that the hospital is a place that provides health services for people who have various health problems and provides inpatient, outpatient, and emergency services. In this research, the treatment registration process studied was for outpatient services. Outpatient according to the KBBI is the treatment of patients by way of outpatient treatment.

2.5. Scrum

The scrum framework is applied in system development in this research. Scrum is a framework that allows one to develop, deliver, and manage complex products [10]. The framework referred to in Scrum includes requirements, analysis, design, evolution, and delivery [11]. The people involved in working on the scrum framework are called the scrum team, which consists of the product owner, development team, and scrum master. The product owner consists of only one person and has the responsibility to maximize the business value of the products produced by the development team. The development team consists of experts who work on products to be delivered to consumers. The Scrum master is the person in charge of ensuring the proper implementation of the Scrum framework [10]. The solution for business process improvement in this research was developed using Scrum framework.

2.6. Unified Modelling Language (UML)

To design the system in this research, the Unified Modeling Language (UML) modeling language was used. UML is a visual model for describing, specifying, building, and documenting an object-oriented software system [12]. According to Sugiarti (2013), UML is one of the language standards in the industry in visualizing, designing, and documenting a software system [13]. The UML Diagrams used in this research are Use Case Diagrams, Sequence Diagrams, Activity Diagrams and Class Diagrams.

2.7. Research Framework

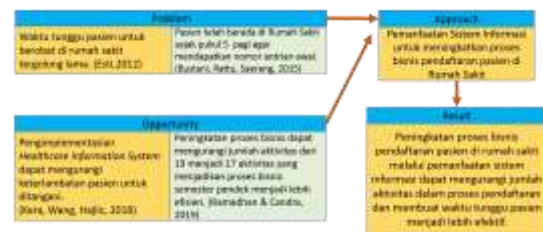


Figure 1. Research Framework

Figure 1 shows the framework for this research. The registration process for patient treatment at the previous hospital was still done manually at the hospital registration counter. As a result, several problems emerged, including the long waiting time for patients to seek treatment because the patient was already in the hospital before the registration counter opened. Based on previous research that has been done, related to improving business processes using web-based information systems, this can provide a more efficient process when compared to manual systems. Therefore, the approach taken to overcome these problems is to present a website-based system. This system is built by implementing the Scrum framework using the PHP programming language and MySQL database. System development begins with the creation of a UML diagram design and continues with the program creation process. After the system is completed, the implementation of the registration process for patients seeking treatment at the hospital is carried out. In this study, the implementation of the system was carried out at XYZ Hospital Jakarta. Then, the

measurement of waiting time for patient treatment will be carried out and calculate the number of activities that can be cut by using this system.

3. RESEARCH METHODS

3.1. Methods

In this study, experimental research methods were used. Experimental research method is research conducted to determine the consequences of a treatment that is intentionally given by researchers. Arboleda (1981) reveals the notion of experimental research is research in which the researcher deliberately manipulates one or more variables in a certain way that causes changes in other variables being measured [14]. Experimental research is a systematic method for establishing causal relationships [15]. From the understanding of experimental research by the experts above, the writer can conclude that experimental research is research conducted to find out the consequences of a cause that is carried out intentionally by researchers so as to provide a change as a result. In this study, the thing studied was the long waiting time for patients to seek treatment at the hospital. By presenting an information system for ordering hospital services, it is expected that there will be changes in patient waiting times to become more efficient.

3.2. Problem, Focus and Subject

The problem that was raised in this study to be resolved was the relatively long waiting time for patients when they wanted to go to the hospital. Even patients started coming to the hospital early in the morning before the registration counter opened. This is done so that they get the queue number for treatment early. The focus of this research is to shorten the waiting time and summarize the activities that occur in the registration of patient treatment. The patients referred to in this study are patients who use BPJS services and have been registered and have made at least one visit to the XYZ hospital (the hospital calls it the old patient status). This study

develops a website-based information system for registration of treatment in hospitals. Through this system, patients can register online from anywhere and anytime without having to come directly to the hospital. So that the hospital waiting room is not too crowded and patients do not have to come to the hospital early in the morning because they have registered online. The subjects studied were XYZ Hospital, located in DKI Jakarta. The system developed in this study is intended for YuCare. Furthermore, this system is managed by YuCare and can be used by patients seeking treatment at XYZ Hospital.

