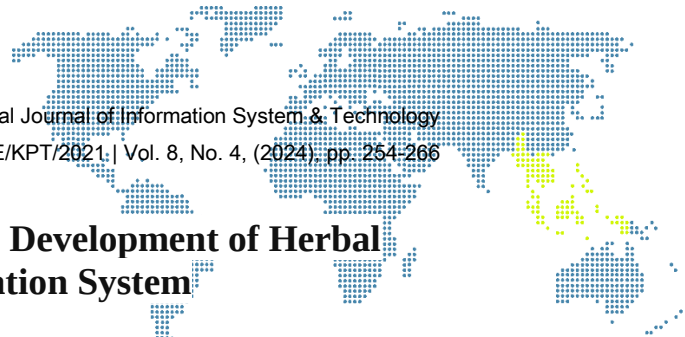




Using of the Waterfall Model in the Development of Herbal Medicine Sales Information System

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Abstract

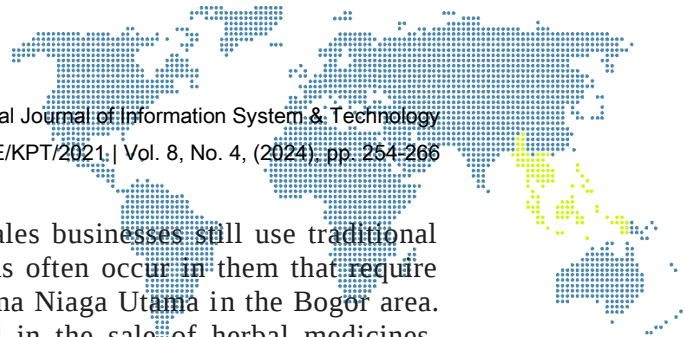
The increasingly advanced development of technology is currently a challenge for companies to create and develop information systems that are implemented in the company. The use of computers equipped with application programs can help improve company performance, such as in trading companies. Where the sales sector has an important role in increasing the progress of the company, because it is related to the income that the company can obtain. Besides that, sales is also directly related to customers, where good service is very necessary to create customer satisfaction. Therefore, it is necessary to implement a good information system for the sales information system. However, looking at current conditions, there are still many companies or places of business where data processing is still done traditionally. If this continues, it can cause problems that can be detrimental to the company. As for problems that arise, such as data processing which still uses handwriting, this is very prone to recording errors. Besides that, it often happens that sales reports are created that are not the same as existing transactions. These problems should be resolved immediately, by developing the information system. So that companies can survive amidst the current competition. In solving the problem, the right method is needed, such as using the Waterfall model. Where this model is carried out in stages and sequentially. By using the right model, the right program application can be produced, according to what the company needs. So that problems that arise can be resolved well, customers get satisfaction from the services provided and company profits increase.

Keywords: Pengembangan sistem, Penjualan Obat Herbal, Waterfall

1. Introduction

Health is very important for all of us. If we are healthy, we can carry out our duties and activities. Meanwhile, if we are in an unhealthy condition, our activities will be disrupted and we will not be able to focus on completing our tasks. Therefore, health has a very important role in our lives. In maintaining health, besides living healthily with a healthy diet and frequent exercise, we can also use herbal medicines according to our body's needs. At this time, herbal medicine is also widely used by the wider community, because it avoids the use of chemicals in carrying out treatment.

So, many businesses have been opened related to herbal medicines, one of which is in the sales business sector. Sales is one of the main functions of an organization's product marketing activities, the activity of delivering goods to consumers [1]. Selling herbal medicines is one of the choices made by people in running their business. Because the herbal medicine sales business has quite good opportunities in the business world which can increase income in the business. Of course, when selling herbal medicine, we want to provide satisfactory service to consumers. It's like the consumer is king, so they need to be given the best service and not disappoint. Apart from that, it is also necessary to be able to manage sales data well, because this relates to information that can be conveyed to parties who need it, especially to company management. Therefore, it is necessary to implement a good information system in this place.



However, in reality, many herbal medicine sales businesses still use traditional systems in managing their business and problems often occur in them that require immediate resolution. As happened with CV. Wina Niaga Utama in the Bogor area. CV. Wina Niaga Utama is a company engaged in the sale of herbal medicines. Managing the data is still done manually. This turned out to cause problems in the sales information system. There are several problems that arise, such as still using handwritten notes when writing the data. If this is done continuously, of course it will be very prone to errors, where if the data is written incorrectly and is not clear, it can cause errors in reading the data or difficulties in reading the data.

