JESICA: Journal of Enhanced Studies in Informatics and Computer Applications
Journal homepage: jesica.itsk-soepraoen.ac.id
e-ISSN: 3046-6938 p-ISSN: 3046-6997
Vol. 1, No. 2, July 2024, Pp. 56-61

Development of an Alokon Stock Management Information System Using a Lean Development Approach

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Keywords:
Information system, lean development, stock monitoring, alokon

Abstract
This study explores the development of an Alokon Stock Management Information System using the Lean Development approach to enhance the efficiency and effectiveness of stock management for contraceptive devices and drugs (alokon) distributed by the Women's Empowerment, Child Protection, and Family Planning Service in Indonesia. Alokon plays a critical role in family planning and reproductive health services. The research aims to address challenges such as inaccurate stock data, distribution delays, and the inability to meet demand promptly, which can disrupt health services. The Lean Development approach, emphasizing principles such as eliminating waste, strengthening learning, and delivering results quickly, was employed to create a responsive and adaptive system tailored to user needs. The resulting system incorporates features for managing alokon data, monitoring stock levels, and generating reports to ensure adequate stock availability and timely distribution. Evaluation of the system's usability was conducted using the System Usability Scale (SUS), involving ten respondents from the primary user groups. The average SUS score was 75, indicating a good level of usability. Users reported the system as comfortable and easy to use, although feedback highlighted areas for further improvement.

1. Introduction
Keluarga Berencana (KB) is an effort to control the birth of children, determine the ideal distance and age for giving birth, and regulate pregnancy through promotion, protection and assistance in accordance with reproductive rights to create a quality family [1]. The aim of KB is to create a quality family. This KB program can be implemented by using contraceptive devices and drugs, hereinafter called alokon, as a means of birth planning [2]. In Indonesia, alokon is distributed by the Women's Empowerment, Child Protection and Family Planning Service and then given to health facilities under the area of the service [3]. Efficient and timely distribution of alokon stock is crucial to ensure that reproductive health services can run smoothly and support KB programs.

Alokon, which includes various types of contraceptives, has an important role in family planning and population control programs [2][4]. Meanwhile, non-alokon, which includes other medical needs, must also be managed well to support the operations of reproductive health facilities. The successful distribution of alokon has a direct impact on the availability of contraceptives in health facilities and, ultimately, on the effectiveness of the national KB program. However, alokon stock management often faces various challenges such as inaccurate stock data, distribution delays, and the inability to respond to demand in a timely manner. These problems can cause stock shortages or inefficient stockpiling of goods. This management requires a reliable information system to ensure adequate stock availability and avoid stock shortages or excesses that can disrupt health services [5]. Therefore, an information system is needed that can predict needs accurately and manage the distribution of alokon stock efficiently.

Traditional methods in developing information systems often take a long time and are not flexible in responding to changing user needs [6]. Therefore, a more adaptive and iterative approach is needed to ensure that the system being developed truly suits the user's needs and can be implemented quickly. The Lean Development approach offers a potential solution to this problem. Lean Development, with its main principles such as Eliminating Waste, Strengthening Learning, Deciding as Quickly as Possible, Delivering Results as Quickly as Possible, Empowering Teams, Building Integrity, and Seeing the Whole [7][8][9], enables efficient and focused system development on the value generated for the user [10]. In this case the user is a health worker who is responsible for managing the alokon stock.

The implementation of the Lean Development approach in developing an alokon stock management information system is expected to provide several main benefits. First, the information system developed will be more responsive and adaptive to changing needs and conditions in the field. Second, the iterative and collaborative development process

allows for continuous improvement based on direct feedback from users, so that the resulting system is more suited to practical needs in the field.

This research aims to explore the application of Lean Development in the development of an alokon stock management information system and provide recommendations for increasing the efficiency and effectiveness of alokon stock management in Indonesia through the resulting website. Thus, it is hoped that this research will provide practical solutions that can be implemented by the Women's Empowerment, Child Protection and Family Planning Services to increase distribution efficiency and improve the quality of reproductive health services through better management of alokon stock.

2. Research Method

This research uses Lean Development to develop an alokon stock management information system. By using this approach, you can take advantage of the Build-Measure-Learn cycle [11] as well as iterative and collaborative principles with users. The stages of Lean Development used in this research are depicted in Figure 1.