3.3. Analysis Design

The analysis design contains an analysis of the current system as well as an analysis of the proposed system in order to achieve the research objective, which is to make patient waiting time more efficient. The following is the flow of treatment registration for BPJS patients who are old patients at XYZ Hospital as a form of current system analysis. Existing patients are patients who have been registered and have made at least one visit to the XYZ hospital. BPJS patients are patients who use BPJS services in the process of paying hospital fees. The current system analysis is presented in the form of Business Process Modeling notation.

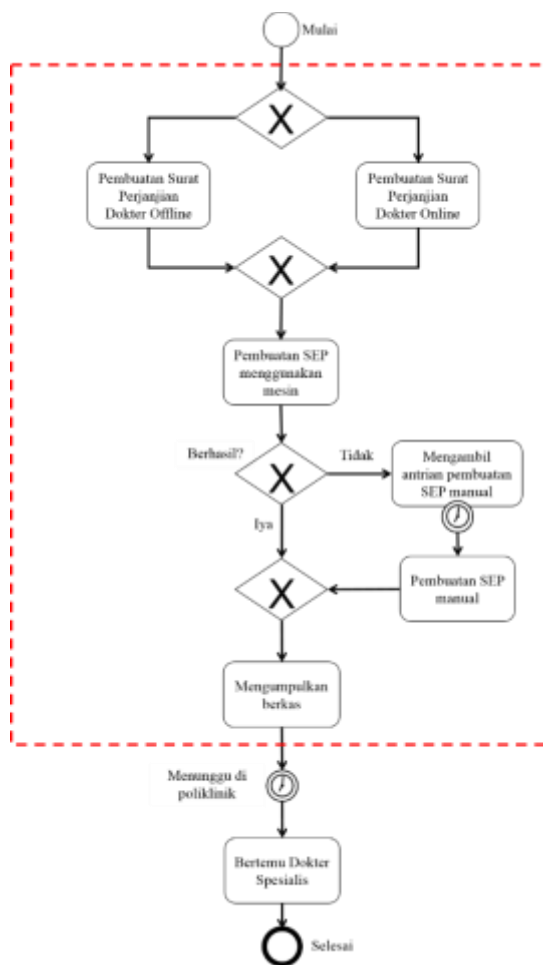


Figure 2. The Current System

From Figure 2 above, the stages that occur in the currently running treatment registration process can be explained as follows:

1. Making a doctor's appointment letter offline
Making an appointment with a doctor offline can be done by going directly to the appointment counter at XYZ Hospital. Hospital staff will serve patients in the process of making a doctor's agreement.
2. Making a doctor's appointment letter online
Making an appointment with a doctor online can be done through the available XYZ hospital application. Patients first download and install the application onto their device, then log in using their medical record number and date of birth. Furthermore, making an agreement with a doctor can be done if the patient data

entered is correct and registered in the hospital database.

3. Making SEP using machine
SEP is required by patients if they want to do treatment in a hospital at a cost borne by the BPJS institution. The process of making SEP can be done using an automatic machine available in the hospital lobby area. Patients simply enter the medical record number and the machine will print the SEP.
4. Is making SEP using machine successful?
If successful, the patient can continue the next registration process, namely collecting the files needed for treatment. But if it doesn't work, the patient has to make an SEP manually. The process of making SEP that fails to use the machine can be caused by the inactivity of the patient's BPJS membership status, or it can also be caused by an agreement letter with a doctor that has not been inputted into the hospital database system.
5. Retrieve manual SEP generation queue
The patient takes a queue number for manual SEP generation. Queue number retrieval is done at the counter for making SEP.
6. Manual SEP creation
The process of making SEP manually through the officer at the counter for making SEP.
7. Collect files
The printed SEP is then collected together with other supporting documents at the registration counter.
8. Is the file complete?
If so, then the patient can go to the polyclinic and wait to be called to meet the doctor. However, if the file is incomplete, the officer will ask the patient to complete the missing file.
9. Meet with a specialist
The patient meets with a specialist doctor for treatment or consultation after waiting for his name to be called to enter the doctor's room.

