

## Creating a Cashier Application with Android-Based QRIS Payment Method Integration

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### ABSTRACT

**Objective:** This study aims to develop an Android-based cashier application integrated with the Quick Response Code Indonesian Standard (QRIS) payment system to enhance transaction efficiency and digital adoption among Micro, Small, and Medium Enterprises (MSMEs). **Method:** The application was designed and implemented using the Dart programming language with the Flutter framework, employing SQLite as a local database for transaction data management. **Results:** The findings demonstrate that the application effectively improves MSME operational efficiency, minimizes errors in transaction recording, and facilitates the use of modern digital payment systems. The integration of QRIS supports smoother financial transactions and accelerates the transition toward digital business operations. **Novelty:** This study presents an innovative digital solution tailored for MSMEs, promoting financial inclusion and competitiveness in the digital economy through a practical, user-friendly, and efficient mobile application.

## INTRODUCTION

Payment systems, a crucial component in maintaining financial stability, have shifted from relying on physical cash to using digital payment platforms [1]. Various initiatives are underway, including the expansion of the QRIS ecosystem, a standardized QR code used to facilitate digital transactions through server-based electronic financial platforms, e-wallets, or mobile banking services. Consistent with current trends, certain trading platforms have begun implementing QR code-based payment systems for transactions [2]. The goal of QRIS is to increase the convenience of digital transactions for the general public and is subject to oversight by a centralized regulatory body due to its standardization [3].

The global expansion of technology, facilitated by the internet, has served as a driving force in the business sector, particularly in the area of sales transaction processing. Cashier applications are one example. Cashiers play a crucial role as individuals responsible for receiving and disbursing essential funds under the guidance of authorized parties (business owners). Additionally, typical cashiers are responsible for facilitating the smooth exchange of funds between clients and vendors by managing outlets/showrooms/stores, overseeing marketing and after-sales support, achieving sales goals, and meticulously documenting cash flow [4].

Bu Ni'mah Food Stall is an MSME located in Kemuning Village, RT. 17, RW. 04, Tarik District, Sidoarjo Regency. This stall serves various food menus, such as pecel rice, beef soto rice, tripe soto, rawon rice, and drinks such as iced tea and iced orange juice.

Every day, this stall can earn up to 2 million rupiah in revenue. However, currently, the stall's operations still experience several obstacles because it relies on a manual cashier system. This system is considered inefficient and has a high risk of errors in recording transactions [5]. The transaction recording process is still done manually, using books and calculators, which often causes delays in service, errors in calculating total transactions, and difficulties in accessing sales data for business analysis purposes. To overcome these problems, the implementation of an Android-based cashier application is very important so that transaction accuracy and efficiency can be improved, while also enabling real-time monitoring of business performance [6].

Research conducted by Hasryana Suci Dwi Purwanto, Rendra Soekarta, and Teguh Hidayat Iskandar Alam in 2023 [6] produced an Android-based cashier application using agile methods. Previous research conducted by Hadid Fathan Azisabil and Rizal Rachman in 2022 also (Hadid Fathan Azisabil, 2022) produced an Android-based cashier application using HTML5, CSS, Bootstrap, JSON, PHP, MySQL, and Cordova, which has several features such as product data management, transaction management, report management, and report printing. However, historically, traditional cashier applications have not integrated digital payment methodologies, including QRIS, which is currently becoming increasingly important for business operators aiming to improve the efficiency and speed of transaction processes for consumers.

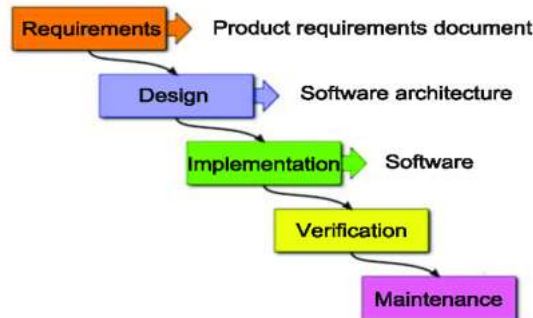
Previous studies have revealed a significant gap between market demand (users) and the functionality offered by current cashier applications, as evidenced by a gap analysis. A significant limitation includes the lack of compatibility with the QRIS payment system, creating a research opportunity to address this issue. This study utilized the Dart programming language and the Flutter framework, incorporating SQLite as the database, and developed a visually appealing and user-centric interface design.