Apart from that, the service provided to consumers is rather slow, this is because searching for data takes quite a long time. If this continues, consumers will feel disappointed with the service provided, so consumers will move to another place that offers better service. Other problems also occur when making herbal medicine sales reports. In making the report, there were difficulties in finding the data and many of the documents did not exist. This creates a discrepancy between the records when the sales transaction occurred and the physical evidence. Because document storage is not neat and very piled up, documents can be scattered and lost.

Problems like this, of course, require immediate resolution. Because of this, it probably doesn't only happen in CV. Wina Niaga Utama, but it can happen in other places. Therefore, changes are needed in the sales information system. It is very necessary to develop sales information systems from conventional to computerized. With the development of the system, especially in the information system for the sale of herbal medicines, it is hoped that the problems that arise as described above will soon find solutions. So that the service provided to consumers can be even better, data searches can also be done quickly, data related to the master and sales transactions can be stored neatly. If this has been done well, the resulting herbal medicine sales report will be accurate so that it can be used by management in carrying out evaluations, monitoring and decision making.

However, developing this system is certainly not easy. There will be many challenges involved and it really requires preparation from the place of business. One of the challenges faced is having to find the right people and experts to help in developing the system. Finding people who really master and have expertise in developing this system is also not easy, it takes a lot of information and references to find them. Apart from that, you also have to prepare funds that will be used to develop the system. Because to produce a new system, which will be implemented as a transformation from a conventional system to a computerized one, definitely requires a lot of funds. Apart from being able to pay the experts who help him, he also has to prepare the facilities and infrastructure needed to implement the new system.

Therefore, everything must be prepared carefully. Because the aim of developing this system is especially related to the herbal medicine sales information system so that it can resolve existing problems in the business premises, so that satisfactory service can be provided to consumers and preparation of herbal medicine sales reports can be done in a timely manner and with the data. can be accounted for accurately. And to achieve all of this, apart from requiring the right experts or system developers, it is also very necessary to choose the right model in developing the system. There are many models offered for developing systems, but here the author will use the waterfall model as an option in efforts to develop systems.

The waterfall model is one of the models in the System Development Life Cycle (SDLC). The process of changing or developing an old system into a new system, using a model or methodology that has been used by someone before, is the definition of SDLC (System Development Life Cycle or someone mentioned with Software Development Life Cycle) [2]. System Development Life Cycle (SDLC) is



a gradual approach to analysis and design that states that systems are best developed through the use of specific cycles of analysis and user activities [3]. With the transformation from the old system to the new system, of course the goals expected by developing this system can be achieved well. Meanwhile, regarding the waterfall model itself, it is the right model for developing this herbal medicine sales information system, because in this waterfall model each stage is carried out sequentially, to carry out the next stage, the previous stage must be completed first, Abdurrahman & Masripah [4]. The stages carried out in this waterfall model start from analysis, design, code generation, testing and support.

By using this waterfall model, it can at least help the tasks of system developers or experts in carrying out system development. The system developer must really understand the existing system at the business location, the problems faced so that he can determine the needs needed to develop the system, especially the information system for selling herbal medicines according to the stages that have been determined. So that the new system that is produced later can be in accordance with what is expected by the system users and run according to expectations and achieve the goals that have been set.

The following are several studies that have been carried out by previous authors, from various points of view, such as : Sistem Informasi Transaksi Penjualan Obat Berbasis Website Menggunakan Metode Prototype [5], Perancangan Sistem Informasi Data Pembelian dan Penjualan Obat pada Apotek Thamrin Medan Menggunakan Visual Studio.Net [6], Sistem Informasi Penjualan Obat pada Apotek Arum Bandar Lampung [7], Perancangan Sistem Informasi Penjualan Obat Pada Apotek Tuh Sehat Berbasis Web [8], Pengembangan Sistem Informasi Kasir Apotek Dengan Metode Waterfall Guna Memperoleh Keakuratan Data Transaksi [9], Rancang Bangun Aplikasi Penjualan dan Persediaan Obat pada Apotek Berbasis Android [10], Rancang Bangun Sistem Informasi Penjualan Obat Pada Apotek “Kartini” Dengan Menggunakan Framework Codeigniter [11], Analisis Pola Penjualan Obat Di Apotek An-Naafi Menggunakan Metode K-Means Clustering [12], Rancangan Sistem Informasi Penjualan Obat Farmasi Pada PT. Guna Abdi Wisesa Berbasis Web [13], Pengaruh Penjualan Obat Secara Daring (Apotek Daring) Terhadap Penjualan Apotek Konvensional Di Kecamatan Tanjung Priok Kota Jakarta Utara [14], Rancang Bangun Sistem Informasi Penjualan Obat Berbasis Website dengan Menggunakan Metode Waterfall [15] dan Rancang Bangun Sistem Informasi Penjualan Obat Berbasis Dekstop dengan Model Waterfall [4].

