

Developing KSAM (*Kenyang Bersama*) Application Using Extreme Programming Methodology

Kurnia Gusti Ayu*, Dwi Wulandari Sari**

*(Faculty of Computer Science, Mercu Buana University, Jakarta
E-mail: kurnia.gusti@mercubuana.ac.id)

** (Faculty of Computer Science, Mercu Buana University, Jakarta
E-mail: dwi.wulandari@mercubuana.ac.id)

Abstract:

Food is the basic human need, but not all people are able to meet this need. Indonesia is still in the top rank of hunger cases due to the fact that there are still many factors that cause people difficult to meet their need for food, for example the hunger case in Morkelle Island, Maluku, in July 2018. On the other side, Indonesia is also the second producer of food waste with an average of 300 kg per year. Regarding this problem, the community concern in sharing leftovers emerges. However, there is an obstacle in implementing this, namely difficulties for producers to give and for consumers to receive the leftovers that are still worth eating. Moreover, the lack of communication and detailed food information sometimes disappoint the consumers/takers because they do not really like the food that they receive. Therefore, it is expected that developing an android-based KSAM (*Kenyang Bersama*) application using the Extreme Programming methodology be able to help the leftover producers/givers to give their leftovers, and the leftover communities to receive and distribute the food to the consumers/takers easily.

Keywords — *leftovers, food waste, food sharing, Extreme Programming, Mobile Android*

I. INTRODUCTION

Hunger issues were experienced by Indonesian people, precisely in Morkelle Mountains, Central Maluku, last July 2018, and about 170 people went hungry. Moreover, the pandemic worsens this situation because of the downturn in the economy, layoffs in several companies, and reduced income. Therefore, this situation has resulted in decreased purchasing power of people for food needs. Regarding this condition, various forms of concern in overcoming hunger issues also aim to reduce food waste in Indonesia, as has been done by FoodBank and Garda Pangan for example, which are communities that receive leftovers and will

distribute them to people in need. According to the data obtained from the Economist Intelligence Unit (EUI), a research and analysis institute from the UK, every single person in Indonesia produces 300 kg of food waste in a year, which comes from food they eat[1]

The accumulated food waste comes from restaurants, hotels, bakeries, catering, and households. This condition indicates that there are difficulties in sharing and receiving leftovers that are still worth eating. In addition, the lack of communication and detailed food information that will be shared raises misunderstandings and disappointment of consumers in receiving food

because producers, when serving food, do not know their consumers' needs such as the kinds of food they prefer[2]

There are several previous studies that examine the way to overcome food waste, such as a study entitled "Sustainable Household Food Management Using Smart Technology", which found a FoodTrek application, which is an android-based application that functions as food expiration time reminder, which aims to reduce food waste. Another example is a study entitled "Developing a Web-Based Food Sharing Application to Help Reduce Leftovers."

The purpose of this research is to build an application that helps leftover producers/givers to share leftovers with consumers by providing easy search and communication between the two parties. In developing this application, a fast and efficient method is needed, and thus, Extreme Programming methodology can be used to examine the current condition. The android mobile-based application is chosen because Google map is easy to apply with GPS, has high mobility, and can be used anytime and anywhere.

II. LITERTURE REVIEW

A. Extreme Programming

Application is developed using software development methodology in order to produce software on time according to the need analysis as a solution to the existing problems, as well as software maintenance and development due to the provided detailed documentation about the system that has been built and the reason the system was built[3]. Extreme Programming is one of the methods of the Agile Development Life Cycle. Extreme Programming (XP) is a software engineering process that tends to use an object-oriented approach, and the goal of this method is a team formed on a small to medium scale. In addition, this method is also suitable if the team meets unclear requirements or changes in requirements that occur very quickly[4].

Meanwhile, according to Ferdiana, Extreme Programming (XP) is known as a method or "technical how to" regarding how a technical team develops software efficiently through various

practical principles and techniques of software development[5]. This method will carry out the stages in order, starting from planning, designing, coding, to testing levels[6]. Extreme Programming (XP) is an Agile method often used in software industry[7]. This method has been widely used for various application systems, such as E-commerce, culinary, term dictionaries, and E-learning [8].