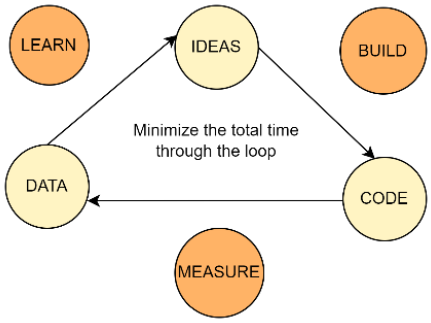


Figure 1. Stages of Lean Development [11]

In the learn stage, the data that has been collected is studied. Then this data will be used to understand and analyze user needs so that at this stage ideas will be generated. Then the idea will be developed into an information system application. After development is complete, measurements need to be carried out to determine the extent to which the information system has met user needs and preferences. This measurement will produce data on user satisfaction with the information system and this data will be used to identify problems, deficiencies and areas that need improvement. The Build-Measure-Learn process is carried out iteratively until the system reaches the desired level of maturity [12][13].

3. Results and Discussion

3.1 Learn

3.1.1 Data Collection and Analysis

The alokon stock data that has been collected is historical data and required stock data from various health facilities under the auspices of the Women's Empowerment, Child Protection and Family Planning Services. Table 1 shows an example of the alokon stock dataset in January 2023 which was collected through the relevant agencies.

Table 1. Alokon stock dataset for january

January		Stock remaining from december 2023	Stock received this month 2/1/24	Out of stock				Total stock	
No	Alokon name			Clinic A	Clinic B	Clinic C	Clinic D	QTY	Unit
1	IUD Coper T	10	6	8	-	-	-	8	Pcs
2	Falope Ring	0	20	2	-	-	-	18	Set
3	Kondom	10	33	5	2	-	10	26	Gros
4	Pil KB	700	2100	200	200	200	100	2100	Blister
5	Susuk KB	20	100	5	5	5	5	100	Set
6	Pregnancy test	47	60	-	-	25	-	82	Pcs
7	Folavit	3	30	-	-	-	-	33	Blister

Based on the dataset that has been collected, 3 variables are determined, namely incoming goods, outgoing goods, and alokon stock. There are 2 conditions for incoming goods, namely a lot and a little. There are 2 conditions for outgoing goods, namely a lot and a little. There are 3 conditions for alokon stock, namely low stock, normal stock and full stock. Detailed conditions for the three variables are as follows:

1. The incoming goods variable is said to be little if the number of incoming goods is less than 50, it is said to be a lot if the number of incoming goods is more than 50.
2. The outgoing goods variable is said to be little if the number of outgoing goods is less than 25, it is said to be a lot if the number of outgoing goods is more than 25.
3. The stock allocation variable is said to be low if the number of stock allocations is more than 50, it is said to be normal if the number of stock allocations is between 50 and 100, and it is said to be full if the number of stock allocations is more than 100.

Based on the data above as well as the results of interviews with stakeholders and users, it has been agreed that the features that must be in the alokon stock management information system include features for managing alokon data, health facilities, distribution of alokon stock, monitoring alokon stock, and generating reports.

3.1.2 Data Modeling

Based on data analysis in the previous stage, a Unified Modeling Language (UML) model was created which describes the system visually [14]. This modeling is expected to facilitate the development of an alokon stock information system by providing a clear and structured representation of how the system works. By using UML modeling, developers and stakeholders can have a better understanding of how the system will function, ensure that all user needs have been considered, and identify potential problems earlier in the development process [15]. This modeling also facilitates more effective communication between the development team and stakeholders, resulting in a system that better meets user needs and expectations.

The resulting UML diagrams are use case diagrams and activity diagrams. Figure 2 shows a use case diagram. There are 2 actors, namely the dinas admin and the health facility admin. The dinas admin is the operator for managing alokon stock at the Women's Empowerment, Child Protection and Family Planning Service, while the health facility admin is the operator at the health facility under the auspices of the service. If you log in as dinas admin and access the "Manage Alokon Data" menu, details of the alokon data stock will appear. If the alokon stock is less than 50 then the information section will appear in red as a warning that the stock is low or running low. Likewise, if you log in as a health facility admin and access "Manage Alokon Stock in Health Facilities" and the alokon stock is less than 50, a red color will appear in the information section. In this way, the health facility admin can request to send alokon via the "Alokon Stock Request" menu.

