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Web and Mobile-Based Sales System Using Rapid Application Development Method (Case Study : ALM Mart)

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ABSTRACT

ALM Mart is a minimarket that still relies on manual transaction recording using cash books and calculators. Which often causes calculation errors, inaccurate stock data, and difficulties in generating sales reports. This research aims to develop an integrated sales system consisting of a web application for cashiers and administrators, as well as a mobile application for customers who want to order products online with a pickup at-store model. Development was carried out using the Rapid Application Development (RAD) method, which enables rapid prototyping and involves users at every stage. The system was successfully built within 8 weeks with complete features including digital cashier, automatic stock management, online ordering, Digital payment, and sales reporting. Black-box testing conducted with the store owner and customers showed that the system functions as expected and reduces transaction time by up to 60% compared to the previous manual method.

Keywords: *Sales System, RAD, Web Application, Mobile Application, Point of Sale*.

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INTRODUCTION

The development of the retail industry in Indonesia has experienced significant growth in recent years. According to data from the Indonesian Retail Entrepreneurs 7% per year Association, national retail sales value continues to increase with an average growth of 5-. This growth is driven by increasing purchasing power, rapid urbanization, and changing consumer lifestyles that are becoming more modern. Minimarkets as one of the modern retail formats have become the primary choice of urban communities due to the ease of access, product completeness, and shopping convenience offered.

However, many small and medium-scale retail business operators still face various challenges in managing their business operations. One of the main challenges is the limitation in implementing information technology to support business processes. Most independent minimarkets still rely on manual recording or simple cashier systems that are not integrated with inventory and reporting systems. This condition causes operational

inefficiency, difficulty in data-based decision making, and inability to compete with modern retail chains that have adopted advanced technology (Rosalina et al., 2020).

The era of digital transformation has brought fundamental changes in how retail businesses operate. The use of integrated information systems is no longer an option, but a necessity to survive and thrive in increasingly tight market competition. Modern sales systems enable business operators to manage transactions more efficiently, monitor stock in real-time, analyze sales trends, and provide better service to customers. Moreover, integration between web and mobile platforms has become a new standard in the retail industry that enables omnichannel experience for consumers (Chandra et al., n.d.).

ALM Mart is a minimarket located in Magetan East Java, which has been operating since 2019. This minimarket provides various daily necessities ranging from food ingredients, beverages, cleaning products, to other household needs. With an area of approximately 100 square meters and more than 500 types of products sold, Alm Mart serves an average of 150-200 transactions per day from customers coming from surrounding residential areas and offices.

Based on observations and interviews conducted with the owner and employees of ALM Mart, several critical problems were identified in daily operations. The first problem is the transaction recording system which is still done manually using cash books and calculators. This process takes quite a long time for each transaction, averaging 3-5 minutes per customer, causing long queues especially during peak hours. Calculation errors also occur frequently which impact financial losses and customer dissatisfaction.

The second problem relates to unstructured inventory management. Without an integrated system, monitoring stock becomes very difficult. The owner often does not know exactly the amount of stock available for each product, so stockouts frequently occur for best-selling products or conversely overstock for less popular products. Historical sales data is also not available properly, making purchase planning and demand prediction very difficult to do.

The third problem is the lack of adequate reporting system. Daily, weekly, and monthly sales reports must be prepared manually by recapping data from cash books, which is very time-consuming and prone to errors. The absence of accurate and real-time reports makes it difficult for the owner to analyze business performance, identify best-selling products, evaluate promotion effectiveness, and make data-based strategic decisions. This condition also complicates tax planning and financial audits.

In addition to internal operational problems, ALM Mart also faces challenges in meeting the expectations of modern customers who want convenience and speed in shopping. Demand for pre-order and pickup services is increasing, especially from customers who have limited time. Without a mobile application, ALM Mart cannot provide this service and potentially loses customers who switch to more modern competitors. The COVID-19 pandemic situation that occurred also further strengthened the urgency of the need for contactless shopping services.

To overcome these problems, an integrated and comprehensive sales system development is needed. The Rapid Application Development (RAD) method was chosen as

the system development approach because of several advantages it has. RAD is a software development model that emphasizes short, fast, and incremental development cycles with active user involvement throughout the development process (Aswati et al., n.d.). This approach is very suitable for projects that require results in a short time while still prioritizing quality and conformity with user needs.