2. Research Methodology

Qualitative research is used as a type of research in developing an information system for selling herbal medicines at this business location. The data in this research was obtained from various sources such as interviews, observations and using literature studies. In conducting interviews, questions and answers are carried out directly to the parties involved in providing information regarding the required data, in this case relating to herbal medicine sales information system data. Before conducting an interview, you must first prepare a list of questions that will be asked to the person being interviewed, so that the interview will run well and the data you want to know can be collected. Apart from conducting interviews, they also make observations. This observation was carried out by directly observing how the herbal medicine sales information system works. The results of these observations are recorded in separate notes, so they can be used to complement the data obtained from the interviews. And finally, do a literature study. This literature study is very important to support research, because by using literature study, we can find out what research has been carried out by previous authors, as well as information related to the research carried out, so that it can help in preparing this research.

The data obtained from interviews, observations and literature studies were then used as a basis for developing an information system for the sale of herbal medicines. Development of a herbal medicine sales information system that uses one of the SDLC models, namely using the waterfall model. This waterfall model was chosen because this model has five stages, where each stage will be implemented one by one in sequence. The first stage must be completed first, then you can proceed to the second stage. And so on until the completion of the fifth stage. So with this model, each stage can be implemented optimally by the system developer. So it is hoped that what has become the goal in developing an information system for selling herbal medicines can be achieved. The stages carried out in the waterfall model are as follows :

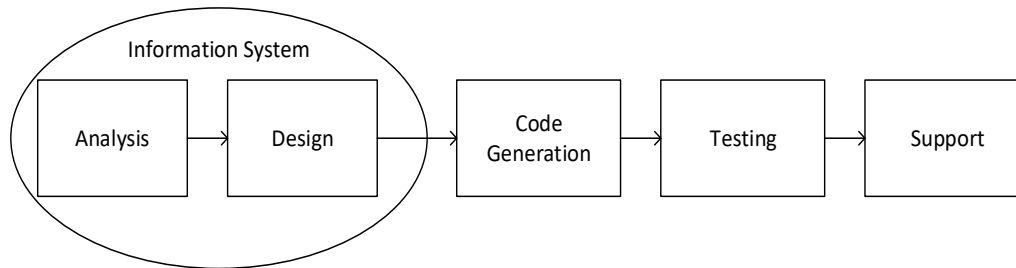


Figure 1. Waterfall Model

Caption :

a. Analysis

Analysis is the initial stage in the waterfall model where this analysis is very necessary to find out the actual conditions in the system that is currently running. Especially in the herbal medicine sales information system. This can be known about the business process, starting from the ordering process, payment process to the report creation process. In a UML diagram, this business process is depicted with an Activity Diagram. Then, based on the results of this initial analysis, it can be determined what needs are needed in developing a herbal medicine sales system. So that later it can be concluded which parts are given access rights in running the new system and what is presented in the system. Based on the system requirements analysis that has been carried out in the UML diagram, it can be depicted with a Use Case Diagram.

b. Design

The second stage, after the analysis stage is complete, the design stage is carried out. In this design stage, a system design is carried out which is related to the herbal medicine sales information system based on the needs analysis that has been made. The designs created can be in the form of database designs and user interface designs. This database design is used to determine the tables that will be used in making the application program so that the data structure can be known, and will be depicted in the form of a Class Diagram [16]. Meanwhile, the user interface design can be described using certain software or related to the programming language that will be used.

c. Code Generation

The next stage is Code Generation, where this stage will be carried out after the design stage is complete. In the design stage, you can already find out about the database design and user interface design. So, the next step is to create an application program, of course based on the design that has been carried out. In this case it is proposed to use the PHP programming language and to create a database using MySql [17].

d. Testing

After the application program is completed in the Code Generation stage, the next stage is carried out, namely testing. This testing is carried out to see whether it is

free from errors and whether the output produced is in accordance with what the user wants or not. And in carrying out testing, the black box testing technique is used, where in this technique you will see whether the data entered and displayed is valid or not. For example, when testing Login, the system will display various displays with several conditions such as the username and password are empty, the username and password are entered but the data is incorrect, the username and password are correct [18].

e. Support

The final stage in this waterfall model is the Support stage. After the application program has been tested and passed and is in accordance with what the user wants, the new system, using the application program that has been created, is ready to be implemented. This stage also supports the use of the necessary facilities in developing the system both in terms of hardware and software.

