Design and Development of Pharmaceutical Company Information System Based on Website using the Waterfall Model

Aris Darisman, Mochammad Haldi Widianto

Abstract: the pharmaceutical company is one of the companies which has an important role and has several activities such as manufacturing, distribution and main services to the community. This activity is controlled by the information systems department. Making information systems is needed to help pharmaceutical companies manage important data, so important data or less important data will be paperless. The design of this information system uses the waterfall method, where the system and design are very well designed before coding and testing operations are carried out. Then the data is stored using a database. Before doing a good design, research using business analysis, user needs, etc. After this information system is finished, the testing method uses blackbox. Testing methods are an important element of quality assurance that represents a fundamental review of specifications, design and coding. This testing technique also focuses on the software information domain. This pharmaceutical company information system was created to support the performance of a company. Making using a waterfall and testing using a blackbox, is expected to increase visability and meet the requirements of a software. The results of testing the device aims to look for errors in the category of functions that are not correct, the interface is not good or access from the database. Some parts are tested namely the home interface, user login, etc. Research shows that the waterfall method can be effectively used in making website-based information systems. After that the blackbox test shows if all the test components have been tested can be used very well

Index Terms: **Pharmaceutical Company, Waterfall, Blackbox.**

I. INTRODUCTION

The current information system is developing very rapidly in line with the large need for information. The development of information technology can not be separated from the rapid development of computer technology, because computers are media that can provide convenience for humans in completing a job[1].

Over time, every company must need an information system to facilitate each of its work activities, so that it can be more controlled and can minimize any errors that exist. In every industrial and sales company, there must be inventory management to determine inventory, manage existing inventory, and manage inventory in industrial and sales warehouses [2].

Besides, the current use of the website is a matter of concern in every circle both for sales, including companies. Apart from the many advantages possessed by the use of the website, website media is also a media that can be useful for finding and getting information for a company.

In its production, several companies in Bandung produce finished pharmaceutical with brands such as Propepsa, Bevita Suspension, Zemindo, Amiclav, Bionemi, Calnic, D-Vit, Estin, Flamic, Fosicol, Gastrolan, Grafix, Grafed, Imox, Loxil, Mesol, Moretic, etc., the results are sold to all regions in Indonesia. Every sale of pharmaceuticals is certainly based on the order letter ordered from each distributor and sub-distributors. In managing the supply of finished pharmaceutical in companies in Bandung using a semi-computerized system using Microsoft Excel.

In previous studies in the manufacture of information system products in pharmaceutical companies is still rare by using direct analysis (interviews with the PT) combined with the waterfall method [3]. so now researchers use this method. The obstacles encountered from the results of the interview are too much using Microsoft Excel when recording data on the delivery of finished pharmaceutical, other things are:

1. Data is not neatly arranged and can cause a long time of input.
2. There is no validation of input so it often results in records that are often incorrectly input, causing mismatch between the physical and the data that has been recorded.
3. When recording this can also cause data to be deleted because there is no specific validation for accidental data deletion.
4. When using the file can not be done together with other users, this makes it not possible to do multi-user for recording inventory of pharmaceutical so it is less able to speed up input.
5. Requires a long time in making the report so that it is not efficient with time

II. LITERATURE REVIEW

A. Information System Development

The more rapid development of a company, especially pharmaceutical companies in the city of Bandung of course, the information system also has an increasingly important role. The demand for an increasingly better information system is due to the demands of the company's development,

technological development, and the development of information systems. Discussing the development of information systems means to improve so that it becomes perfect about the existing system. In the discussion of information system development, several important concepts will be elaborated as a supporter theory to facilitate understanding of system development, namely the basic concepts of information systems development [4].

B. System Requirements Analysis

According to [5] analysis of system requirements has the meaning that the whole information system becomes part of a component that has the goal of identifying and evaluating the kinds of problems or obstacles that will come and enter the system so that in the future it can be overcome, improved and also developed. The purpose of analyzing is to understand and understand the system needs to be created by developing systems that represent the needs, both for the needs of the system and the user.

The types of system requirements included in the non functional category are:

1. Operational Requirements: must be explained technically how the new system will be operated.

2. Performance Needs: explained how well the performance of software developed in processing data, displaying comprehensive information.

3. Security Needs: contains statements about the security mechanisms of applications, data and transactions that will be implemented on the system.