By using this method, the advantages and disadvantages associated with the completion of the software are detected. More specifically, it is also shown that the clients focus more on the solution compared to the completion schedule of the software [9]

The following figure shows the cycle of the Extreme Programming Methodology:

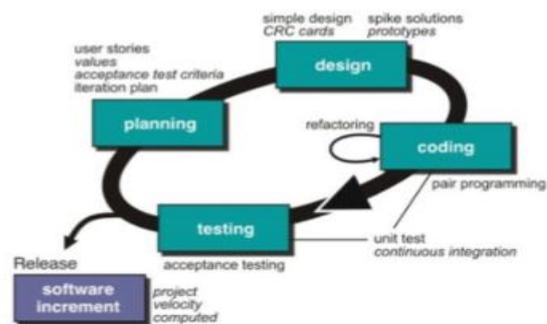


Figure 1. Cycle of Extreme Programming Methodology[5]

B. Android

Android Operating System (OS) is built based on Linux platform, which is open source, so Android is also open source[10]. Android is a Linux-based operating system designed for touch screen mobile devices like smartphones and tablet computers. Android was originally developed by Android, Inc. with financial support from Google, that later bought it in 2005[11]. Android provides an open platform for developers to create their own applications. Android applications provide convenience in meeting needs quickly and practically[12]

C. Food Waste

Waste is unusable and discarded materials. Waste can come from household or industrial waste,

and it is often thrown away carelessly[13]. Food waste is food or foodstuffs that are still worth consumed or processed, but are deliberately not consumed or processed so that they are stale then discarded[1]

D. Google Maps API

Google Maps is a free web-based service provided by Google and a popular tool for showing location point on the maps. Google Maps is a world map used to see the geographical regions and sites around the world. In other words, Google Maps is a map that can be viewed using a browser[13]. However, today’s sophistication of technology enables the Google Maps feature to be added to a mobile device by utilizing a Java Script library.

III. RESEARCH METHOD

This research used the Extreme Programming Methodology in the system development process through some stages explained below:

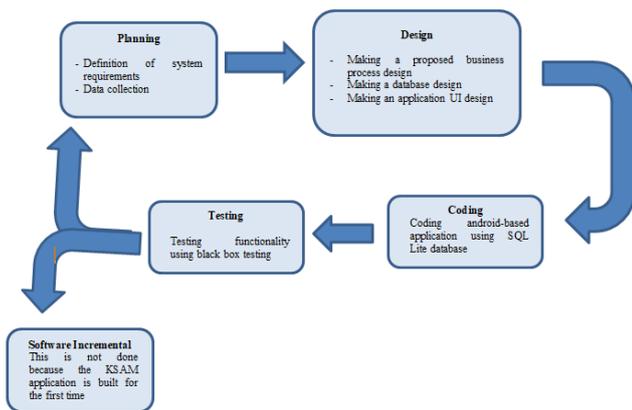


Figure 2. Stages of XP Methodology

The followings are data collection techniques used in this study:

a. Observation

This technique aims to observe the objects of research. This was done by visiting leftover producers like housewives, catering owners, and bakeries owners to obtain the required data.

b. Interview

In addition to observation, interview was conducted with the catering owners, hotel staff, consumers, and members of the leftover communities.

c. Literature Review

The literature study was conducted to obtain the basis from other sources to support this application development.

IV. RESULTS AND DISCUSSION

Based on the Extreme Programming Methodology used in this research, the implementation of the stages of the method is presented below:

A. Planning

In the early stages, a literature study was carried out by reading journals, news, and methods related to research. The next step was to conduct interviews with leftover producers such as housewives, catering owners, bakeries owners, and leftover consumers/takers, like leftover communities who had difficulty in finding sources to provide foods for consumers (people in need). In addition, there were some producers (who provide leftovers) who had difficulty in dealing with leftovers. Based on the results of interview and observation, the results of a needs analysis regarding the development of the KSAM application were obtained, namely the analysis of functional and non-functional requirements.

TABLE I
FUNCTIONAL NEEDS OF KSAM APPLICATION

No	Needs Description
1	The system has a registration feature for the application users.
2	The system has a login and logout features.
3	The system can display the application user profile.
4	Leftover producers can manage data (add, delete, edit) as well as provide detailed food information (photos, location of picking up the food, and food descriptions)
5	Users can view the list of food information that is shared.
6	Producers can receive and view the food request list notification from consumers.
7	The system can manage transactions (accepting requests, processing transactions, and finishing transactions).
8	The system can display transaction history.

9	The system can manage messages between producers and consumers.
10	The system can receive and display testimonials & ratings.
11	The system can display the user's location.

TABLE II
NON-FUNCTIONAL NEEDS OF KSAM APPLICATION

No	Needs Description
1	The system can be accessed stably within 7 x 24 hours.
2	The system must have a user-friendly view.
3	The system can operate on an android smartphone.
4	The system only accepts one e-mail for one account.
5	The system can block users who violate the rules.

