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E-CATALOG APPLICATION FOR FOOD AND BEVERAGES AT CAFÉ RUANG SEDUH BASED ON AUGMENTED REALITY

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Abstract

Café is a place where people gather while enjoying the dishes provided, such as drinks and food accompanied by music and comfortable facilities and infrastructure. The dishes listed in the café menu book vary with various and unfamiliar names. Sometimes the variety of dishes served does not match expectations, leading to customer dissatisfaction, thus allowing customers to be reluctant to come back. This study proposes an innovation on service quality by developing an Android-based e-catalog application for dish dishes. The application of Augmented Reality on the display of the food or beverage menu is used to beautify the aesthetics of the dish and attract customers to come back. The system was developed using a prototype method applied to an Android-based application using the Kotlin programming language, MySQL as a database, and testing using ISO 25010. Through this AR-based food and beverage e-catalog application, customers can view information on the café's dishes, which are categorized by best-selling menu, latest menu, and all menus. Customers can also view the presentation in a 3D image and its rating. Based on the results of testing on 50 respondents, it was found that this AR-based food and beverage e-catalog application resulted in a usability test of 96% and a functional suitability test of 100%. So it can be concluded that the percentage value obtained shows the overall software quality has a "Very Good" scale and is feasible to use.

Keyword: augmented reality, café, e-catalog, ISO 25010, prototype.

1. INTRODUCING

The café is a place that is synonymous with neatly arranged tables and chairs as well as comfortable sofas, selling various variants of coffee and snacks as supports accompanied by music and a relaxed atmosphere that consumers can feel [1]. Cafés are categorized into informal restaurants [2], [3] and are usually open until late at night, and some are even 24 hours, and we often find them in the middle of the city or densely populated places. Ruang Seduh Café is where customers can enjoy drinks such as coffee, boba, and other soft drinks available at the café. Not only drinks, but customers can also enjoy a variety of foods. The various types of food and beverages available at this café are listed on the menu list served by the waiter when the customer arrives. This café, located in Bandar Lampung City, is open every day from 10.00-23.30 WIB.

Based on observations, the name of the dish listed on the menu is sometimes foreign to hear and makes customers ask about the drink's composition. The variety of menus provided by cafés with various and unfamiliar names often makes customers hesitate to order [4] so that customers often ask for clarity about the types of food and drinks on the café menu. Many cafés provide a menu list that includes pictures to assist customers in determining orders, but it is not uncommon for café customers to feel disappointed with dishes that do not meet expectations, both in appearance and size [5].

The difference between the appearance of the dish and the pictures in the menu book can affect customer satisfaction. Another factor regarding dissatisfaction is the presentation of the appearance of the food that is not appropriate so that it impacts the amount of leftover food. In addition, excessive size can also make food residue thrown away. This gives customers dissatisfaction with the menu dishes ordered, especially customers who come for the first time. Therefore, it can allow customers to be reluctant to come back to the café.

The utilization of technology can provide efficiency in simplifying human business processes [6]–[9]. The use of Augmented Reality (AR) technology is able to provide new innovations to increase customer satisfaction and build a positive impression [10]. Augmented Reality allows users to see 2D or 3D virtual objects projected on the real world through mobile devices media [11]. This is supported by previous research that innovation can increase customer satisfaction [12]. Augmented Reality technology implemented through an Android smartphone can help customers

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determine food and beverage menu choices with the 3D objects and show information about each engaging and interactive food [13], [14]. The application of Augmented Reality in food and beverage catalogs can make product information presented more effectively and interactively to encourage customer interest in buying [5], [15].

This study aims to develop an e-catalog application by applying Augmented Reality technology. The AR technology will be used in the food and drink menu of the Ruang Seduh Café. Customers can see food and drinks in 3D projected to the real world through Android smartphone media. Customers can also view information about the composition of processed ingredients used in the food or drink on the menu. This information is helpful for customers who have food allergies so that customers can choose other menus. The application was also tested using the ISO 25010 method on two aspects, namely functional suitability, and usability.

2. RESEARCH METHODS

The object of this research is the Ruang Seduh Café in Bandar Lampung which requires a solution to improve service and increase the attractiveness or promotion of food and beverage offerings. The system development in this study using the Prototype method includes the stages of listen to customer, build/revise mock-up, and customer test drives mock-up as shown in Figure 1.

