Android-Based Chicken Development Monitoring Application

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Abstract. Eggs are one of the staples of Indonesian people's food. Based on data from the Central Statistics Agency (BPS), it was found that the total national egg consumption in 2018 was 2,766,760 tons. As for the total production of 2,968,954 tons, so there was an excess of 202,195 tons of national stock. Even though there is excess stock, the current market price is unstable due to seed restrictions, so the chicken is slow to produce. In addition, the weather in the environment around the cage also affects the productivity of laying hens. In linda chicken farms, the problems faced are the same as those above, weather factors affect the health and productivity of chickens. If there is an unstable temperature and weather many chickens will experience pain and may even die. In this case, breeders sometimes do not know how the temperature and the weather are housed, whether or not the chicken needs it. With this Kancer system, breeders can monitor the development of laying hens and cages. Starting from the active or not the chicken is producing, changes in temperature, humidity and notification if there is rain. Microcontroller device that is installed in a cage and connected to a wifi network will send data temperature, humidity and rain detection to the server, then from the server the data will be processed and then sent to the application. And to monitor the productivity of each chicken, the kancer system utilizes the qrcode that has been stored per-chicken data, then through the kancer qrcode application is scanned and the application will display chicken data ranging from age to the number of eggs produced by the chicken.

1. Introduction

The need for national consumption chicken eggs in 2018 was 2,766,760 tons with a total production of 2,968,954 tons, so that an excess national stock of 202,195 tons was obtained. Based on data from the Central Statistics Agency (BPS), in 2017 chicken egg exports were 386 tons, this figure increased by 27.39 percent compared to 2016 [1]. However, although egg production is currently still sufficient for national needs, the price in the market is unstable due to breeding restrictions and drug restrictions which in turn results in slow production of chickens. In addition, extreme weather in a number of areas also affects the productivity of chickens and a decrease in supply to the market makes supply to the market decrease while demand increases.

Linda Chicken Farm is one of laying hens in Padang. In this livestock business, the problem often faced is the problem of chicken disease, this disease can be caused by viruses, weather factors, and temperature factors. Non-conducive weather like continuous rain can cause the chicken to become sick and even die. And temperatures that are too cold or too hot can also affect the health of chickens. Then in monitoring the development of chickens, the owner of the farm still uses a manual method that is by remembering when these chickens lay eggs, when giving vitamins, and how many chickens
that die. Of course this makes monitoring the development of chickens ineffective because every time more and more data must be processed to see the development of the chicken.

Ease in monitoring the development of chickens is needed, such as ease in monitoring new breeds, chicken productivity in producing eggs, vitamins, feed, dead chickens, and others. So that the development of chickens can be controlled properly. So by developing a monitoring application for the development of poultry by utilizing qrcode technology can help the work of chicken farmers in monitoring the development of chickens and can also help in improving the quality of their chicken farms.

2. Methodology

In conducting this research, the Software Development Life Cycle (SDLC) method was used. SDLC is the stages carried out to build a software system. This stage is done to produce the desired software [2]. The stages of SLDC in building software are as follows:

1). Planning

Planning is a stage that starts from defining the problem, then continues by describing the design of making Android-based Laying Chicken Development Monitoring Application such as project management to be created and the required design documents.

2). Requirement Analysis

Requirements Analysis is a stage that shows the process of analyzing and developing the needs of users of android-based applications and creating functional requirements documents. At this stage, data collection was carried out directly at the Linda Chicken Farm located in Lalang Village, By Pass Padang City. In the process of collecting data, interviews are conducted directly with the owners of chicken farms, so that the system needs to be obtained.

3). Design

Design is a stage that focuses on the design of making information systems based on Android. The system design used is UML in the form of usecase diagrams, sequence diagrams, class diagrams and activity diagrams.

4). Development

Development is the process of changing a design from paper to software. This stage is in the form of preparing files, creating databases, coding programs, and others.

5). Implementation

The implementation phase is the stage where applications that have been made are used by the user. This stage aims to identify mistakes and ensure the application works according to user needs.

3. Results and Discussion

In this discussion consists of analysis and system design, as well as system implementation and testing.