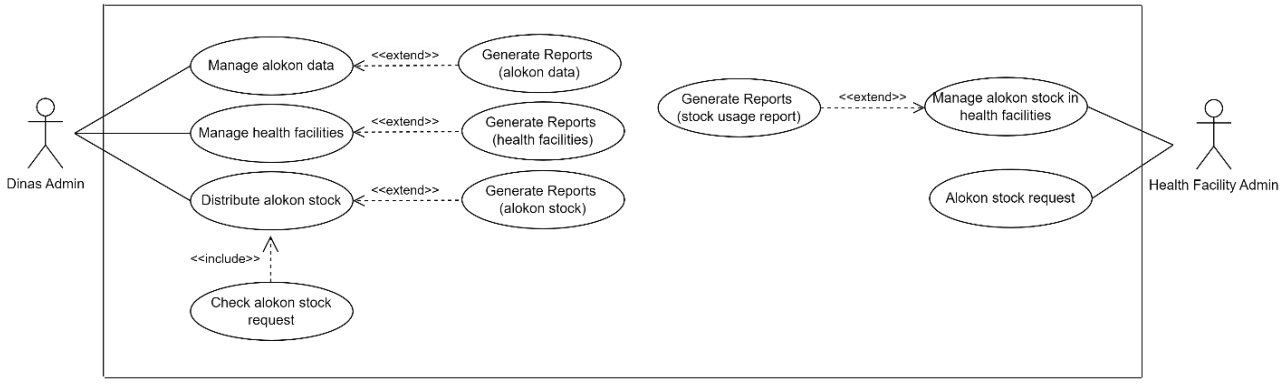
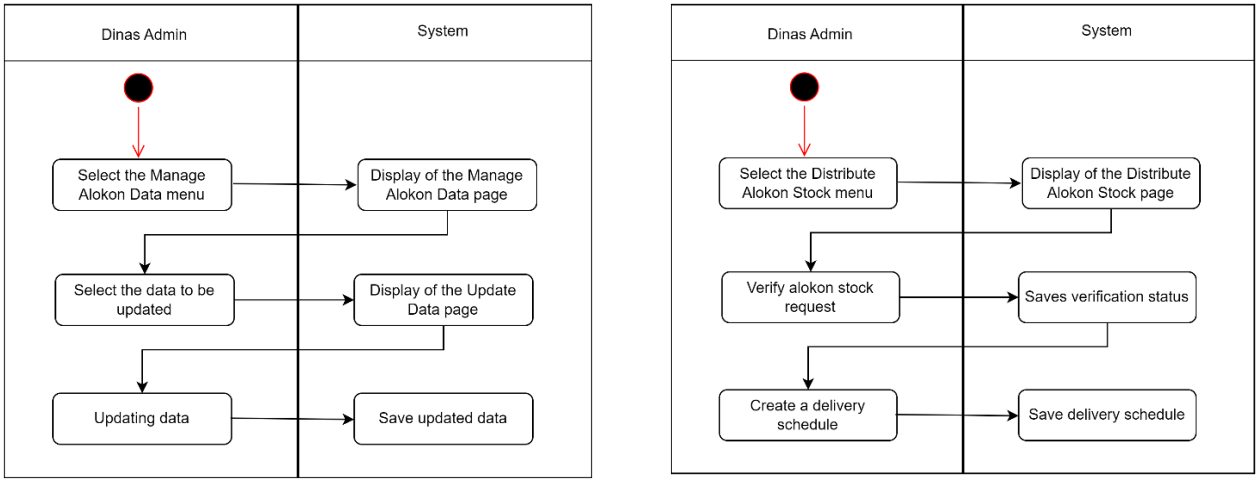


Figure 2. Use case diagram

The activity diagrams shown in Figures 3a and 3b illustrate the process of distributing alokon stock by the dinas admin. Figure 3a shows the steps taken by the dinas admin to update the alokon data and how the system responds to each step. This process starts from the dinas admin selecting "Manage Alokon Data" menu on the system. Then the system displays the alokon data management page which contains a list of alokon data available to be managed. The dinas admin then selects the alokon data that he wants to update from the list displayed. The system displays a page to update the data selected by the dinas admin. This page includes a form with detailed information of the data to be updated. The dinas admin updates the alokon data by filling in the form provided on the data update page. These updates may include changes to information such as stock quantities, alokon types and other relevant information.