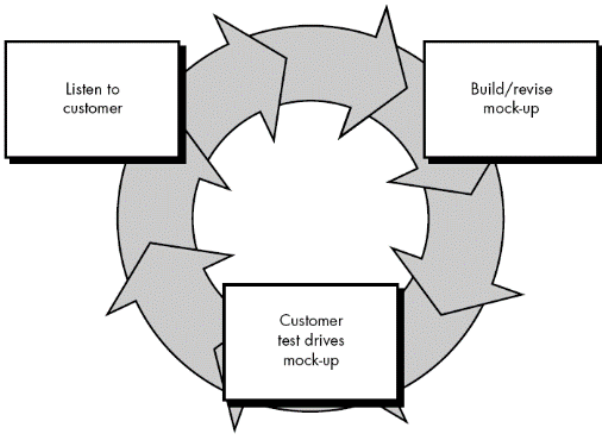

Fig 1. Research stage

Based on Figure 1, here is the explanation.

2.1. Listen to Customer

Communication is done to collect data that is used as the basis for analyzing problems, needs, and planning. Communication is carried out in interviews with the café owner, which includes comparing the appearance of the food and beverage menu list with the dishes served on customer satisfaction.

Based on the interview, it was found that the problem with the current system is that there are some differences between the images of the food or drink menu on the menu list and the results of the food or drink served. From the problems found in the current system analysis, an Augmented Reality-based food and beverage e-catalog application is proposed. The business processes currently running are regarding ordering food or drinks until the dishes are served.

In software development, a business process design is needed to make this AR-based e-catalog application. The design consists of Augmented Reality system architecture, use case, class, and activity diagram. The architectural design of the AR system is shown in Figure 2.

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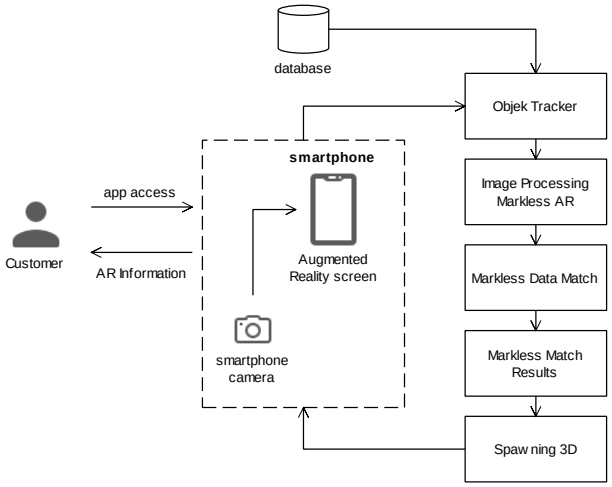

Fig 2. System architecture

Based on Figure 2, customers can access the application and see an overview of the AR 3D using the camera media on an Android smartphone. Customers open AR access by tracking menu objects, both food/beverages, which then the system will process the object and match the object's data to the database. Then the system will display the results of matching the object data in the form of a 3D display on the media.

After the general business processes have been formed, the next stage is analyzing user needs through use case diagrams. Use case diagrams are used to detail the business processes of the e-catalog application in detail based on user needs, shown in Figure 3.