Based on this contextual framework, the main objective of this research is to design a cashier application for the Android platform, designed to improve operational effectiveness at Warung Makan Bu Ni'mah. The main objectives of this research include the creation of an Android-based cashier application, the integration of QRIS payment modalities, increasing transactional precision and efficiency, and facilitating business performance monitoring, so as to facilitate cashiers in sales transactions.

The methodological framework used in the development of this cashier application begins by describing the scope of the research, obtaining data through face-to-face interviews with the owner of Warung Makan Bu Ni'mah, and implementing software development using the *Waterfall methodology* [8]. This application operates on the Android platform, utilizing the Dart programming language and the Flutter framework, in addition to integrating SQLite as its database. This application will be developed using Flutter, an SDK (Software Development Kit) developed by Google for the creation of mobile applications. Flutter aims to support the development of high-performance applications that can run on Android and iOS platforms using a single code base. The framework uses the Dart programming language, which makes it accessible for efficient learning [9].

## RESEARCH METHOD

This research uses the waterfall method, also known as the classic life cycle or 'Linear Sequential Model.' This method describes a structured and phased approach to software development, starting with identifying user needs, followed by planning, designing, building, and finally handing over the system to users. This process is completed by providing full support for the developed software [10]. These stages are depicted in the following illustration:



**Picture 1.** Stages of the *Waterfall Method*

## RESULTS AND DISCUSSION

### A. Needs Analysis

The system planning phase is a crucial step in developing a QRIS-based cashier application. At this stage, various planning aspects are designed to ensure a smooth implementation process and meet user needs. System planning encompasses project planning, resource planning, and technical implementation planning.

Data collection techniques are carried out through observation, literature review, interviews:

#### 1. Observation

Observations were conducted to directly understand the operational conditions and workflow at Warung Makan Bu Ni'Mah. This activity aimed to identify more detailed system requirements and ensure that the developed solution could address existing issues.

#### 2. Literature review

The literature review includes a review of previous research, supporting theories, and the technology used in the development of the QRIS-based cashier application. This review aims to provide a strong theoretical foundation and understand the context and background of this research.

#### 3. Interview

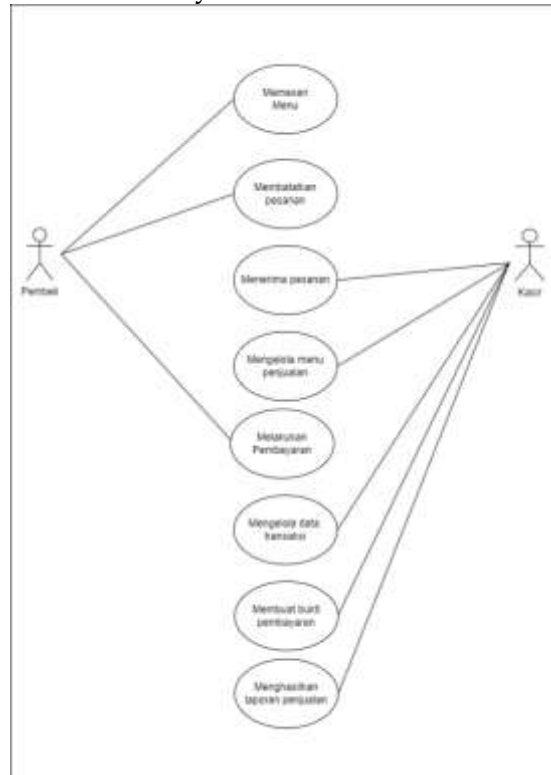
To gain deeper insight into the needs and challenges faced by Warung Makan Bu Ni'Mah, interviews were conducted with the business owner and several customers. The purpose of these interviews was to obtain direct information from potential users regarding their views on the current cashier system and their expectations for the new system.

