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RnD & *ADDIE* IN DESIGNING AND DEVELOP A MOBILE-BASED FOOD ORDERING AND PAYMENT INFORMATION SYSTEM

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Abstract

The development of a food ordering and payment information system using MIT App Inventor addresses the need for efficient and convenient solutions in the restaurant industry. This study utilized the Research and Development (RnD) method, incorporating the ADDIE procedure and the MIT framework to design and implement the system. The major findings indicate a significant improvement in operational efficiency, service quality, data security, and customer convenience. By enabling online ordering and payment processing, the system streamlines restaurant operations and enhances the overall customer experience. The secure storage of sales and order data minimizes the risk of data loss and fraudulent activities, ensuring reliable transactions. Furthermore, the system's ability to prevent fictitious orders and provide customers with a user-friendly platform for menu browsing and payment contributes to a more efficient and secure dining experience. The discussion highlights the implications of these findings, emphasizing the system's potential to revolutionize traditional restaurant transactions and improve service delivery. Suggestions for further refinement include additional testing, integration with POS systems, user training, feedback mechanisms, security enhancements, and market expansion. By implementing these suggestions, the food ordering and payment system can maximize its impact on the restaurant industry, leading to enhanced operational efficiency and customer satisfaction.

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INTRODUCTION

The development of information technology is very helpful for human needs and activities. One of them is a system for ordering and paying for food or drinks online[1]. Mobile apps are widely used because their users are getting more massive[2].

The food ordering and payment information system built using MIT App Inventor is an application designed to facilitate the process of ordering and paying for food in restaurants[3]. The app uses Android technology and serves as a platform for customers and food sellers to interact and make transactions[4].

The use of MIT App Inventor does not require mastery of programming languages because users only need to drag and drop visual objects to create applications that can be run on Android devices[5]. The advantage of MIT App Inventor is that users don't need to remember and write instructions so it won't cause frustration in developing apps[6].

The most commonly used way to order food is to use human services to ask for a list of food menus[7]. This will feel troublesome for the waiter if many customers have come, so a tool is needed that works to support the ordering process, without having to use a lot of human labor in the process. Thus, there must be electronic equipment that helps the process. It must be admitted that applying this control system is not easy, considering that to be able to master how this control system works, it is

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not only necessary to understand science in the field of electronics but also knowledge in the field of programming.

From these problems, the author raised the title "Food Order Information System and Payment Using MIT APP INVENTOR". In this case, the food ordering and payment information system using the MIT App Inventor is an application that can help facilitate the food ordering and payment process[7] in restaurants, as well as improve operational efficiency and service quality to customers.

App Inventor is a service based on *Cloud* which is free and allows users to create their mobile applications using a visual block-based programming language[8]. By using App Inventor, users can access applications through web browsers such as Chrome, Firefox, Safari, and others, both online using an internet connection and offline without an internet connection[9]. App Inventor allows users to create Android apps in a way that is easier for the layman to understand, using a drag-and-drop system to add the desired steps[10].

This application allows customers to choose the desired food menu and place an order through the application. Then this application will send the order information to the sales system in the restaurant so that restaurant staff can prepare the food ordered[11]. In addition, the app also allows customers to make payments online using credit cards or other available payment methods.

This research aims to develop a Food Order and Payment Information System based on the MIT App Inventor as an innovative solution for improving the efficiency and quality of service in the food ordering process[12]. As an application development platform known for its ease of use, MIT App Inventor was chosen to facilitate the creation of a food ordering application that can be accessed by customers practically and efficiently.

With a focus on a better user experience, this system is expected to make it easier to choose menus, place orders, and obtain information related to prices and menu availability in real time. Thus, this research is expected to make a positive contribution to the development of a more modern and effective food ordering information system[13].

The differences between this study and the previous research are that it has a Novelty and Research GAP including:

1. On the campus of Raden Intan State Islamic University Lampung (UIN RIL), there is no application to order food or drinks, especially for Lulu Kulin, which can be ordered by students, lecturers and employees.
2. Previous research has not discussed and collaborated between the RnD method, the ADDIE procedure and the MIT framework which can be illustrated in the chart below.