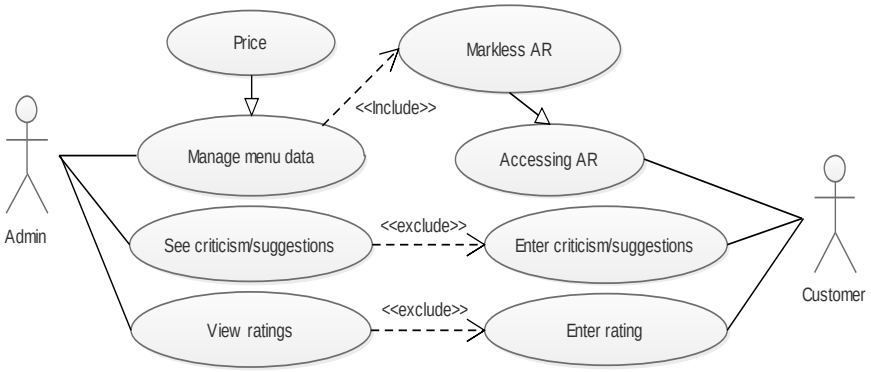

Fig 3. Use case diagram

Based on Figure 3, the user comprises two actors, namely admin and customer. Admin can manage menu data, view criticism/suggestions, and view ratings. Customers can access menus in AR, enter criticism/suggestions, and enter ratings for food offerings. Admin can also manage food/beverage menu data in which prices and object images are 3D. The customer accesses the AR menu for both food/beverage dishes, then the system displays the object's data in 3D. Customers can enter criticism/suggestions on the menu, which then the data is received and viewed by the admin. Customers can enter a value or rating of a dish which the admin can then see.

Furthermore, an activity diagram is designed to describe the workflow or activities of a system or business process. Figure 4 shows the business process of an AR-based food and beverage e-catalog starting from the admin managing the food/beverage menu data, including changing prices and adding food/beverage menus, which then the menu list can be seen by customers. Customers can access AR to view the food/beverage menu in 3D. Customers can also enter criticism/suggestions and give a rating on the food/beverage offerings on the menu.

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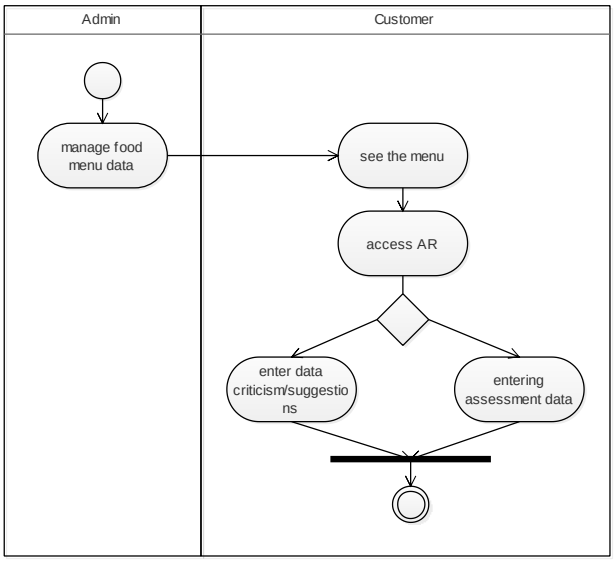

Fig 4. Activity diagram

Finally, to describe the system's structure in terms of defining the classes that will be created to build the system, a class diagram is designed. Class diagrams consist of attributes and methods or operations. Attributes belong to a class, while operations or methods are functions that are owned by a class. Figure 5 describes the contents of the class diagram used to build the database.

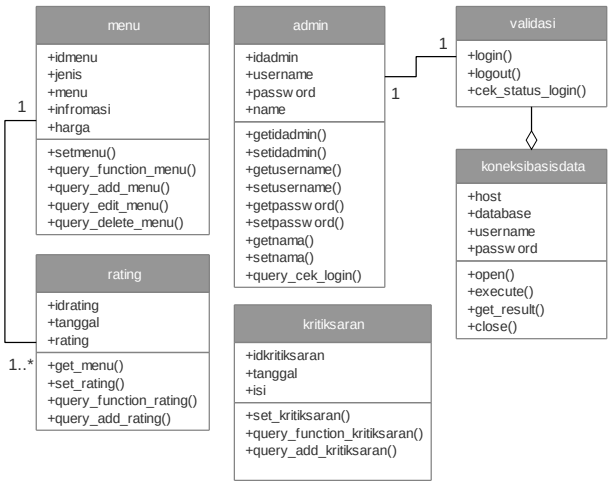

Fig 5. Class diagram

Based on Figure 5, the admin has an admin id that serves as a unique id. Admin can manage username and password attributes as user authentication data to enter the system. On the food/beverage menu, customers can view detailed menu information and prices. In addition, customers are provided with a rating service feature and criticism/suggestion on drinks/food dishes to assess customer satisfaction.

2.2. Build/Revise Mock-Up

At this stage, apply to design into a mobile-based e-catalog for food and beverage with the help of Android Studio version 2021.1.1. Mobile-based system development is carried out using the Kotlin programming language. Also, components needed to build this system include XML, ARCore SDK and Sceneform Library. The following is an explanation of each of these components.