After the dinas admin has finished updating the data, the system saves the changes and updates the alokon data in the database.



(a) (b)

Figure 3. Activity diagram

Meanwhile, Figure 3b shows the process for distributing alokon stock. This process starts from the dinas admin selecting “Distribute Alokon Stock” menu then the system will display the alokon stock distribution page which contains information about stock requests that need to be verified. The dinas admin then verifies the requests for alokon stock received from various health facilities. This verification process involves checking the number of requests, the validity of the request, and the completeness of the information included. After the dinas admin completes the verification, the system saves the verification status. Verification status can be "Accepted" or "Rejected" with clear reasons if rejected. After the stock request is verified, the dinas admin creates a delivery schedule for the alokon stock. This schedule includes details such as delivery date and time, as well as the amount of stock to be sent to the health facility concerned. The system stores the delivery schedule that has been created by the dinas admin. This information will be used to ensure deliveries are made on time and according to the specified schedule.

3.2 Build

The implementation of a website for the alokon stock management information system aims to provide an efficient platform for dinas admins and health facility admins in managing and monitoring alokon stock. The technology used in developing this website is PHP as a programming language and MySQL as a database management system (DBMS). The implementation results can be seen in Figures 4 and 5.

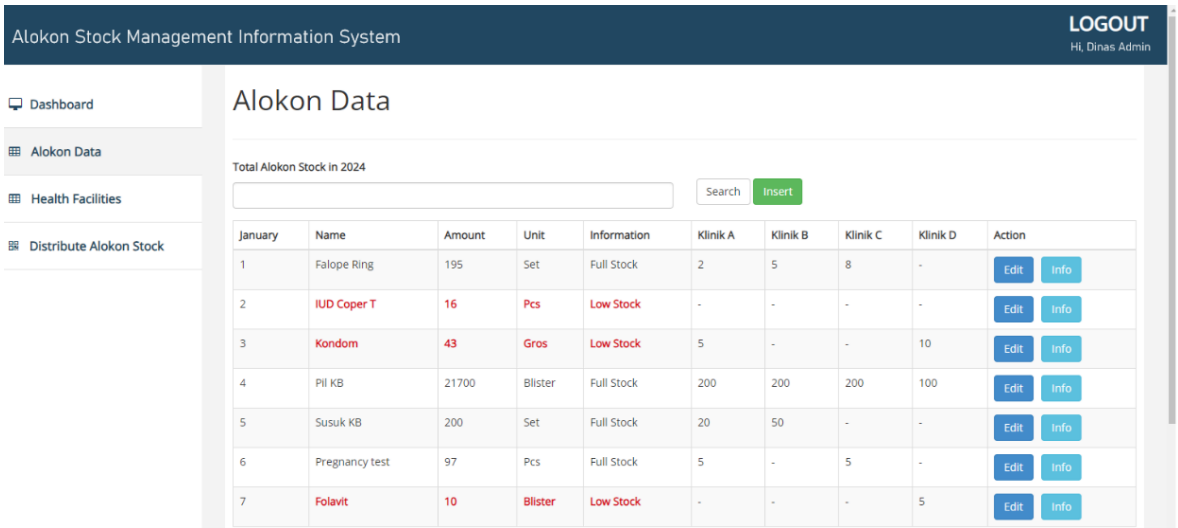


Figure 4. Distribute Alokon Stock Page

On the distribution of alokon stock page shown in Figure 4, warning information is displayed in red if the stock alokon is less than 50. If the alokon stock is more than 50 then the writing will be normally black. Figure 5 displays the alokon data page that can be used by the dinas admin to verify alokon stock requests requested by health facilities. The dinas admin can approve or reject this request. If accepted, the dinas admin can immediately make a schedule to distribute alokon to the health facilities that request it.