4. Kubutuhan Politics and Culture whose contents are related to political and cultural issues.

C. Waterfall

Initially, this model was named "Linear Sequential Model". This method is also called the "classic life cycle" or what is now called the waterfall model. This method is a method that was first raised in 1970 so it is often considered too old-fashioned, but this method is often used by technicians in Software Engineering (SE). This method takes a systematic and neatly arranged approach such as a waterfall starting from the level of system requirements then continues to the stages of analysis, design, coding, testing/verification, and maintenance. Called a waterfall because like a waterfall falls one by one so that the completion of the previous stage can then proceed to the next stage and walk-in sequence. the steps in the waterfall model can be seen in the following image:
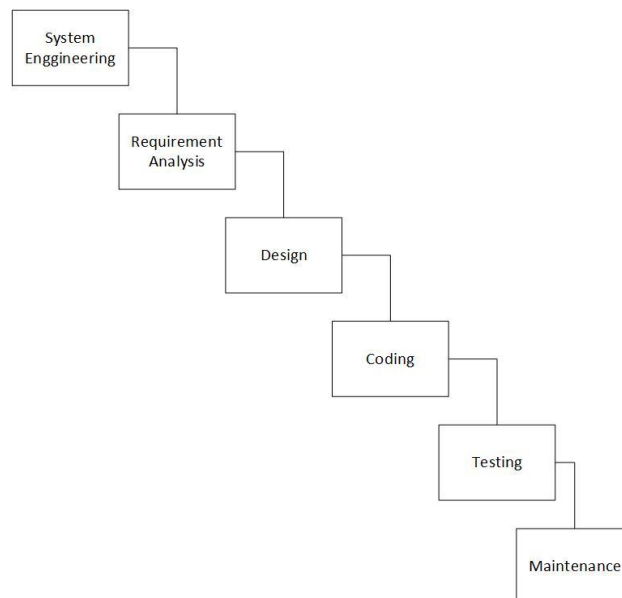

Fig 1. Waterfall Methods

According [6] The stages of the waterfall model are as follows:

1. System Engineering

This stage begins by looking for the needs of the whole system to be applied in software

2. Requirement Analysis

At this stage the system developer needed communication aimed at understanding the software expected by the user and the limitations of the software. This information can usually be obtained through interviews, discussions or direct surveys

3. Design

The requirements specification from the previous stage will be studied in this phase and the system design is prepared

4. Coding

In this phase, the system is integrated with syntax so that the information system can be used as needed, which will be integrated in the next stage..

5. Testing

All units that have been developed and correctly coding are directly tested for their use, such as using blackbox testing.

6. Maintenance

the final phase in the waterfall model. Finished software or information systems, run and then maintained

D. Unified Modelling Language (UML)

UML is one tool that can be used in object-oriented programming languages, currently, UML will begin to become a future standard for the industry. UML is a general syntax for creating a logic model of a system and is used to describe the system so that it can be understood during the analysis phase and UML design is usually presented in the form of diagrams or pictures that include classes and their attributes and operations, as well as the relationships between classes that include interfaces, associations, and composition [7].

E. Database

Database or database is a collection of various data and information stored and arranged in a computer systematically that can be checked, processed or manipulated by using a computer program to obtain information from that database [8].

III. SYSTEM ANALYSIS

A. Business Process

A business process is a collection of activities or structured work that is interrelated to solve a particular problem or that produces a product. This section analyzes the work procedures that exist in the finished drug inventory information system in a pharmaceutical manufacturing plant in Bandung, this business process aims to identify and evaluate problems that occur and the needs that are expected.
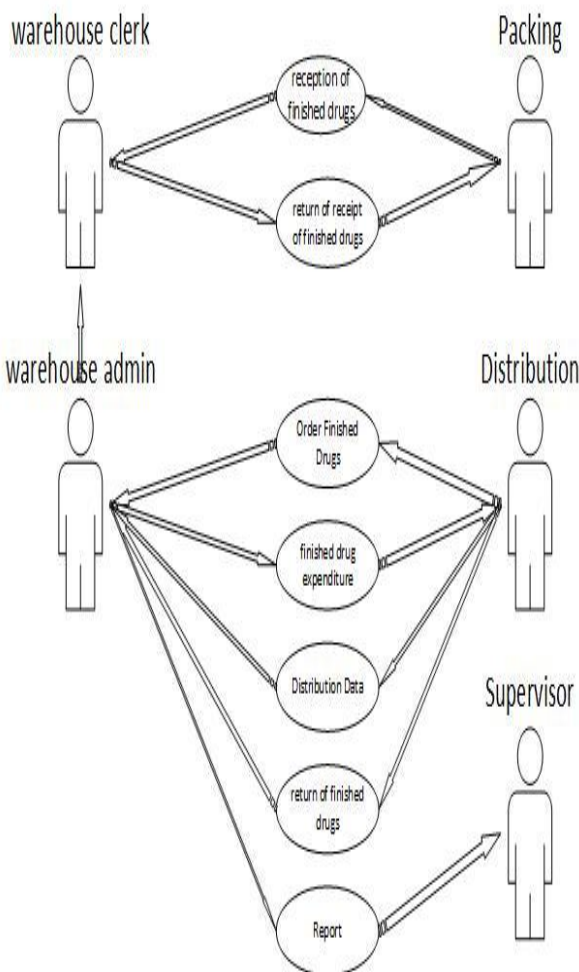