## B. System Design

This system analysis phase aims to map the functional requirements of a QRIS-based cashier application through visual representations in the form of Use Case Diagrams and Activity Diagrams. These diagrams will help visualize the interactions between users and the system and illustrate the process flow within the system.

### Use Case

*Use case diagrams* are used to explain the main functions provided by the system and the actors who interact with the system.



**Figure 2.** Use case diagram

Figure 2 illustrates the use case diagram design, depicting the interaction between a customer and a cashier. It begins with the customer placing an order and making a payment. The cashier adds the order, manages transaction data, updates product inventory, and generates a sales report. Upon successful payment, the cashier creates and provides proof of payment to the customer.

### Activity

*Activity diagrams* are used to visualize the flow of sales transaction processes in the system, from when a customer places an order until payment is completed.

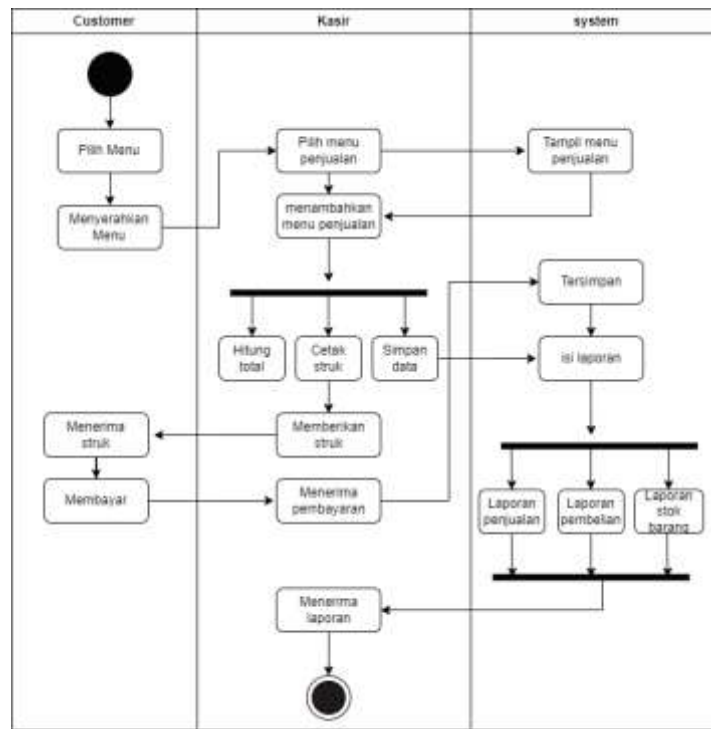


Figure 3. Activity Diagram

Figure 3 illustrates the activity diagram design, which depicts the workflow of a sales transaction involving three main roles: the customer, the cashier, and the system. This diagram visualizes the steps that occur from the customer selecting food and beverages to the transaction being completed and the transaction report being generated.

### C. Implementation

At this stage, the design created in the previous stage is implemented in the form of a series of program units. To ensure that the developed program is ready for use, each program unit must undergo a testing process.

#### Home page

This page presents a summary of important information, such as total daily earnings. Each item is clearly displayed, complete with a "View Details" button that allows users to access more detailed information. A screenshot of the home page can be seen in Figure 4.

#### Transaction page

This page displays a comprehensive transaction history, detailing each transaction, including the date, amount, and payment status. The transaction page can be seen in Figure 5.

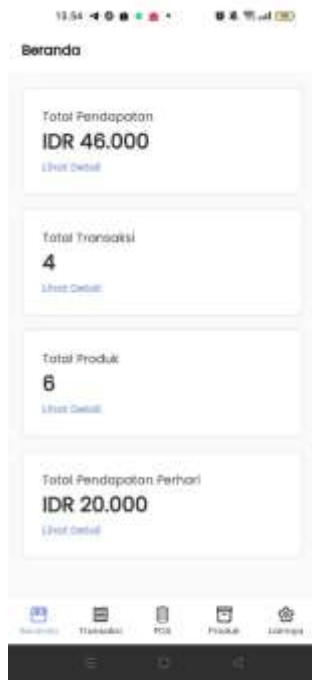


Figure 4. Home page



Figure 5. Transaction page

## Product Page

The product page is used to manage the product list, giving users the ability to add, delete, and edit products as needed. The product page display can be seen in Figure 6.