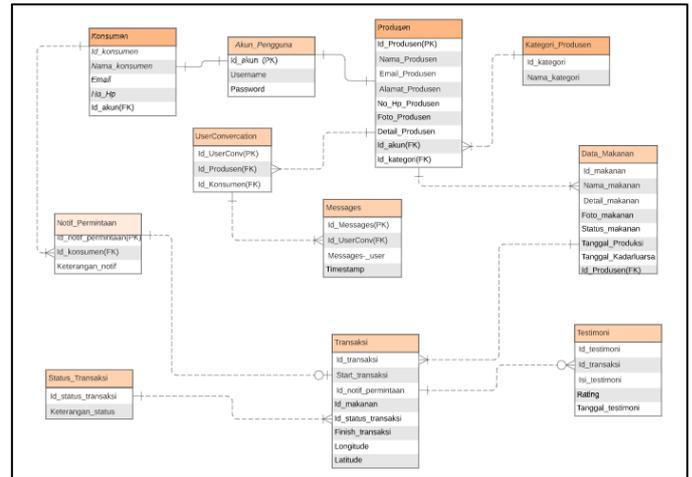


Figure 4. Logical Database Design of KSAM Application

B. Design

At this stage, the team needs to design a process, and data that have been adjusted to the requirements of the users. The following is a business process design for the KSAM application, which is illustrated in the Use Case Diagram:

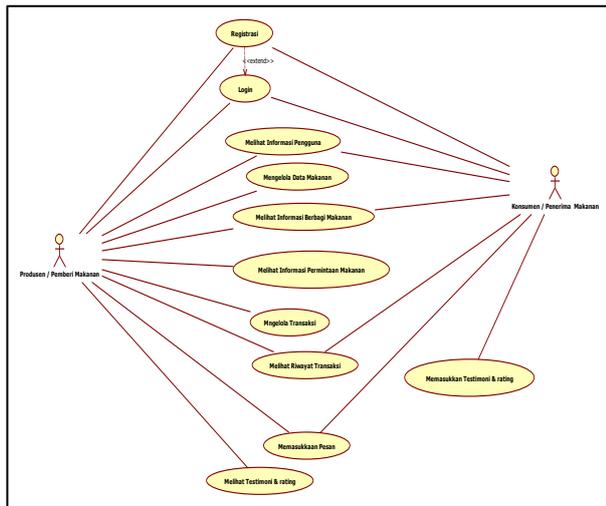


Figure 3. Use Case Diagram for KSAM Application

The following is a database design illustrated in the Logical Database Design:

C. Coding

After designing a business process and database, the next step was coding the program with an Android-based programming language. The results of the implementation of the KSAM application were written in the form of an application interface. Figure 5 shows the initial display of the KSAM application when it was first installed, and there are 2 menu options of registration for food producers and consumers. Figure 6 shows the display of the producer registration.



Figure 5. The Initial Display of the KSAM Application

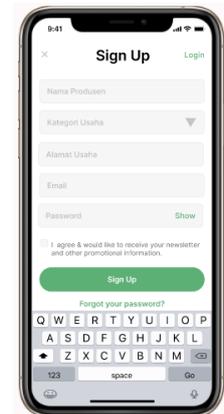


Figure 6. Display of the KSAM Application for User Registration (Producer)

Figure 7 shows the display of user registration for food consumers (recipients) on the KSAM

Application. Figure 8 shows the display of Login menu to start accessing the application.

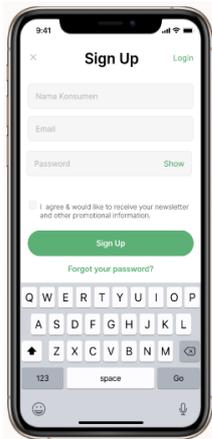


Figure 7. Display of the KSAM Application for User Registration (Consumer)

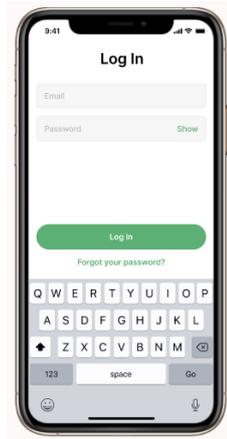


Figure 8. Login menu of KSAM Application

Figure 9 shows the display of user profile of the producer, which contains user profile information, the list of food information, and a menu for entering data of food information. Figure 10 shows a menu for entering data of food information.



Figure 9. Display of Profile Page of KSAM Application User



Figure 10. Display of Detailed Information Page of Food that Will Be Shared

Figure 11 shows the information page of food that will be shared, including the list of food shared by the producers. Figure 12 is the page containing detailed food information, and there is a button to start a transaction.