Figure 2. Business Object of Drug Inventory

B. Identification of User Needs

The information system must provide convenience and systematic for the user following the needs, while the user needs are as follows:

1. The system created must facilitate the user in his work
2. The system created must have data security so that it can be restricted in its use
3. The system must be used by employees who have been registered
4. The system made must be able to display reports and even print reports in accordance with existing data input

5. All data must be available and always easy to find and obtain in order to facilitate users in using this system
6. This information system must be able to facilitate the warehouse supervisor in its use.
7. The system made must be able to facilitate the input and receipt of finished pharmaceutical.
   With the definition of needs as follows:

Table 1. Information Needs

No	Name	Goals	Frequency
1	Drug Receipt Report	Warehouse Supervisor	Monthly Period
2	Report on Drug Expenditures	Warehouse Supervisor	Monthly Period
3	Distributor Data Report	Warehouse Supervisor	Supervisor Needs
4	GOJ Inventory Report	Warehouse Supervisor	Monthly Period
6	Delivery orders	Distributor	Setiap saat
7	Proof of receipt of finished pharmaceutical	Warehouse Admin	Setiap Saat
8	Reports on Receiving Medication for Finished Medicines	Warehouse Supervisor	Supervisor Needs
9	Report on Drug Expenditures Return	Warehouse Supervisor	Supervisor Needs

C. Program Testing

Before the program is implemented, the program must be free of errors. For that, the program must be tested in advance to determine the errors that might occur. Testing or testing of this program is done by testing White Box and Black box techniques

Black Box Testing where for testing the program immediately looks at the application without the need to know the structure of the program. This test is carried out to see whether a program has met or not [9], [10].

IV. RESULT

A. Home User Interface

This index page is the main page of the information system interface of the website. The first content contains a Logo, which the company logo will be included on. Next is about, when pressed will contain some information about the company. The most important thing is the log in section. not all parties can enter this website.

Because the design uses the Waterfall so a very mature analysis is carried out before entering the coding section. The following is an example of the resulting image:
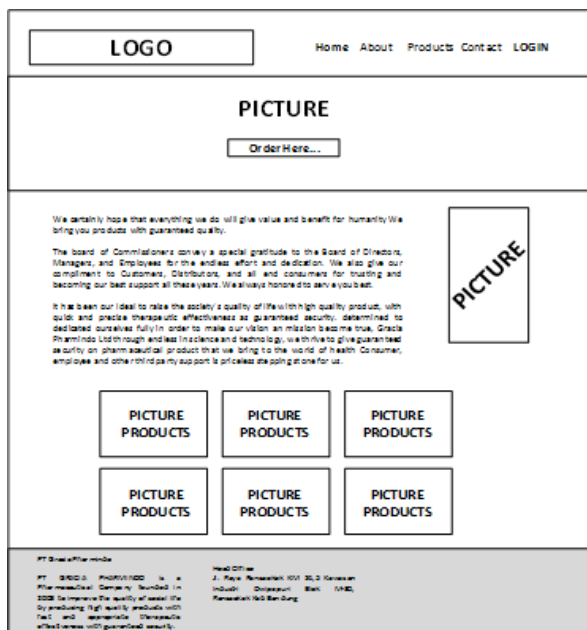
Figure 3. User Interface Home

Analyzed using a blackbox to enter the web. then produce the following results:

Table 2. BlackBox Test Home

Component testing	Expected results	Result
Enter the website	May enter website	Successful

So the experiment according to [10], states if making a home using a waterfall has been successful

B. Login User Interface

Furthermore, a mode is made to enter the login, where only employees can enter, while consumers, visitors, etc. cannot access the private database of this pharmaceutical company.