3. Results and Discussion

3.1. Analisa Sistem Berjalan

In the current system analysis, the business processes that exist in the herbal medicine sales information system are explained. This business process is used to explain the workflow in the herbal medicine sales information system at a place of business. Even though the sales information system is implemented in many business places, each business place has its own policy in implementing the system. So this cannot be generalized to other sales information systems. The business process of the herbal medicine sales information system (which is implemented at CV. Wina Niaga Utama), is as follows :

Customers come to the business premises and will be served by the sales department. Next, customers can immediately select the type of herbal medicine they need, and if the type of medicine they are looking for is not available, then the customer asks the sales department whether the medicine they are looking for is available or not. The sales department will check first by looking at the list of medicines, if they are still available they will be conveyed to the customer, and then make a note as proof of the customer's order. However, if there is none, the sales department will confirm it with the customer. If the order is complete, the note made by the sales department will be informed to the customer regarding the amount the customer must pay. Then, the customer will make a payment, and as proof, the customer will get the original note, while the copy note will be kept by the sales department. At the end of each month, the sales department will prepare a herbal medicine sales report, which will later be submitted to the owner.

Based on the business process of the herbal medicine sales information system, an activity diagram can be created. This activity diagram is a UML diagram that is used to describe the workflow of a system, in this case the system described is an information system for selling herbal medicines in diagram form. With this activity diagram, it can make it easier for readers to better understand the business processes that exist in the running system. The illustration of the Activity Diagram image is as follows:

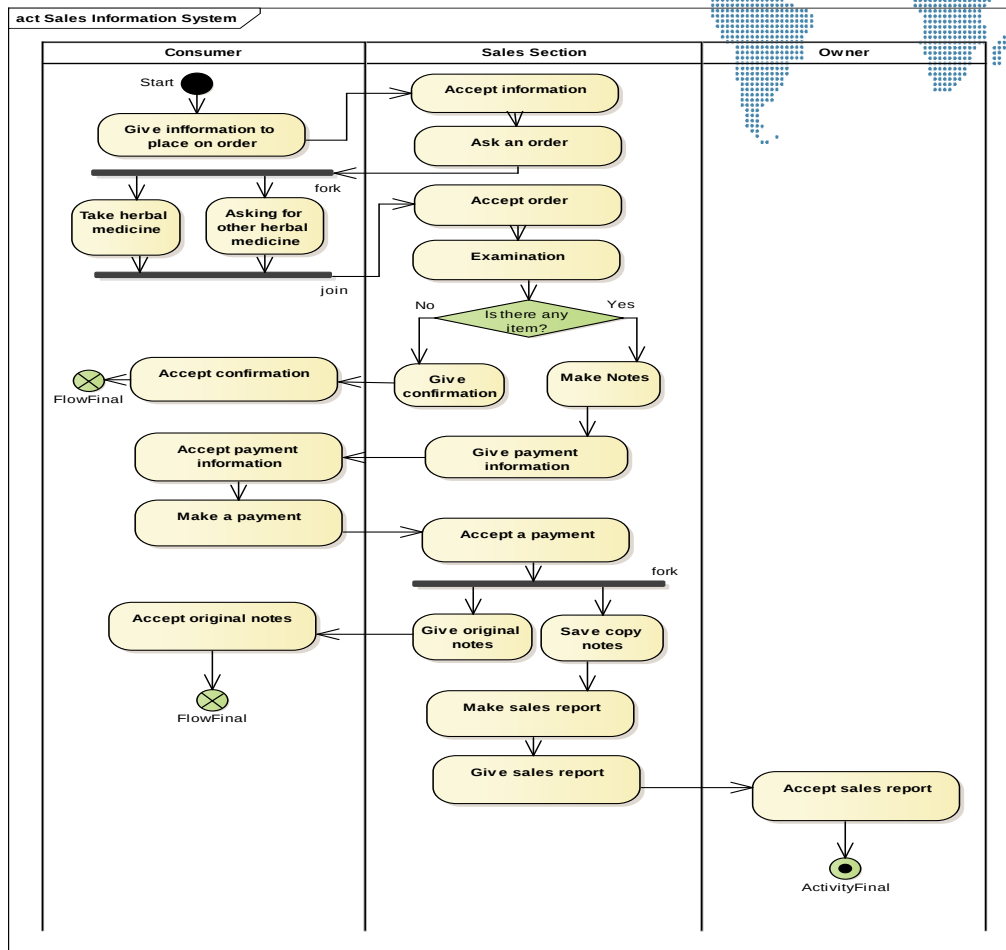


Figure 2. Activity Diagram

3.2. Waterfall Model

1) Analysis

Based on the business processes that have been explained and supported by the activity diagram above, we can understand the workflow implemented in the herbal medicine sales information system at the business location. The data obtained will then be analyzed further, especially by system developers. The system developer is then tasked with determining the requirements needed to develop the system. In the process of determining system requirements, of course an in-depth analysis is needed and in this case it is not only based on the thoughts of the system developer, but also based on information submitted by the user. Therefore, communication between system developers and system users is very important. System developers can find out what needs users want from the new system they are creating. Therefore, system developers must really understand what the system users need, besides that, system developers must also really know in detail the current system and the problems that occur [19]. After understanding the current system, the needs needed to develop an herbal medicine sales information system can be determined, as follows :