1. Kotlin as backend programming that can be integrated with the user interface.
2. XML as the front end to provide mobile-based interface.

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3. ARCore is Google's augmented reality platform that provides simple yet powerful tools for creating AR experiences.
4. Sceneform is a 3D framework with a physically based renderer optimized for mobile devices and makes it easy to build augmented reality apps without requiring OpenGL.

2.3. Customer Test Drives Mock-Up

The customer test drives mock-up is carried out in the form of a conclusion from the system testing. System testing aims to find errors in the system and revise the system. The conclusion will be obtained on the e-catalog application's performance and feasibility testing using the ISO 25010 method with functional aspects of functional suitability and usability. The selection of two of the eight elements adapts to the application's requirements [16]. The following is the formula for calculating the testing percentage in Equation 1 [8].

$$\textbf{\textit{Testing}}\ (\%) = \frac{\textbf{\textit{Actual score}}}{\textbf{\textit{Ideal score}}}\ \textbf{\textit{x}}\ \textbf{100} \qquad (1)$$

The actual score is the sum of all respondents' responses to the provided questionnaire. Meanwhile, the ideal score is determined by the highest value obtained from the questionnaire. The test results are then calculated using Equation 1, followed by a Likert scale-based interpretation of the system's feasibility to arrive at findings and recommendations for further development. The following is a range of interpretation criteria based on ISO 25010, shown in Table 1 [17].

Table 1. Interpretation score range

Range (%)	Assessement
0-20	Very poor
21-40	Poor
41-60	Slightly not good
61-80	Good
81-100	Very good

3. RESULT AND DISCUSSIONS

3.1. E-Catalog Application

The following are menu page examples that have been developed:

1. Login Menu presents a login data form consisting of a username and password. Login is required for admins to manage in-app data, such as food, drinks, etc. If the login is valid, the application will display the main menu. If the login is not valid, the system will display a failure notification in the login menu. The login menu display can be seen in Figure 6.

Fig 6. Login menu

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2. The main menu presents information on food and beverage data, divided into the best dishes, the newest dishes, and all menus. The entire food or beverage displayed contains food/beverage photo information and the customer satisfaction value (rating) for the dish. However, before the system displays information on the main menu, the system first displays the application user data menu, which contains the customer's name and mobile number. The main menu display can be seen in Figure 7.

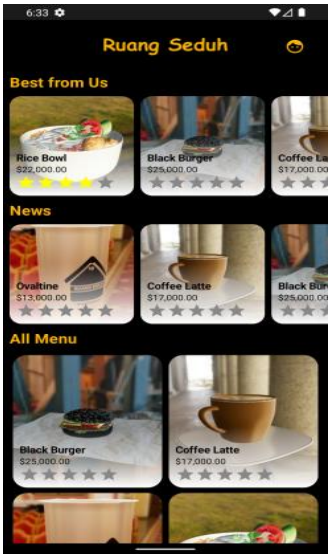

Fig 7. Main menu

3. The dish menu displays the detailed content of food/beverage dishes. If the customer presses one of the menu dishes listed, the system will display information, ratings, and 3D augmented reality of the dish. Augmented reality overlays digital content and information of the dish onto the physical world as if they're there, in the customer's space. That is done by utilizing ARCore to let the system augment 2D images, which can be recognized to place a 3D model on it. In this menu there is also a "criticism and suggestion" button that is used by customers in providing input in the form of suggestions or criticisms on the dish as well as a "rating" button that is used by customers to rate the dish. The dish menu display can be seen in Figure 8.

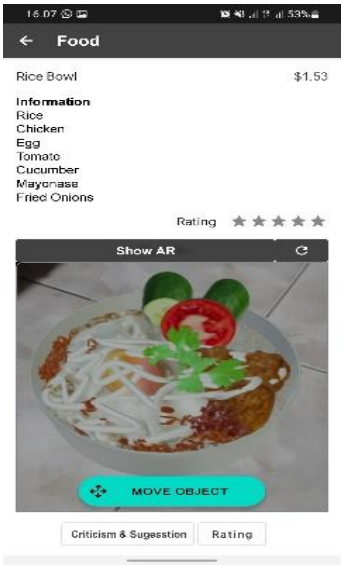

Fig 8. Dish menu

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4. The suggestion menu is a display that provides a review feature for customers on food and beverage dishes. Customers can give input in criticism or suggestions on this menu. With reviews from customers, it can be used to improve the café. The suggestion menu can be seen in Figure 9.