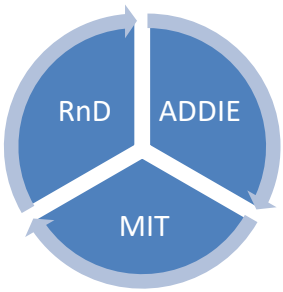

Figure 1. Mind mapping

METHOD

The research method used to build the Food Order and Payment Information System using MIT App Inventor is the Research and Development (RnD) method[14].

Development research known as R&D research is a research method used to validate and develop products. In this study, Borg and Gall (1983) defined development research as the process used to develop and validate products. The steps of this process are usually referred to as the RnD cycle, which consists of studying the research findings related to the product to be developed, developing a product based on these findings, conducting trials in the place where the product will be used, and making revisions to correct the shortcomings found in the trial stage[15].

This study uses the RnD Method with the ADDIE (Analyze, Design, Development, Implement, Evaluate) procedure approach adopted by Robert Maribe Branch[16] [17]. ADDIE has 5 stages, including[18]:

1. Analyze

   The analysis of user needs was carried out by understanding the needs and activities of students and lecturers at

UIN RIL, namely finding that students and lecturers at UIN RIL needed a more effective and efficient system to order and pay for food[19], mainly due to the need for ease and comfort in making transactions[20].

The problem found by this author is that the food ordering and payment system on the UIN RIL campus has not met the needs and activities of students and lecturers. The existing system still uses human services to request a list of food menus, which can cause difficulties for waiters. Thus, this research aims to develop a food ordering information system[21] and more modern and effective payments using the MIT App Inventor.

The application designed to make it easier for users to order and pay for food is the MIT APP INVENTOR framework where using Android technology, this application can be run on Android devices and allows customers to choose the desired food menu and place an order through the application. In addition, the app also allows customers to make payments online using credit cards or other available payment methods[22].

2. Design

To design and build this mobile app, it uses several stages:

First, design and design the Flowchart flow which can be seen below:

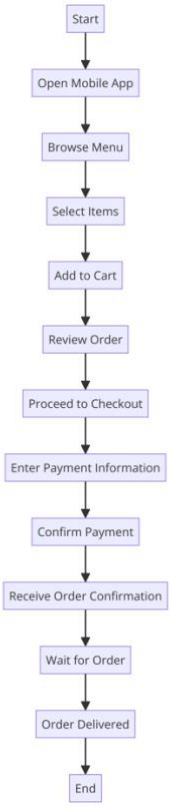

Figure 2. Flowchart Diagram

From the figure above can be explained the stages:

1. Start:
2. Open Mobile App:
3. Browse Menu:
4. Select Items:
5. Add to Cart:
6. Review Order:
7. Proceed to Checkout:
8. Enter Payment Information:
9. Confirm Payment:
10. Receive Order Confirmation:
11. Wait for Order:
12. Order Delivered:
13. End:

Users can use the Design page to design the layout of the app. With the page feature, the design can drag and place components such as buttons, images, or slides into the visual representation of the mobile screen, thus allowing users to feel comfortable with the app's interface[23]. The design for this study includes several features in the MIT APP Inventor.

Second, Properties

MIT App Inventor is a visual programming platform that makes it easy to create Android apps. In MIT App Inventor, the concept of "Properties" refers to the attributes owned by the components in the application. Each component, such as a button, label, or image, has certain properties that can be set to change its appearance or behaviour [23].