- a. Admin can do login
- b. Admin can manage customer data
- c. Admin can manage medicine data
- d. Admin can manage user data
- e. Admin can manage sales transaction
- f. Admin can manage payments transaction
- g. Admin access sales report

- h. Sales section can do login
- i. Sales section can manage sales transaction
- j. Sales section can manage payments transaction
- k. Sales section access sales report
- l. Owner can do login
- m. Owner access sales report

From the requirements above, it can be seen who uses the information and what they can do. And from the results of exploring needs as mentioned above, they need to be documented. In this case, to describe these needs, use a use case diagram. Use case diagram is a modeling used to describe the behavior of the system to be created. With a quick definition, use case diagrams are used to determine the functionality of a system [20]. The following is a depiction of the Use Case Diagram:

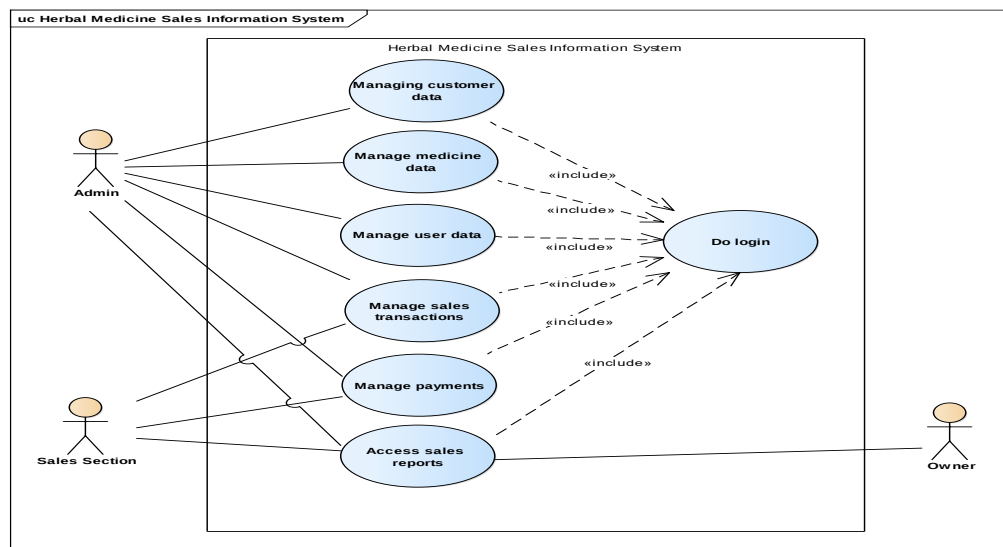


Figure 3. Use Case Diagram

2) Design

The Design stage is the second stage carried out after the Analysis stage is completed. In the Analysis stage, the needs needed to develop an information system for selling herbal medicines are known. Based on these needs, a system design is then created. There are two designs created, namely:

a. Design Database

Databases have an important role in creating program applications, where a database is a collection of tables or files that interact with each other. With a database, we can see the data structure that will be related to the application being created. The database design can be described using an Entity Relationship Diagram (ERD), where in the ERD, we can determine entities, attributes, relationships between entities and their cardinality. Apart from that, it can also be demonstrated using a Class Diagram, which can show in detail the data structure used in developing the system. Because a class can consist of three areas, namely starting from the class name, attributes (which are equipped with their data types) and the methods used in the class. And each class will be connected and its multiplicity can be determined to form a Class Diagram. In this herbal medicine sales information system, several classes are involved, such as : Customer class, Medicine Class, User Class, Sales Class, Payments Class and DetailSales class. The Class Diagram of the herbal medicine sales information system can be described as follows :