3.1 Use case diagrams

Use Case diagram is a modeling to illustrate the functionality of the software to be made [3]. In the application of monitoring the development of laying hens, functional for the user as a farmer is shown in the use case diagram in Figure 1.
3.2 Sequence Diagram

Sequence Diagram is a diagram that illustrates the behavior of objects in the use case by explaining the life time of objects and messages sent and received between objects [3].

3.2.1 Sequence Registration

Farmers do account registration by entering their email and password, then the email and password will be executed by the createAccount() function, in the validation process the email and password are registered to authenticate. If it works next, the homepage is displayed.

Figure 1. Use Case Diagram

Figure 2. Sequence Registration
3.2.2 Sequence Login

Farmers enter their email and password, then the email and password will be executed by the signIn function in the validation process. The validation process will retrieve the existing email and password on the authentication, if there is a meaning that the account is valid and then display the homepage.

![Figure 3. Sequence Login](image)

3.2.3 Sequence Scan

The farmer selects the scan menu, then performs a qrcode scan. The system will process the code that is read in the qrcode, then retrieve data based on the code from the database, then display the detailed chicken data in the detail form.

![Figure 4. Sequence Menu Pindai](image)

3.2.4 Sequence history of giving vitamins and drugs

The user selects the history menu, then the form will load the existing history data in the database. Users want to add history data, users will be directed to the form added, then the data entered will be processed and sent to the database. If the process is successful, the message will display successfully to the history list form.
3.2.5 Sequence of egg productivity

The user enters the application, then on the homepage will load the egg productivity data taken from the database, then display the data to the homepage.

3.2.6 Cage State Sequence

The user enters the application, then the homepage will load data on the state of the cage (humidity and temperature) taken from the database, then display the data to the homepage.
3.3 User Interface Implementation

The results of the implementation of the Monitoring Application for the development of laying hens consist of the following appearance:

3.3.1 Splash Screen

Splash screen display is the initial appearance of opening the application, this display will emerge for 4 seconds when the application is first opened. The splash screen display can be seen in Figure 8.

![Splash Screen](image)

Figure 8. Splash Screen

3.3.2 Display of Farm Registration Form

Peterkan registration form is useful for registering the user's farm to get access rights to use this application. Data that must be entered when registering livestock is:

a. Farm Name, used to find out the user's farm name.
b. Address, the user's farm address is used.
c. Email, an email used to be used to login to the application.
d. Password, the password used will be used to login to the application.

Display the registration form can be seen in Figure 9.
3.3.3 Login Display

The login form is used to start the application. The function of the login form is to limit who can access the application and access data on the system according to the user's access rights.

When entering, the data that must be entered are:

a. Email, functions to open user accounts owned by application users.

b. Password, functions to run the application, so that unauthorized people cannot login.

Display Login Form can be seen in Figure 10.
3.3.4 Display Home Page

The successful login will then enter the homepage. On the home page the user can access 2 main menus namely scan and vitamins & medicine. And also, users can see info on the results of temperature sensors, humidity and rain detection on farms, and information on egg productivity that has been produced by farmer's hens. Display the home page can be seen in Figure 11.

3.3.5 Display Scan Qr Code

Figure 12 below is the display when the user presses the scan menu, then the application will open the camera to be able to scan the qr code owned by the chicken.

![Homepage](image-url)

**Figure 11.** Homepage
3.3.6 Detailed view of Chicken Information

If the qrcode scanned by the user is correct and the chicken data is in the database, the application will display detailed data on the chicken information. The detailed data is in the form of gender, age, number of eggs that have been produced.

Then, on this page, the user can add information such as the chicken laying eggs today or not, and also can give special notes to the chicken. Display page detail chicken information can be seen in Figure 13.
3.3.7 Display history of chicken productivity

On the chicken information detail page, there is a button to be able to see the history of chicken productivity. If the user wants to know the history of chicken egg productivity, the user can click on the button. Then the application will switch the display to the chicken productivity history page. On this page, users can find out the productivity of chickens and also special records held by chickens. Display history of chicken productivity can be seen in Figure 14.

![Figure 14. History of chicken productivity](image)

3.3.8 Display History of Vitamins and Medicines routinely

Figure 15 is a display of the history of vitamins and routine medication given by farmers every month to maintain the quality and health of laying hens. On this page, users can add notes on routine vitamin administration. And on this page the user can find out the last time the vitamin was given.