In Figure 2 there are several processes which are marked with a dotted red line. The part that is inside the red line indicates the process in which the patient's companion can substitute the patient. This means that the patient does not need to be directly involved in the process. Based on this, the process that can be represented by the patient's companion is used as the basis for analyzing the proposed system in this study. The analysis of the proposed system is presented in the following form of Business Process Modeling notation. In Figure 2 there are several processes marked with a dotted red line. The part that is inside the red line indicates the process in which the patient's companion can represent the process. This means that the patient does not need to be directly involved in the process. Based on this, the process that can be represented by the patient's companion is used as the basis for analyzing the proposed system in this study. The proposed system analysis is presented in the form of Business Process Modeling notation can be seen in figure 3.



Figure 3. The Proposed System

Figure 3 describes the steps taken by patients when using a web-based treatment registration system.

1. Register for treatment online
Patients can register for treatment online by accessing the system developed in this study from anywhere and anytime.
2. Meet a specialist

On the day of treatment, the patient can just wait for his name to be called to enter the doctor's room without the need to do other processes. So there is no need to complete administrative matters again because previously it has been done through the system. After the patient's turn arrives, the patient can meet with a specialist doctor for treatment or consultation.

3.4. Research Stages

The research stages are the steps that will be carried out in this research from the beginning of the research to the completion of the research. The stages of the research can be seen in figure 4.

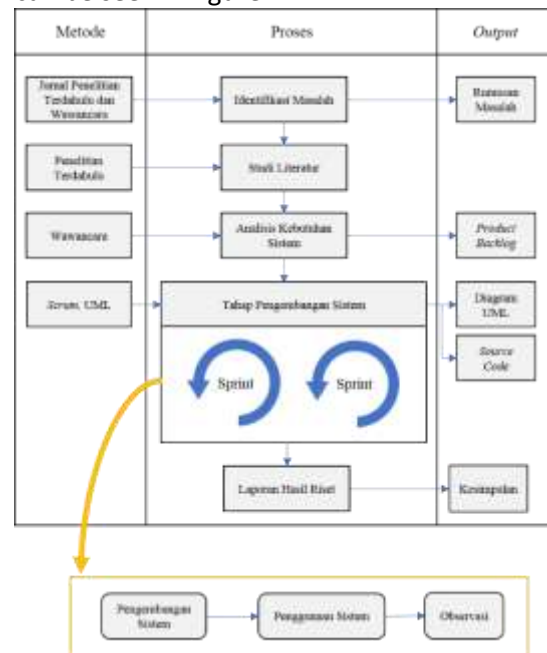


Figure 4. Research Stages

According to figure 4, the stages of this research are:

1. Identification of problems
Problem identification is done to find out what obstacles are happening in the community. This stage is carried out by reading previous research journals regarding the waiting time of patients seeking treatment at the hospital as well as interviews conducted with YuCare. This stage produces the formulation of the problem that has been written in previous chapter.

2. Literature Study

Literature study was conducted to collect the data needed in this research. This is done by reading the results of previous research.

3. System Requirements Analysis

This stage is carried out to determine the needs of the system to be built by conducting interviews with YuCare. The result of this stage is the product backlog.

4. System Development Stage

After the system requirements are obtained and recorded in the product backlog, the next step is to execute the system creation. The processes included in this stage are the design of UML diagrams, coding, database creation, user interface design, to testing the system built to find out all functions are running well. The use of the scrum framework applies the concept of sprints in system development. One sprint activity includes system development, patient use of the system, and observation of the results of using the system. If the results are not in accordance with the purpose of this study, namely to make the patient's waiting time faster, then the next sprint is carried out to improve the parts that can still be improved. The number of sprints carried out is in accordance with the conditions that occur in the field later until the research objectives are achieved.

5. Research Result Report

The final stage of this research is to present the results obtained in written form from the beginning to the end of the research.

4. RESULTS AND DISCUSSIONS

4.1. BPI and Scrum Implementation

The implementation of the BPI stages is in line with the implementation of the Scrum framework. There are five stages in BPI, namely Organizing for Improvement, Understanding the Process, Streamlining, Measurement and Controls, and Continuous Improvement. In this study, the BPI stage

carried out only reached the fourth stage. While the fifth stage was not carried out.