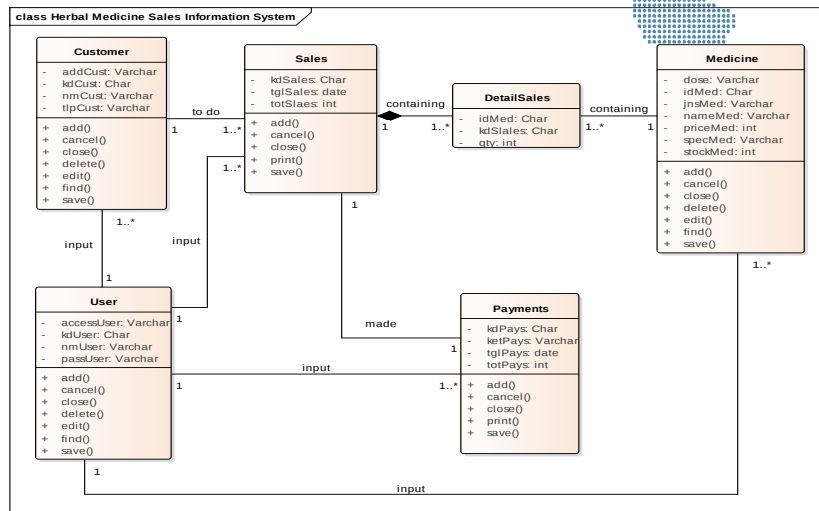
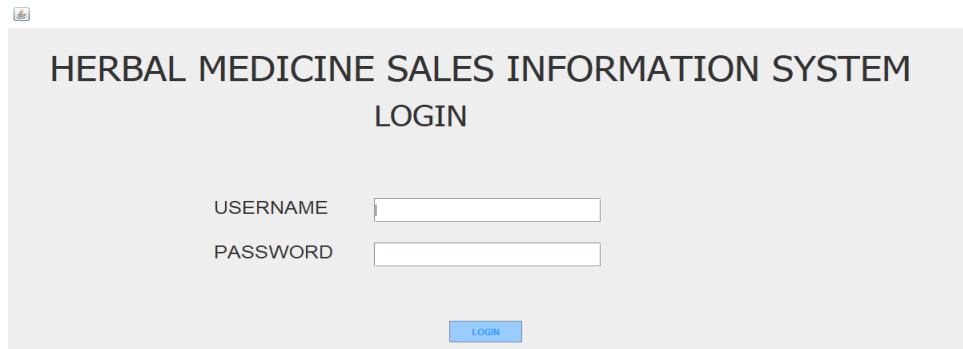


Figure 4. Class Diagram

b. User Interface Design

Apart from the database design above, user interface design is also very necessary in system development, especially those related to herbal medicine sales information systems. This user interface contains important data that will be displayed. The data displayed has of course been adjusted to the needs required in developing the system. With the user interface, it is hoped that it will make it easier to see what data will be input and the resulting output. User friendliness is very necessary when designing a user interface. This makes it easier for users to use the application in the new system that will be implemented. The user interface design in the herbal medicine sales information system is as follows:



HERBAL MEDICINE SALES INFORMATION SYSTEM
LOGIN

USERNAME

PASSWORD

Figure 5. Login User Interface



HERBAL MEDICINE SALES INFORMATION SYSTEM
CUSTOMER DATA

CUSTOMER ID

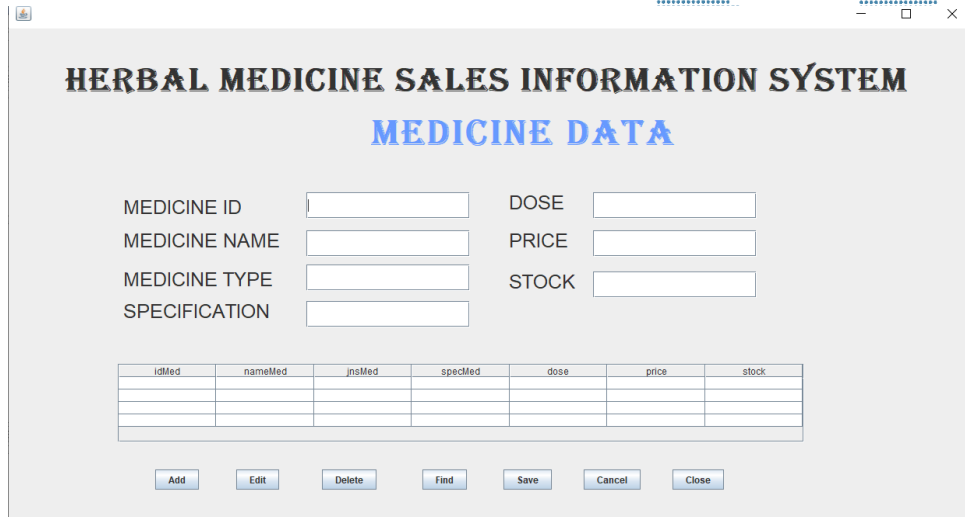
CUSTOMER NAME

CUSTOMER ADDRESS

PHONE

kdCust	nmCust	addCust	tpCust

Figure 6. Customer Data User Interface

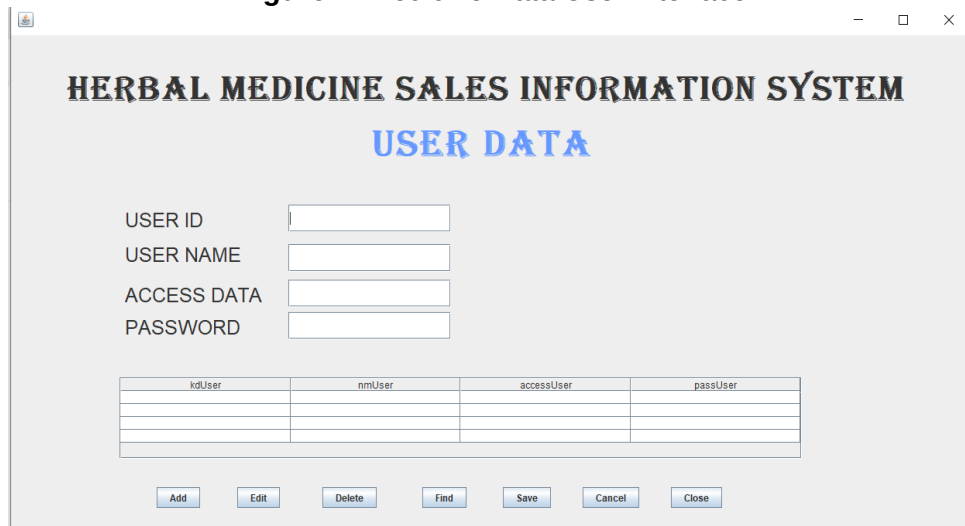


HERBAL MEDICINE SALES INFORMATION SYSTEM
MEDICINE DATA

MEDICINE ID DOSE
 MEDICINE NAME PRICE
 MEDICINE TYPE STOCK
 SPECIFICATION

idMed	nameMed	instMed	specMed	dose	price	stock

Figure 7. Medicine Data User Interface



HERBAL MEDICINE SALES INFORMATION SYSTEM
USER DATA

USER ID
 USER NAME
 ACCESS DATA
 PASSWORD

idUser	nmUser	accessUser	passUser

Figure 8. User Data User Interface

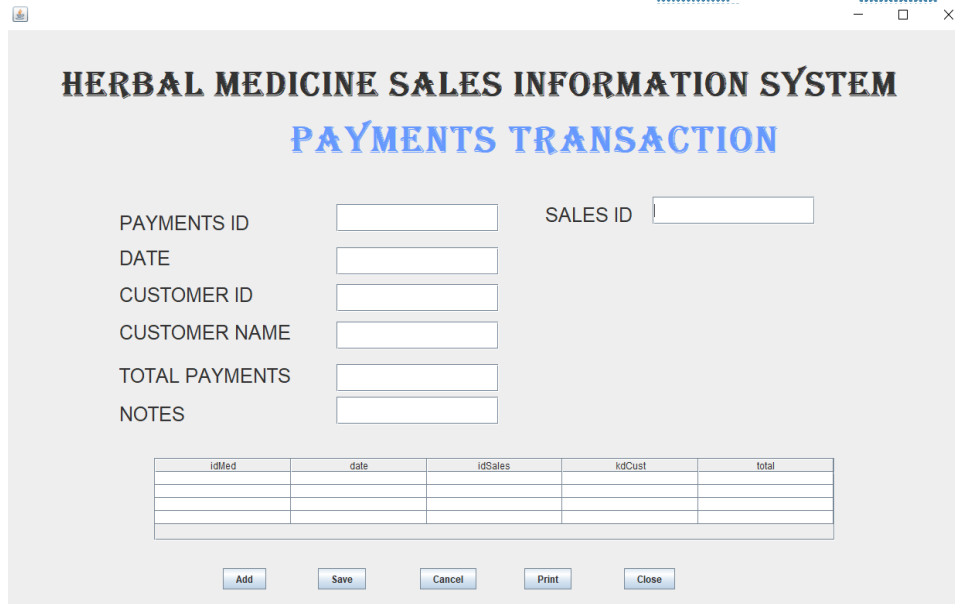


HERBAL MEDICINE SALES INFORMATION SYSTEM
SALES TRANSACTION

SALES ID MEDICINE ID
 DATE MEDICINE NAME
 CUSTOMER ID PRICE
 CUSTOMER NAME QUANTITY

idMed	nameMed	price	qty	subtotal

Figure 9. Sales Transaction User Interface



idMed	date	idSales	idCust	total

Figure 10. Payments User Interface

3) Code Generation

The next stage is Code Generation. This stage is carried out after the design stage is complete. In the design stage, two designs have been created, namely the database and the user interface. These two designs will later be used as a reference in creating the application program. And before the program application is created, it must first be determined which programming language software and software to use in creating the database, with the hope that the finished application can then be implemented well. In this code generation, it is proposed to use the Java programming language and MySQL as the software used in creating the database. In the coding used in making the application program, it is taken from the attributes which are the main keys of each class. When making the coding, it should also have meaning, for example coding for the sales transaction ID: TR1224001. This coding means that the first two digits indicate the initial transaction code (TR: Transaction), the next two digits indicate the month (12: December), the next two digits indicate the year (24: 2024) and the next three digits indicate the transaction sequence number (001). : serial number one). What needs to be coded in this herbal medicine sales information system is : kdCust, kdUser, idMed, idSales and kdPays.