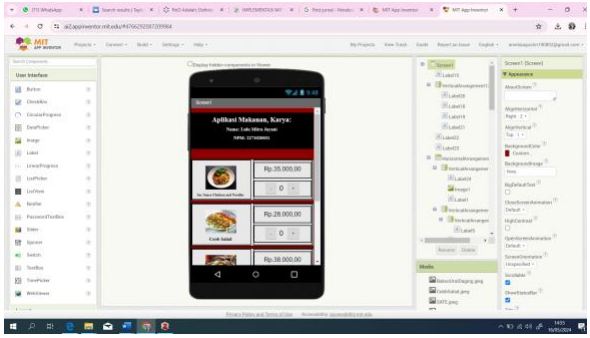

Figure 3. Menu Design

Third, Blocks

On the blocks page in MIT App Inventor, several blocks of code are used to program Android apps according to your needs. This blocks page contains several components that are useful for building applications, including Control, Logic, Math, Text, Lists, Colors, Variables, and Procedures.

The app inventor interface consists of five configuration panel blocks: 1. Palette – Toolbox: Here one can choose what elements want to be used in the project and then drag them to the preview screen. 2. Viewer – Application preview screen. 3. Components – Tree used items: One can rename or remove the buttons at the bottom. 4. Properties – Property screen: It is used to customize the appearance of selected items. 5. Media – Media management: This block allows uploading images, music, or video in the application. Also, there is another block in the header of the platform, that allows saving, exporting, or deleting the work done. MIT's App Inventor, allows you to create your Android applications that are adapted to mobile devices such as smartphones and tablets. Using of MIT App Inventor application, a very practical application has been developed[5].

Figure 4. Block A Design

Using these blocks, users can easily create Android apps that suit their desires.

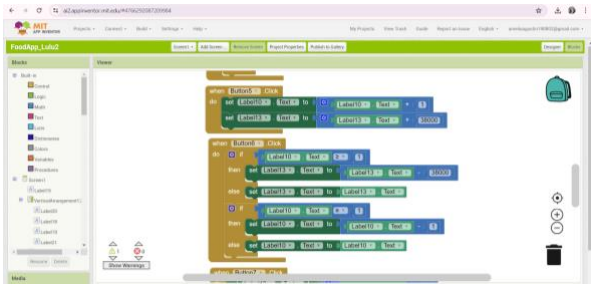

Figure 5. Block b Design

Blockcodes or Block Programming provided by MIT App Inventor is a relatively complete block programming concept and can meet the needs of creating research applications. The features available in Block Programming, such as controls, logic, math, text, lists, colours, variables, and procedures, allow app developers to create more complex and effective applications [24].

Figure 6. Block c Design

3. Development

In the development of a food ordering and payment information system using the MIT App Inventor, the applications used are the online and offline versions of the

MIT App Inventor. The app allows users to create Android apps in a way that is easier for the layman to understand, using a drag-and-drop system to add the desired steps.

Materials used in the development of this application include images, buttons to increase or decrease the number of orders food price tags and food name labels. This application allows customers to choose the desired food menu and place an order through the application. Then, this application will send the ordering information to the sales system in the restaurant, so that restaurant staff can prepare the ordered food. In addition, the app also allows customers to make payments online using credit cards or other available payment methods

4. Implementation

The implementation of this food ordering and payment information system is carried out in local MSMEs around UIN RIL. One example of implementation is at Lulu Kuliner, which consists of six food menus, including Satay, meatballs, fried noodles, cooked salad, Soy Sauce Chicken and Noodles.

5. Evaluate

The evaluation of this food ordering and payment information system was carried out to evaluate the performance of the application and find minor errors, such as buttons that do not work or incorrect code blocks. Thus, the app can be improved and improved to improve the efficiency and quality of service in the food ordering process.

RESULTS AND DISCUSSION

In building this food ordering and payment information system, it uses 5 stages:

First, Analyze

Lulu Culinary has 6 food menus including Satay, meatballs, fried noodles, Cook Salad, Soy Sauce Chicken and Noodle.

This application is designed to order food with the menu above and pay online with third parties such as Dana, Shopee Pay, Gopay, Link Aja, Brimo, i-Saku, PayPal and Ovo.