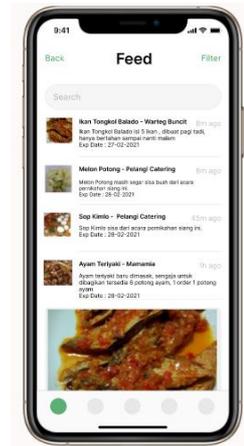


Figure 11. Display of the List of Food Information

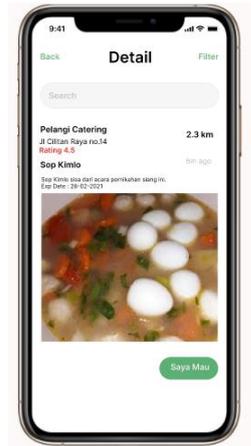


Figure 12. Display of Detailed Food Information

The next step, after the user (consumer) selects and sees the detailed food information, if the user wants to get the food, the user can press the “I Want” button then go to the consumer transaction page, as shown in Figure 13. On this page, the ongoing transaction is shown, and there is Cancel button to cancel the transaction and Chat button to communicate between the two parties (consumer and producer), as shown in Figure 14. Requests for food to be sent to consumers will be accepted by the leftover producers/givers, in which there are 3 buttons, which are “the request is accepted” button, “the transaction process is complete” button, and “chat” button, on the producer transaction page, as seen in Figure 15. After the transaction is completed, the consumer provides testimony and rating for the food. Figure 16 shows the rating information that has been given.

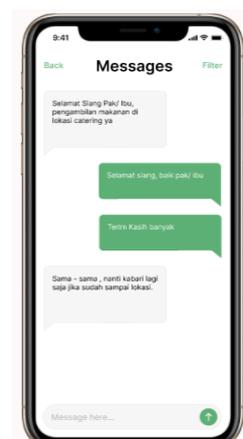
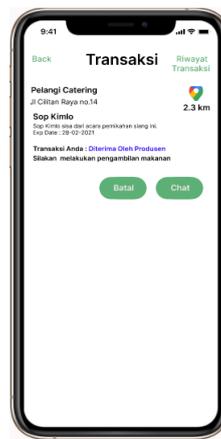


Figure 13. Display of Leftover

Consumer/Taker Transaction Page

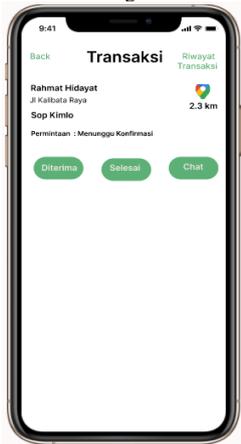


Figure 15. Display of Leftover Producer/Giver Transaction Page

Figure 14. Chat Page Display

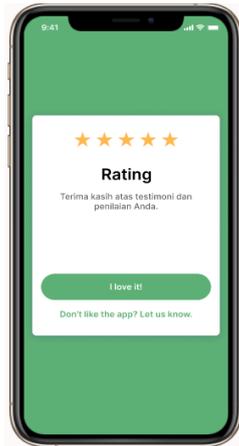


Figure 16. Rating

D. Testing

After the application is made, testing is carried out using the Black-Box method to check for errors; if any, the application will be repaired.

TABLE III
THE RESULTS OF BLACK-BOX TESTING

No	Page	Expected Outcomes	Results	Status
1	Application User Registration	Display the sign up/registration form	Successfully display and save registration data	OK
2	Application Login	Display the login form	Successfully display the login form and execute the login process	OK
3	User Profile	Display the application user profile	Successfully display the user profile	OK
4	Data of Food Information	Display a form to fill out the data of food information	Successfully display and save the data of food information	OK
5	Information about Food Sharing (Feed)	Display the information of food that will be shared	Successfully display the information of food that will be shared	OK
6	Detailed Food Information	Display the detailed food information	Successfully display the detailed food information	OK

7	Transaction (Consumer)	Display the information of food request transaction and the distance from the consumer's location to the producer's	Successfully display the information of food request transaction from the consumer to the producer and the distance of their locations	OK
8	Transaction (Producer)	Display information of food request transaction from the consumer	Successfully display information of food request transaction from the consumer	OK
9	Chat	Display the page for communication	Successfully display the page and start communication	OK
10	Testimony and Rating	Display food testimonials and ratings page	Successfully display the testimonial and rating form, and the results	OK

V. CONCLUSION

Based on the results and discussion of this research, it can be concluded that:

1. The KSAM (*Kenyang Bersama*) application is equipped with functions to help facilitate the process of food sharing.
2. This application becomes one of the efforts to reduce waste and hunger issues.
3. Google Maps API technology can be used to find out the distance among users.

In addition, there are some suggestions to improve this application, namely:

1. It is necessary to disseminate information about the waste caused by leftovers as well as the occurring hunger issues. It is also important to gradually educate the community about the use of KSAM application so that this application brings

direct benefits to solve the existing problems.

2. It is recommended that KSAM application be developed by adding functions to detect whether the food is the same as the picture of the food on the display that is provided by the producer/giver.
3. To satisfy and to ease the users in using the application, it is necessary to analyze user satisfaction and experience with the KSAM application, and then the results can be used as a basis for further application development.

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