4) Testing

The next stage is testing, after the code generation stage is complete, it means that the program application created has been completed. This testing is used to test the program application. In the tests carried out, it will be possible to find out whether the application being tested is free from errors and also to find out whether the output produced is as desired or not. Therefore, when conducting testing, it is necessary to involve users, because these users will later implement the application in their new system. Users can view and evaluate when testing is carried out. The data used in testing should also use real data, meaning data that is usually used in the company's daily operations. When testing is carried out, the resulting output will be seen and whether the resulting output can solve the problems that exist in the running system. If there are still deficiencies, of course users can provide input to the system developer, so that improvements can be made immediately. To carry out this test, use the Black Box method, where in the black box method, you can see the data entered into the application with the results showing whether

the application is valid or not. The following is an example of testing with a black box to test Login:

Table 1. The testing with a black box to test Login

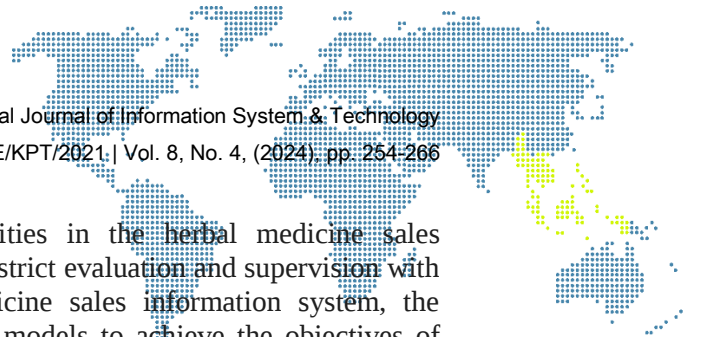
No	Testing Scenario	Test Case	Output	Testing Result	Note
1	Doing clear data of username and password, then click login	Username (empty) Password (empty)	System will denied access and system show message "Wrong username and Password"	According to expectations	Valid
2	Input with correct username and empty password, then click login	Username (user) Password (empty)	System will denied access and system show message "Wrong username and Password"	According to expectations	Valid
3	Username empty and input the correct password, then click login	Username (empty) Password (password)	System will denied access and system show message "Wrong username and Password"	According to expectations	Valid
4	Input wrong username and password, then click login	Username (salah) Password (salah)	System will denied access and system show message "Wrong username and Password"	According to expectations	Valid
5	Input with the correct username and password, then click login	Username (user) Password (password)	System successful and will show main course	According to expectations	Valid

5) Support

The final stage in the waterfall model is the support stage. The support stage can also be said to be a maintenance stage which is carried out after the testing stage has been completed. This means that the new system produced supported by the program application is ready to be implemented. In implementing this new system, of course it must also be supported by adequate facilities and infrastructure. Such as the use of required hardware and software, where the hardware specifications must support the new system. Apart from that, after the new system in the herbal medicine sales information system is implemented, of course this new system will also require periodic maintenance, so that this new system can be used for a long period of time. Training for employees is also very necessary so that employees who are given access can adapt and be able to run the new system well. So that the objectives in developing this herbal medicine sales information system can really be achieved and existing problems can be resolved and the company can increase its income and be able to compete with other companies.

4. Conclusion

With current technological advances, it turns out that there are still many companies or places of business whose data management is still done traditionally. This of course causes problems in the system, such as what happened in the herbal medicine sales information system, where the problems that arise can have a negative impact on the company. Therefore, companies must make changes and improvements immediately, such as developing systems to produce new systems. Where this new system is implemented, of course it is the best solution to solve the current problems. With the new system being implemented which is supported by the program application, of course the company has a lot of hope in it. This new system is able to solve existing problems, is able to help employee performance effectively and efficiently, is able to meet the needs required by its users and is able to provide the best service to consumers. If everything goes well, of course it can increase the company's income. Because the company will also



quickly get updated information regarding activities in the herbal medicine sales information system, the company can also carry out strict evaluation and supervision with this new system. In developing this herbal medicine sales information system, the Waterfall model is used as one of the appropriate models to achieve the objectives of developing this system. This research can be developed again by future researchers, so that the expected results can be even better.

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