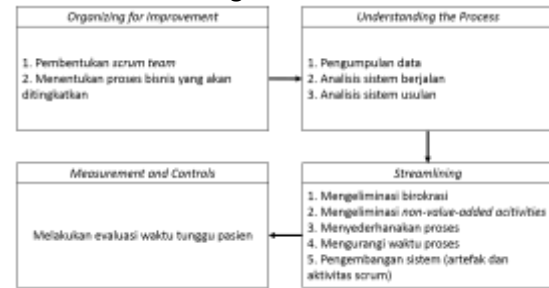


Figure 5. BPI and Scrum Implementation

Figure 5 describes the BPI steps carried out in this research. In more detail will be described as follows:

1. Organizing for Improvement

The first stage in BPI, namely organizing for improvement, is to form a team. In this case, the team formed is a scrum team consisting of the Product Owner, Scrum Master, and Development Team. The product owner for this project is the founder of YuCare. Furthermore, who acted as the Scrum Master was researcher's supervisor in conducting research. Then the development team is played by researchers. At this stage it was also decided that the business process that wanted to be improved was the registration process for patient treatment at XYZ Hospital.

2. Understanding the Process

The second stage at BPI is understanding the process, namely collecting data on the ongoing process. Interviews and observations were conducted to collect data on several patients at XYZ Hospital. The data collected is the current registration process for patient treatment and the waiting time experienced by patients with this process. Based on the results of interviews and observations, a flow chart of the ongoing process was made, the diagram can be seen in Figure 2. Then, an analysis of the process is carried out and results in an analysis of the proposed system which can be seen in Figure 3.

3. Streaming

The third stage at BPI is streamlining, namely executing business process improvements. The streamlining stage carried out in this research is eliminating bureaucracy, eliminating activities that do not directly contribute to meeting consumer expectations and do not support business processes (non-value-added activities), simplify processes, and reduce processing time. Eliminating bureaucracy is done by eliminating the activities of making doctor's appointments, printing SEPs and collecting files. Non-value-added activities that can be identified by the current registration process are patient queues. The queue in question is when the patient makes an offline doctor's appointment and prints the SEP manually to the officer. So, doing queues can be eliminated. The activities that were eliminated were replaced by registering for treatment through a web-based system. So that the patient only needs to do one activity to replace several processes at once. In this way, the registration process for treatment becomes simpler. This also reduces the time that patients have to pass when registering for treatment. Web-based system development is then carried out by creating scrum artifacts and performing scrum activities. The artifacts created are the product backlog, sprint backlog, and increments, each of which will be discussed further in this chapter. Then the scrum activities that are implemented are sprint planning by compiling the sprint backlog and determining the tasks to be carried out, running sprints by executing tasks on the sprint backlog, and sprint review by reviewing the unfinished sprint backlog to be worked on in the next sprint.

4. Measurements and Controls

The fourth stage at BPI, namely measurement and control, is to evaluate the system that has been built. Evaluation is done by measuring the waiting time of the patient after using the

system and then comparing it with the waiting time of the patient before using the system.

4.2. Analysis Stage

In the analysis stage, the work done is to analyze the system requirements by creating a scrum artifact called the product backlog. The product backlog contains a list of system requirements. There are 42 product backlog items made in this research. Each item represents a feature required by each actor who uses the system.

4.3. Development Stage

The system development stage is carried out in 2 sprints to implement each item from the product backlog. The result of each sprint that has been completed and can be used is called an increment. In addition, at this stage there is also documentation of system development made using UML modeling, system display for users (user interface), testing of all features, and evaluation.

4.3.1 Sprint Backlog

The sprint backlog contains ordered product backlog items. The position of this order determines the order in which the items are executed. The sprint backlog is made during the sprint planning activity. In this research, there were 2 sprint backlogs. The first sprint backlog consisted of 42 items, but only 13 items were completed in 30 days. Other unfinished items are continued in the second sprint and included in the second sprint backlog. The second sprint backlog consists of 29 items and can be completed in 14 days.

4.3.2 Increment

The increments in Sprint 1 that have been completed and can be used are the login, logout, forgotten password, password reset, and new account registration features. While the increment in sprint 2 includes all items contained in the product backlog. The final result of the development in the form of a web-based system can be accessed on the yucare.online site.