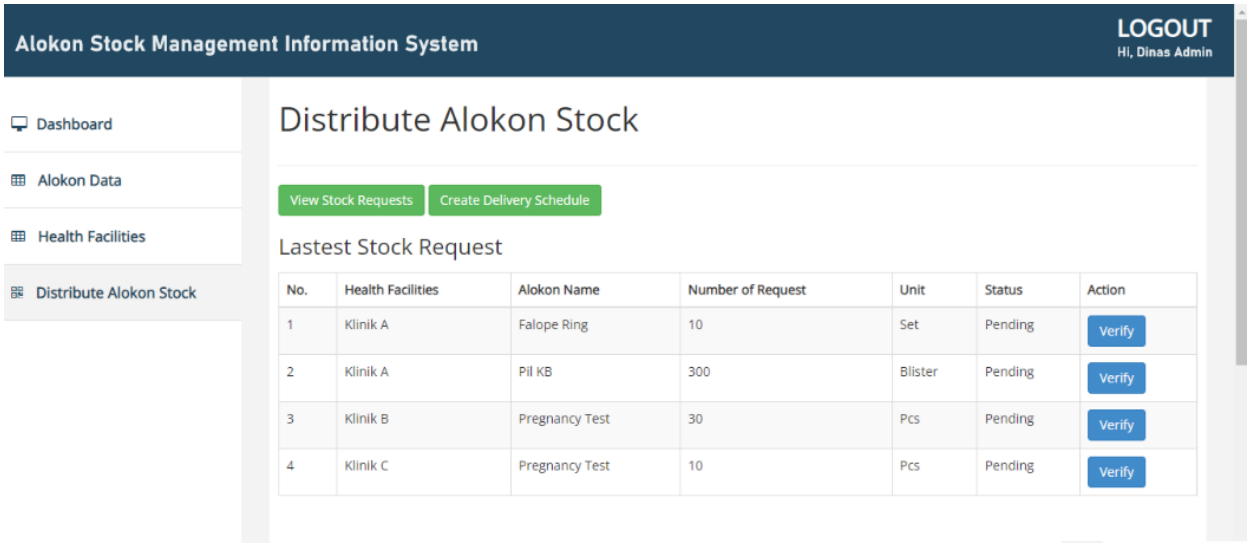


Figure 5. Alokon data page

3.3 Measure

To evaluate the usability of the alokon stock management information system that has been developed, the System Usability Scale (SUS) method is used. The SUS method is a simple but effective evaluation tool for assessing system usability from the user's perspective [16]. This test involved 10 respondents consisting of dinas admins and health facility admins who will be the main users of this system. After using the system, each respondent was asked to fill out the SUS questionnaire consisting of 10 questions based on previous research [17]. These questions are designed to measure various aspects of usability, such as comfort, ease of learning, and user confidence in using the system. Examples of questions included in the questionnaire are “I feel comfortable using this system” and “This system is easy to learn” [17]. Each question is rated on a Likert scale from 1 to 5, where 1 means strongly disagree and 5 means strongly agree. The score for each question is then calculated to obtain a total SUS score for each respondent. Table 2 shows the results of the SUS questionnaire completed by all users.

Table 2. SUS questionnaire results for 10 users

Odd Items	Even Items	SUS Score
18	17	70
17	18	80
19	16	75
16	19	65
18	17	85
17	18	70
19	16	80
16	19	75
18	17	70
17	18	80
AVG		75

Based on the test results using the System Usability Scale (SUS) shown in Table 2, the average SUS score is 75. This score of 75 has an adjective rating of Good [16], indicating that this system has a good level of usability. This score shows that users feel quite comfortable and confident when using the system. Users feel that this system is comfortable and easy to use and are confident in operating the various features provided. However, feedback also indicated that there were several areas that still needed improvement to further enhance the user experience.

4. Conclusion

Based on the results of the research and testing that has been carried out, it can be concluded that the Lean Development approach allows the development of applications that are more adaptive and responsive to user needs. This happens because the Build-Measure-Learn iteration ensures that the system being developed is always updated based on user feedback, resulting in a more appropriate solution. This research also produces a website-based alokon stock management information system that can meet user needs in managing and distributing alokon stock efficiently. Implementation of features such as allocation data management, stock distribution, and stock monitoring has proven to be very useful in daily operations. These features ensure adequate stock availability and avoid stock shortages or excesses that could disrupt health services. Based on test results using the System Usability Scale (SUS), the average SUS score is 75. This score shows that this system has a good level of usability. Users feel comfortable and confident in using the system, although there are several areas that require improvement to improve the user experience. Thus, this research shows that the application of Lean Development in developing an alokon stock management information system can increase the efficiency and effectiveness of alokon stock management, as well as provide good user experience. For further research, it is recommended to use other evaluation methods to measure the extent to which this alokon management information system has been successfully developed. So that the measurement of this system can be done more comprehensively.

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