The sequencing flow is by the flowchart algorithm, namely:

1. Start: The process begins with the user initiating the action to order food. This is represented by the "Start" symbol.
2. Open Mobile App: The first actionable step is to open the mobile app designed for ordering food. This action is critical as it serves as the gateway to the entire ordering process.
3. Browse Menu: Once the app is open, the user browses through the available menu. This step involves exploring different categories, items, and possibly special offers or new arrivals.
4. Select Items: After browsing, the user selects the desired food items. This involves choosing specific dishes, customizing them if needed (e.g., adding extra toppings), and deciding on the quantity.
5. Add to Cart: The selected items are added to the virtual cart. This step allows the user to compile all desired items before proceeding to the next phase.
6. Review Order: Before finalizing the purchase, the user reviews the order. This involves checking the selected items, quantities, prices, and any additional notes or instructions.
7. Proceed to Checkout: Once the order is reviewed and confirmed, the user proceeds to the checkout phase. This is the transition point from selection to payment.
8. Enter Payment Information: At checkout, the user enters payment information. This may include credit/debit card details, choosing a

payment method, or applying discounts and promo codes.

9. Confirm Payment: After entering the payment information, the user confirms the payment. This step often involves verifying the payment details and authorizing the transaction.
10. Receive Order Confirmation: Upon successful payment, the user receives an order confirmation. This confirmation provides details of the order, estimated delivery time, and a receipt.
11. Wait for Order: The user then waits for the order to be prepared and delivered. The waiting time can vary based on the restaurant's processing time and delivery logistics.
12. Order Delivered: The final step in the process is the delivery of the order. The user receives the food at the specified location.
13. End: The process concludes with the successful delivery of the order. The "End" symbol marks the completion of the flowchart.

Second, Design.

The app menu consists of:

1. Figure 1 (Order Menu) where there is a picture of the food you want to order, the price of rupiah, the button to increase and decrease the number of orders, the name of the food you want to order, the total number of food ordered in rupiah, and the button (buy) to order the food that has been ordered.
2. On the payment page, there is a button to choose the payment method desired by the user, such as through Dana, Shopepay, LinkAja, Gopay, BRIMO, i.saku, PayPal and Ovo. Has a back button to go back to the previous page when you want to change the order.

Figure 7. Booking Menu

Figure 8. Payment Menu

Third, Development.

1. Cloud DB Database The development of the Lulu Culinary application begins with the development of a cloud database that is used to store order data and food menu information. CloudDb allows easier and more efficient access to data so that the Lulu Culinary application can be accessed online.
2. API (Online Payments)

An API (Application Programming Interface) is an interface that allows an application to interact with other systems, such as online payment systems [25]. APIs are used to allow customers to make payments online using credit cards or other available payment methods.

3. System Integration
   The development of the Lulu Culinary Application involves system integration to interact with other systems, namely the restaurant management system. This integration allows the application to send order data and food menu information to the restaurant management system so that restaurants can easily manage orders and manage food menu inventory.

1. Implementation
   For Lulu Culinary MSMEs:
   Tested with a user population of 40 people with a sample of 15 people:

No.	Position	Order Quantity	Information
1.	Student	5	Successful
2.	Lecturer	10	Successful

Fourth, Evaluation

From the results of the ongoing system analysis, the design of a system has facilities to order from restaurants that have been registered in the system. This system has several advantages, namely:

1. Customer Convenience is that customers can get information on the menus contained in the restaurant, making it easier for customers to order online.
2. Payment Security is so that sellers don't have to worry about orders that will not be paid because the customer's balance will be temporarily stored in the system.
3. Customers can easily place orders where customers do not need to go to the restaurant directly to place an order, customers only need to come to pick up their order or have a reservation for a place that has been booked through the system.
4. Sales Monitoring is so that the owner of Lulu Culinary can easily see the sales results, making it easier to manage the restaurant to help in the development of restaurant services.