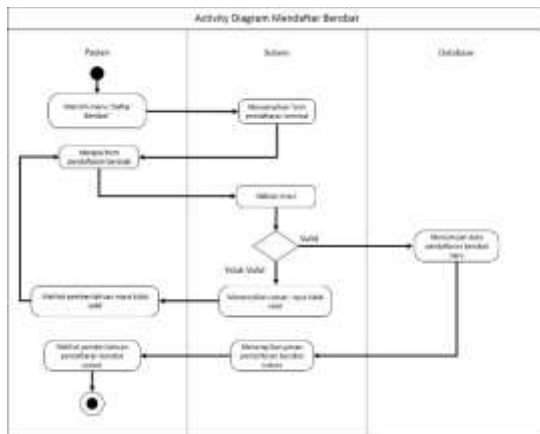


Figure 9. Sign Up for Treatment Activity Diagram

The final UML diagram for documentation of this system is the class diagram. The class diagram for this system can be seen in figure 10.

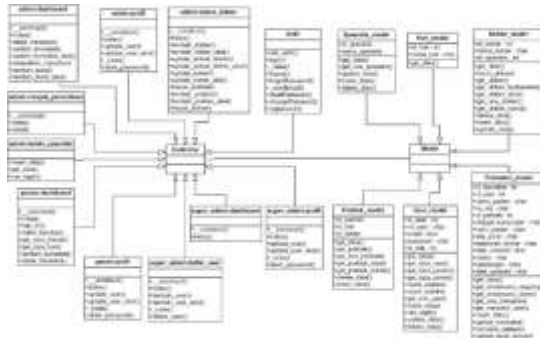


Figure 10. Class Diagram

The class diagram on the development of a web-based medical registration system is divided into two parts based on the controller and model. In the controller, there are 11 classes, namely Auth class, doctor management class for admin, profile class for admin, dashboard class for admin, request history class for admin, specialist management class for admin, dashboard class for patients, profile class for admin. patient, user list class for super admin, dashboard class for super admin, and profile class for admin. While in the model, there are 6 classes, namely model specialist class, model day class, model doctor class, transaction model class, user model class, and model practice class.

4.5. Testing

The testing phase is carried out to determine the success of the system implementation based on the system requirements analysis that has been made. In this study, the analysis of system requirements is made in the form of a product backlog. Thus, the product backlog becomes a reference in testing the system. There are 42 product backlogs created and tested. The test results show that all 42 product backlogs have been successfully implemented.

4.6. Evaluation

The system that has been tested can then be used by the patient. The purpose of using this system is to make the waiting time of patients when seeking treatment at the hospital becomes more efficient. After being used by 1 patient, the waiting time for patient treatment can be compared between before and after using the system. Calculation of patient treatment time can be done using flow analysis with the following formula.

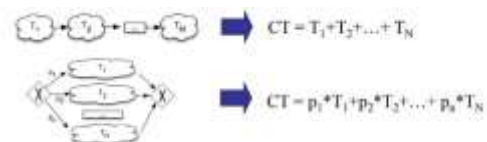


Figure 11. Formula for Flow Analysis Calculation

Figure 11 explains the formula for calculating business processes. Calculating CT or cycle time for processes that run without conditions (XOR split) is done by adding the time of each existing process. While calculating CT for processes that have conditions (XOR split), is done by multiplying the percentage of activity division by the time of each process that is in line, then added by the percentage times the processing time of the other paths in the same XOR split.

Figure 12 contains the registration process for patient treatment which is currently running at XYZ Hospital. There is a measure of time in minutes and there is also a percentage of the distribution of activities carried out conditionally, such as the activity of making doctor's appointments and printing of SEP.

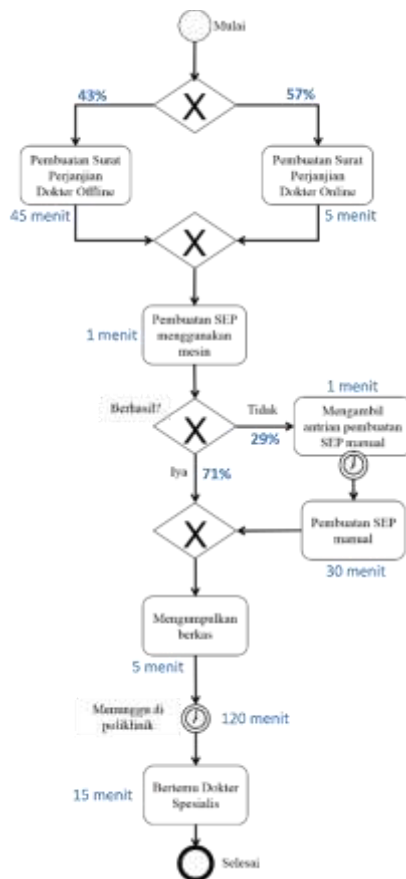


Figure 12. Time Measurement Before Using The System

From Figure 12 can be made process times tables that describe each process with time. The process times tables for the registration process for treatment before using the system can be seen in Table 1 below.