### Add Product Page

The add product page is used to add new products. This page can be seen in Figure 7.



Figure 6. Product page



Figure 7. Add product page Post Page

This page is used to conduct sales transactions quickly and efficiently, allowing users to select products, calculate total payments, and automatically record transactions. This page can be seen in Figures 8 and 9.



Figure 8. Post page

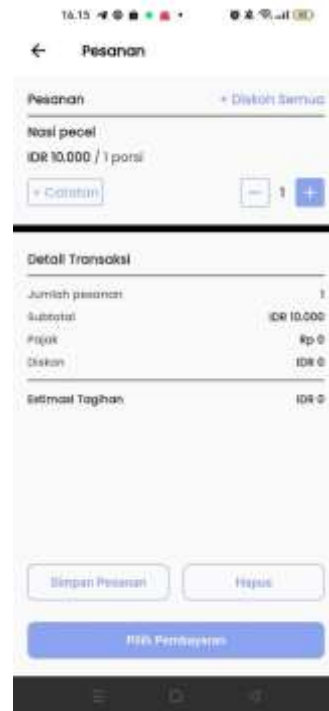


Figure 9. Order page

### Payment Method Page

This page provides customers with a choice of payment methods, including cash or QRIS for ease and speed. A preview of this page can be seen in Figure 10.

### Successful Transaction Page

The successful transaction page displays a notification that the payment was successful, along with transaction details and the option to print a receipt or return to the home page. This page can be seen in Figure 11.



Figure 10. Payment method page



Figure 11. Successful transaction page

### Total Daily Income Page

The daily total revenue page presents a real-time summary of daily revenue, making it easy for users to monitor daily turnover and recorded transaction details. This page can be seen in Figure 12.

### Other Pages

Other pages offer various features, such as Business Information, Printer, and Manage Receipts. A preview of these pages can be seen in Figure 13.



Figure 12. Total daily income page

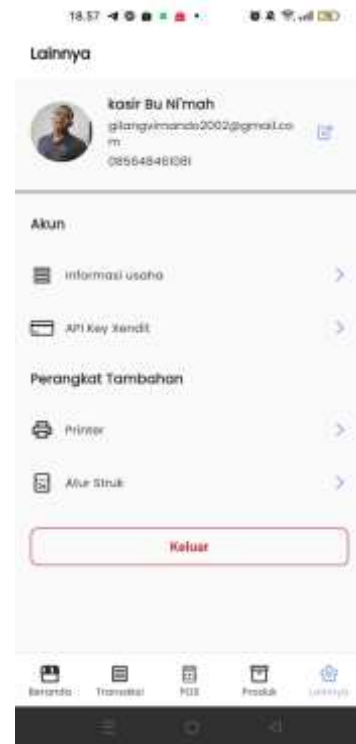


Figure 13. Other pages

### Business Information Page

The business information page allows users to manage their business details, including uploading a logo, entering a business name, email address, and phone number. This feature helps users customize their business information to make it appear more professional and reflect their business identity. This page is shown in Figure 14.

### Manage Receipt Page

The manage receipt page is used to customize the appearance and content of transaction receipts. Through this page, users can customize the information listed on the receipt, such as the business name. This page is shown in Figure 15.



Figure 14. Business Information Page



Figure 15. Manage Receipt Page

### Printer Page

The printer page is used to connect and manage printer devices in the system. Users can use this page to search for and connect printers via Bluetooth. This page is shown in Figure 16.

### D. Testing

At this stage the design in the previous stage is realized in the form of a series or program unit. To ensure that the program created is ready for use, testing of each program unit is required

#### Black Box Testing

In this test, the tester applies the Black Box Testing method, also known as Behavioral Testing. This method focuses on analyzing the input and output results of the application or program being tested without looking at the underlying code structure. The primary goal of this test is to ensure that the application or program operates as expected. The results of the test are shown in Table 1.