Comparison of the old system and the new system at Lulu Culinary:

Legacy Systems	New System
Customers place orders by visiting directly to the restaurant.	Customers can order food using the app without having to visit the place of dining directly.
Recording food orders is still done manually on paper.	Recording food orders is done by the system.
After ordering food, customers must wait until the order is ready.	Because orders are made through the application, customers can pick up orders according to the desired time, making it more effective
Customers must pay for the order directly after ordering.	Payments are made automatically by the system.
Sales and order data is still stored manually so that it is possible to lose data and there is no data backup.	Sales and order data have been stored in the system database and minimize data loss and data can be viewed at any time by the owner.
Bookings without meeting in person by phone can have the risk of fictitious orders.	Ordering using the system will store the customer's balance first to minimize fictitious orders.

This research discusses the development of a food ordering and payment information system using the MIT App Inventor. This system is designed to facilitate the process of ordering and paying for food in restaurants using Android technology. This application allows customers to choose the desired food menu and place an order through the application. In addition, the app also allows customers to make payments online using credit cards or other available payment methods.

The research method used in this study is the Research and Development (RnD) method. This process includes studying research findings related to the product to be developed, developing a product based on these findings, conducting trials in the place

where the product will be used, and making revisions to correct the shortcomings found at the trial stage.

The results of this study show that the food ordering and payment information system using the MIT App Inventor can help facilitate the process of ordering and paying for food in restaurants. This application also improves operational efficiency and service quality to customers. In addition, the app also allows customers to make payments online, which is more practical and efficient.

This study uses several features in the MIT App Inventor, such as the Design page to design the layout of the app, Properties to set the attributes of the app's components, and Blocks to program the Android app. Using these features, users can easily create Android apps that suit their desires.

This study shows that the development of food ordering and payment information systems using MIT App Inventor can help improve operational efficiency and service quality to customers. The app also allows customers to make payments online, which is more practical and efficient. In the trial of lecturers and students, as many as 10 people with the successful category.

The study on the development of a food ordering and payment information system using MIT App Inventor revealed several key findings. The system significantly improved operational efficiency by enabling customers to order food and make payments online, enhancing the overall service quality by providing a user-friendly and convenient experience. Data security was also improved as sales and order data were stored in a database, minimizing data loss and ensuring accessibility any time.

By storing customer balances before processing orders, the system effectively reduced the risk of fictitious orders, ensuring secure transactions. Customers benefited from the convenience of viewing menus, placing orders, and making payments without the need to visit the restaurant in person. Additionally, the system allowed restaurant owners to monitor sales data efficiently, aiding in service management and development. In conclusion, the findings indicate that the food ordering and payment system developed using MIT App Inventor has the potential to significantly enhance operational efficiency, service quality, data security, and customer experience in restaurant settings, offering benefits such as fraud prevention and improved sales monitoring.

CONCLUSION

Conclusion: The development of a food ordering and payment information system using MIT App Inventor presents a significant advancement in streamlining restaurant operations and enhancing customer experience. The findings demonstrate improved operational efficiency, enhanced service quality, data security measures, and convenience for customers. By leveraging technology to facilitate online ordering and payment processes, the system has the potential to revolutionize traditional restaurant transactions and improve overall service delivery.

Suggestions:

1. Further Testing and Refinement: Conduct additional testing and refinement of the system to ensure seamless functionality and user experience.
2. Integration with POS Systems: Explore integration possibilities with Point of Sale (POS) systems to streamline order processing and enhance data management.
3. User Training and Support: Provide comprehensive training and support for restaurant staff and customers to maximize the benefits of the system.
4. Feedback Mechanism: Implement a feedback mechanism to gather insights from users and continuously improve the system based on their suggestions.
5. Security Enhancements: Continuously update and enhance security measures to safeguard customer data and prevent fraudulent activities.
6. Market Expansion: Consider expanding the system to other restaurants and food establishments to reach a wider customer base and increase adoption rates.

By implementing these suggestions, the food ordering and payment information system can further enhance its effectiveness, usability, and impact on the restaurant industry, ultimately leading to improved operational efficiency and customer satisfaction.

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