Tabel 1 Process Time Table before using the system

No.	Proses	Waktu
1.	Pembuatan surat perjanjian dokter <i>offline</i>	43%, 45 menit
2.	Pembuatan surat perjanjian dokter <i>online</i>	57%, 5 menit
3.	Pembuatan SEP menggunakan mesin	1 menit
4.	Pembuatan SEP menggunakan mesin berhasil	71%
5.	Pembuatan SEP menggunakan mesin tidak berhasil	29%
6.	Mengambil antrian pembuatan SEP manual	1 menit
7.	Pembuatan SEP manual	30 menit
8.	Mengumpulkan berkas	5 menit
9.	Menunggu di poliklinik	120 menit
10.	Bertemu dokter spesialis	15 menit

So, the process can be calculated using the cycle time formula as follows.

$$CT = (43\% \times 45 \text{ minutes}) + (57\% \times 5 \text{ minutes}) + 1 \text{ minute} + (71\%) + (29\% \times 31 \text{ minutes}) + 5 \text{ minutes} + 120 \text{ minutes} + 15 \text{ minutes} = 172.9 \text{ minutes}$$

Figure 13 contains the registration process for patient treatment using the system built in this research. There is a time unit in minutes for each process.



Figure 13. Time Measurement After Using The System

Times identified in Figure 13 can be made into process times tables that describe each process with time. The process times tables for the registration process for treatment after using the system can be seen in Table 2.

Tabel 2 Process Time Table after using the system

No.	Proses	Waktu
1.	Melakukan pendaftaran berobat secara <i>online</i>	5 menit
2.	Menunggu di poliklinik	120 menit
3.	Bertemu dokter spesialis	15 menit

So, from the process times table process can be calculated using the cycle time formula as follows.

$$CT = 5 \text{ minutes} + 120 \text{ minutes} + 15 \text{ minutes} = 140 \text{ minutes.}$$

From the results of the cycle time calculation above, there is a difference in the duration of time between before and after using the system. The patient's treatment process time

before using the system amounted to 172.9 minutes. Meanwhile, the patient treatment process time after using the system amounted to 140 minutes, experiencing a shortening of 32.9 minutes. Thus, this study concludes that the use of a web-based information system for registration of patient treatment at XYZ Hospital makes the waiting time of patients for treatment more efficient.

5. CONCLUSION AND FURTHER DEVELOPMENT SUGGESTION

5.1. Conclusion

After going through each stage of the research, the things that can be concluded are:

1. The BPI steps applied in this research are forming a team, determining the process to be improved, collecting the required data, analyzing the current system and the proposed system, eliminating bureaucracy and non-value-added activities, simplifying and reducing time business process. This results in a web-based system that can be used to replace the patient registration process that is currently running at XYZ Hospital.
2. Patient waiting time after using the web-based system can be shortened by 32.9 minutes.
3. The implementation of BPI measures combined with the Scrum framework results in a web-based system that can make patient waiting time efficient. Thus, the BPI theory issued in 1991 is still relevant to use and can be combined with Scrum.
4. Patients are willing to use a web-based system because they do not need to install applications on their smart phones. To install an application, it takes device memory as a data storage area. While web-based systems can be accessed directly through an existing browser without requiring separate storage memory.
5. The concept of improving business processes proposed in this study can be applied in XYZ Hospital with type A.

5.2. Future Development

In the future, this research can be improved by doing more research:

1. This study tested the system developed for only 1 patient. In the future, it can be tested on more patients to obtain consistent results.
2. Further analysis is needed to apply the same concept as this study to other hospitals as well as type B, C, and D hospitals. The registration process for patient treatment at other hospitals may be different from that applied to XYZ Hospital.
3. System development for other processes in XYZ Hospital is very possible to do. One of them is the process of making drug prescriptions, which in the process may only be attended by the patient's companion. So that if this process can be replaced by the system, it will have a more meaningful impact on patients and patient companions.

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