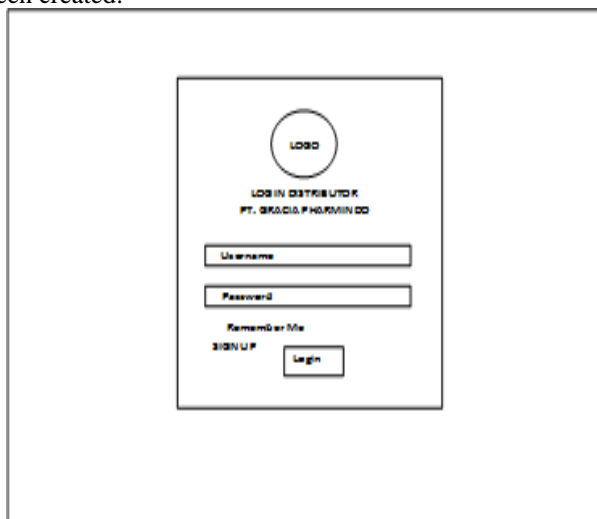The following is the result of the login interface that has been created:

Figure 4. Login Interface Home

This menu is also made with the waterfall method so that it is designed as well as possible first and then designed and finally the coding and testing application. Then the test is done using a BlackBox as in the following table:

Table 3. BlackBox Test Login

Component testing	Expected results	Result
Login function testing	May login with user access	Successful

So the experiment also according to [10], states if making a home using a waterfall has been successful

C. Home Admin User Interface

Then enter the admin menu, where in this menu as an admin can use the options that have been given such as data recap, distributor data, sales orders, reporting, add data, etc. The following is the result of the admin menu user interface
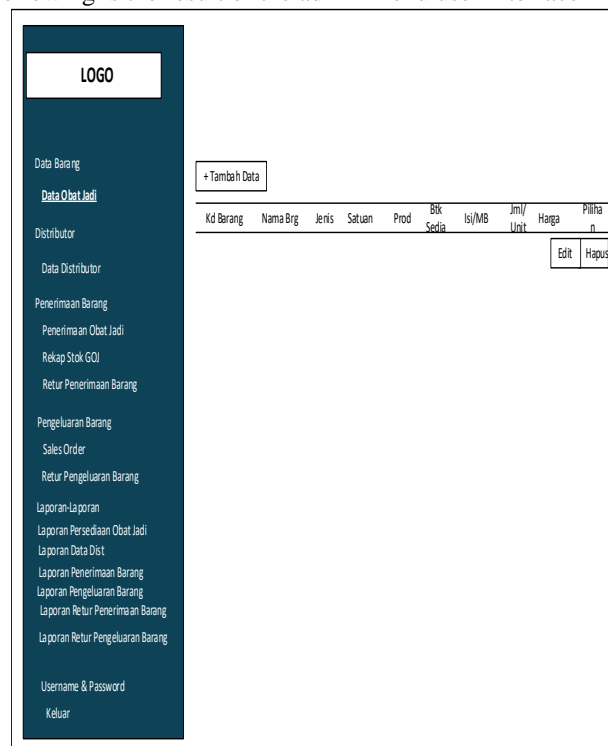

Figure 5. Login Interface Home Admin

Furthermore, the same as before carried out several tests using the black box, with the results as in the following table:

Table 4. BlackBox Test Home Admin

Component testing	Expected results	Result
Add Data	May add data	Successful
Connect Distributor	Can Connect Distributor	Successful
Received Goods	Can Connect received goods	Successful
Report Distribution	Can Connect Report Distribution	Successful
Log Out	Can Logout	Successful

Of all the tests carried out by the BlackBox and according [10] to, the method of using waterfall is still efficient and effective for use in making websites for pharmaceutical companies

V. CONCLUSION

The information system developed for pharmaceutical companies is very necessary because of the need for effectiveness and efficiency to reduce the operational budget of a pharmaceutical company. In this study, the information system is based on a web site due to a very fast database request by the company. in making information systems in this study using the waterfall method that plans the system with the best possible planning before proceeding to the next stage. After the planning stage is finished, testing is done using BlackBox. Based on the results of testing using BlackBox, all components of the information system are running well as in, the Home User Interface that can be used correctly, then the Login User Interface can also be used properly, so it can be concluded if the system development using the waterfall method has been successfully used in making information systems in this pharmaceutical company. In the future, it is possible to develop information systems using other methods.

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