3.3.9 Display graphs of egg productivity

Figure 16 is a graph display of the productivity of farmed chicken eggs every time. On the graph the user can find out the number of eggs produced by laying hens every day and can compare the number of eggs produced with previous days.
3.3.10. Display temperature and humidity charts

The graph display of temperature and humidity serves to provide knowledge to the user how the temperature and humidity that exist in the cage now, if the temperature and humidity rise or fall, the breeders can do something about their chickens. Because temperature and humidity also affect the development and productivity of laying hens.

A graph of temperature and humidity can be seen in Figure 17 and Figure 18.
3.4.4 Testing Results

After implementing and testing the application monitoring the development of laying hens, it was found that all application features run 100% if the application is connected to the internet. The test results can be seen in the table.

| No. | The Activity                      | Information                                                                 | The Result |
|-----|-----------------------------------|-----------------------------------------------------------------------------|------------|
| 1   | Animal Husbandry Registration     | -when the user enters the farm data and press the save button the farm data will be saved to the Fire base Real time Database | Success    |
| 2   | Application Login                 | -If the user has not logged in, the application will take the user to the login page  
-If the user has previously logged in, the application will go directly to the main page and load data from the database. | Success    |
| 3   | Scan Qr code                      | -When the application gets the code from the scanned qr-code, the application displays detailed chicken data based on the scanned qr-code. And the application will load data from the database and display it on the application | Success    |
| 4   | Add new information about chickens| -The data added on the detail page runs fine and the data is saved to the Fire base Realtime Database | Success    |
Add Vitamins - This action works fine, and the data entered is stored in the Firebase Realtime Database

Edit Vitamins and medication routine - This action works fine, and the data entered is stored in the Firebase Realtime Database

Egg productivity chart - The application will display a graph of laying hens productivity every time

Graph of changes - The application will display a graph of temperature changes each time

Moisture change graph - The application will display a graph of laying hens productivity every time

User Profile - The application will display the profile of the user who is logged in.

3.5 Application Testing on Android

Android-based Reimbursement applications are tested on several types of smartphones. Smartphone to be tested on various screens and OS. The following table tests several smartphones, in Table 2.

| Smartphone Name          | Screen Size | OS used   | Test result                  |
|--------------------------|-------------|-----------|------------------------------|
| Xiomi Redmi Note 4X      | 5,5 inch    | Nugget    | The application is running well |
| Samsung J3 Pro           | 5 inch      | Oreo      | The application is running wellk |
| Xiomi redmi 3            | 5 inch      | Lolilop   | The application cannot be installed |
| Oppo A37                 | 5 inch      | Lolipop   | The application cannot be installed |
| Oppo A57                 | 5,2 inch    | Marsmellow | The application cannot be installed |

From the above table it can be concluded that the application can be installed on Android with an operating system version of the nugget and above. On the android version of the nugget down the application cannot be installed.

3.6 Comparison after using the application with before using the application

After doing application development and testing application features. Then the application is used by partners and implemented directly to partner farms. After implementing on the farm, the comparison found by the partners before using the application and after using the application, can be seen in Table 3.

| Before                          | After                          |
|---------------------------------|---------------------------------|
| - There are no records          | - Take notes in the application |
Know the temperature and weather around the cage based on feelings — Can directly monitor temperature and humidity remotely

Not knowing exactly how many eggs are produced on the farm — Can see in the application the amount of production, and data displayed in the form of statistics can see the amount of livestock productivity each time.

Data is not neatly stored — Application of all farm data has been recorded and presented with informative

Manajemen kandang tidak teratur — Menajemen kandang menjadi teratur

**Table 4. Table of User Satisfaction**

| Partner satisfaction with the Kancer system | satisfied |
|-------------------------------------------|-----------|
| a. Completeness of Content                | satisfied |
| b. Accuracy                               | satisfied |
| c. Display                                | satisfied |
| d. Ease                                   | satisfied |
| e. Accuracy                               | satisfied |

4. Conclusion

This Laying Chicken Development Monitoring Application is an application that is designed to assist laying hens in monitoring the development of their chickens. This application stores and sends data in realtime. Breeders can monitor the development of their chickens remotely while they are still connected to the internet. In the application, breeders can see detailed information about breeding and laying hens, ranging from age, sex, number of eggs produced, and history of productivity of chicken eggs, and also breeders can see the temperature and humidity in a stable through the application.

References

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