NO	Tested Features	Test Steps	Expected results	Test Results
1.	Add product data	Fill in the product input form, click the save button	Product data is successfully saved to the database without duplication.	SUCCEED
2.	Editing product	Edit the	Product data was	SUCCEED

NO	Tested Features	Test Steps	Expected results	Test Results
	data	desired values, then press the save button.	successfully updated and saved in the database without any duplication.	
3.	Deleting product data	By clicking the delete button	Product data has been successfully deleted.	SUCCEED
4.	Do not fill in all the columns available on the product data addition page.	Entering product data with empty or invalid values.	Data will not be saved and the user will remain on the add product page.	SUCCEED
5.	Form to search for product data	By entering the value of the product you want to search for.	If the searched value already exists in the database, it will be displayed. However, if the searched value does not exist in the database, it will not appear.	SUCCEED
6.	Ordering menu	By entering the order menu.	The order menu has been successfully saved to the cart.	SUCCEED
7.	Cash payment	Make payment according to the price of the menu ordered.	The payment is successfully processed, the receipt is displayed, and the transaction history is recorded on the transaction page.	SUCCEED
8.	Qris Payment	Making payments through testing using Postman.	The payment was successfully processed, accompanied by the display of the receipt, and the transaction history was recorded on the transaction page.	SUCCEED

NO	Tested Features	Test Steps	Expected results	Test Results
9.	Did not make payment	Without making any payment process.	The payment status will be recorded on the transaction page with the description "Draft".	SUCCEED
10.	Check total income per day	By specifying the date to be checked.	Total daily income is successfully displayed according to the selected date.	SUCCEED
11.	Check the total amount of income as a whole.	By clicking the "View Details" button, the user will be directed to the transaction history page.	The total amount of overall revenue is successfully displayed.	SUCCEED
12.	Check the number of products.	By clicking the "View Details" button on the Home page, the user will be directed to the Products page.	The total number of products is successfully displayed.	SUCCEED
13.	Business Information	By filling out the form which includes uploading your logo, business name, email, and telephone number.	Data saved successfully	SUCCEED
14.	Set Receipt	By filling out the form containing information and messages.	Data saved successfully	SUCCEED
15.	Search for a printer	By connecting the printer device.	The printer is successfully connected.	SUCCEED
16.	Print receipts	Print receipts	The receipt was	SUCCEED

NO	Tested Features	Test Steps	Expected results	Test Results
	using a printer.	using a printer.	printed successfully.	
17.	Send receipts in photo form.	By sending the receipt in photo format.	The receipt in photo format was successfully sent.	SUCCEED

### E. Maintenance

The system maintenance phase aims to fix any errors found in the application. During this process, all identified errors are continuously fixed to ensure optimal application performance. Maintenance is performed over a specific period of time, providing an opportunity for ongoing evaluation and updates as needed.

## CONCLUSION

**Fundamental Finding :** This study successfully developed an Android-based cashier application integrated with the QRIS payment system, aimed at enhancing the efficiency and modernization of financial transaction management for MSMEs. The use of the Dart programming language and Flutter framework enabled the creation of a user-friendly interface, while the integration of a local SQLite database ensured **fast, secure, and offline-capable data processing**, making it highly suitable for MSMEs operating in areas with limited internet connectivity. **Implication :** The findings imply that the adoption of digital payment systems such as QRIS, when supported by tailored technological solutions, can **significantly improve operational efficiency, accuracy, and financial management** among MSMEs. This innovation aligns with Indonesia’s digital economy transformation goals, encouraging small businesses to embrace cashless transactions and improve competitiveness in the digital marketplace. **Limitation :** This study is limited by the scope of testing and does not include long-term performance evaluation or large-scale user trials to assess system stability and user adaptation in diverse business contexts. **Future Research :** Future studies are encouraged to expand the system’s functionality by integrating **cloud-based synchronization, inventory forecasting, and data analytics**, as well as conducting user experience assessments across various MSME sectors to enhance scalability and overall impact.

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