Fig 9. Suggestion menu

5. Like the menu suggestion, the rating menu provides a review feature for customers to improve the quality of food and beverage dishes in Ruang Seduh Café. Customers can rate dishes using a scale of 1 to 5 on this menu. The rating menu can be seen in Figure 10.

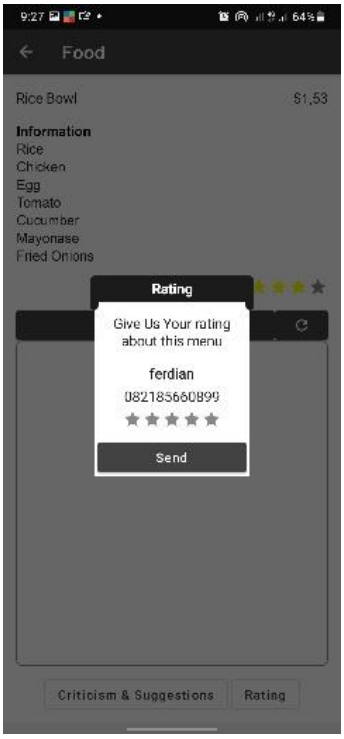

Fig 10. Rating menu

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3.2. ISO 25010 Testing

The system developed was tested involving 50 respondents with 45 people as customers and five café baristas. Here are the test results:

1. Functional suitability, testing is carried out to assess functionality feasibility to do specific work for users and provide precise results and accuracy to user needs. The results of the questionnaire functionality assessment on the system with 15 questions to 50 respondents. The following is the calculation result of each respondent's weight values to the questions given for the system functionality.

$$\frac{3{,}750}{3{,}750} \times 100\% = 100\%$$

Based on the testing quality result of the software built in the functionality aspect of the application, the percentage of success is 100%. The obtained value is then converted based on likert scale at Table 1. It can be concluded that the percentage value obtained indicates the quality of the software functionality aspect has a scale of "Very Good".

2. Usability, testing is carried out to assess the ease of users for using and operating it. The results of the questionnaire usability assessment on the system with 10 questions to 50 respondents. The following is the calculation result of each respondent's weight values to the questions given for the system usability.

$$\frac{2{,}400}{2{,}500} \times 100\% = 96\%$$

Based on the testing quality result of the software built in the usability aspect of the application, the percentage of success is 96%. The obtained value is then converted based on likert scale at Table 1. It can be concluded that the percentage value obtained indicates the quality of the software functionality aspect has a scale of "Very Good".

Here are the ISO 25010 test results, which include two aspects: functional suitability and usability.

$$\frac{6{,}150}{6{,}250} \times 100\% = 98.4\%$$

Based on the results of ISO 25010 testing that has been carried out on 50 respondents, it was found that the e-catalog application can make it easier for customers at the Ruang Seduh Café to find out the food and beverage menu and its 3D augmented reality. The e-catalog application can also be implemented because it is by user needs, especially for Ruang Seduh café customers.

4. CONCLUSION

This study has succeeded in developing an AR integrated food and beverage e-catalog application that can assist in managing menu data and increase customer attractiveness. Customers can see how the shape of the food/beverage will be served in 3D. Customers can also find out the quality of the assessment of the food/beverage, and customers can also find out the description of the food/beverage. The system development uses the prototype method, which consists of three stages, starting from the listen to customer, build/revise mock-up, and customer test drives mock-up. The application was made using the Kotlin programming language, MySQL as a database, and AR Core as a library for implementing the Augmented Reality system. To assess the system's feasibility, the system is tested using ISO 25010, including functional suitability and usability. Based on the results of the ISO 25010 testing that has been carried out involving 50 respondents, the mobile-based e-catalog application can already be implemented because it is by user needs. This is evidenced by the test results with an average total percentage of 98% based on the Likert scale, which is "Very Good" and feasible to use.

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