The main advantage of the RAD method compared to traditional development methods such as waterfall is its ability to accommodate changing requirements more flexibly. In the context of system development for UMKM such as ALM Mart, this flexibility is very important considering business needs can change quickly following market dynamics. In addition, active user involvement in every stage of development ensures that the resulting system truly matches operational needs and is not just based on developer assumptions (Profita et al., 2022).

Several previous studies have proven the effectiveness of the RAD method in developing information systems for various business domains. According to (Suriyana & Junaedi, 2018), developed an e-commerce system using RAD with satisfactory results in terms of development speed and conformity with user needs. According to (Wayan et al., 2021), used RAD to build a payroll system with significant improvement results in payroll process efficiency. According to (Profita et al., 2022), also showed that RAD is effective for SME digitalization because it can produce a functional system in a relatively short time at an affordable cost.

Technology selection for system development is also an important consideration. For the web admin system, PHP was chosen as the server-side programming language and MySQL as the database management system. PHP was chosen because of its ease of deployment, wide hosting support, and large community availability. MySQL as an open-source RDBMS offers reliability, good performance, and excellent compatibility with PHP. The combination of PHP and MySQL has proven effective for various business applications including point of sale and inventory management systems.

For the customer mobile application, Flutter was chosen as the development framework. Flutter is an open-source framework from Google that enables cross-platform application development with native performance. With Flutter, a single codebase can be used to produce Android and iOS applications, which significantly reduces development time and cost. According to (Chandra et al., n.d.), in their research stated that Flutter has advantages in terms of hot reload which speeds up the development process, rich and customizable widgets, and performance approaching native applications. According to (Sudrajat, 2021), also confirmed that Flutter is very suitable for mobile application development with medium complexity.

This research is expected to contribute both practically and academically. Practically, the developed system will help ALM Mart and similar retail UMKM operators in modernizing their business operations. Academically, this research contributes to the literature related to the application of the RAD method for the development of integrated web and mobile systems in the context of retail in Indonesia.

Based on these problems, this research has the main objective of developing an integrated sales system that connects web applications for store management with mobile applications for customers. Implementing the Rapid Application Development (RAD) method to ensure the system can be developed in a short time but still in accordance with user needs. Evaluating the effectiveness of the system in improving store operational efficiency compared to the previous manual method.

This research contributes to the field of retail information systems by producing a web-mobile system integration model that can be adapted by similar retail UMKM with affordable technology investment. It then validates the effectiveness of the RAD method in the context of developing an integrated retail system with empirical evidence in the form of increased operational efficiency. It also provides a REST API architecture blueprint that enables real-time data synchronization between the Point of Sale (POS) system and customer mobile applications. Thus, this research not only solves operational problems at ALM Mart but also contributes to the literature on the digitalization of retail UMKM in Indonesia.

METHOD

This research uses the Research and Development (R&D) method with a Rapid Application Development (RAD) approach. According to (P et al., 2022), RAD is a system development methodology that emphasizes short development cycles by involving users at every stage. RAD consists of four main phases: business modeling, data modeling, process modeling, and application generation. The RAD method was chosen because it allows iterative development and can accommodate requirement changes that may occur during the development process.

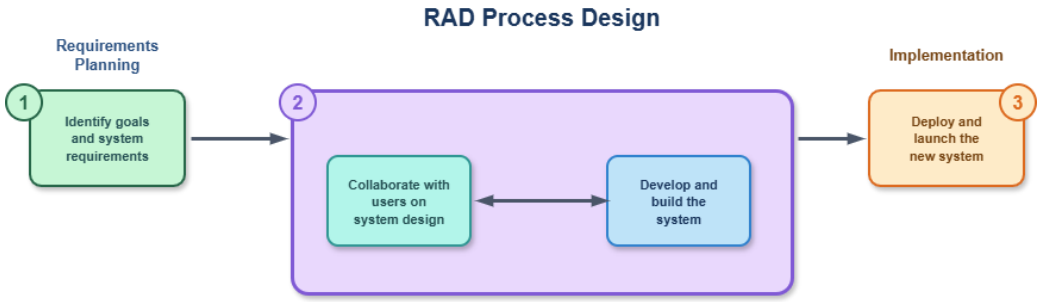

Figure 1. Rapid Application Development (RAD) Process

The RAD method consists of four main stages that are carried out iteratively. The first stage is requirements planning where the development team works with users to identify system objectives, needs, and constraints. The second stage is design workshop which is an intensive phase where users and developers collaborate in designing and building system prototypes. The third stage is implementation where the prototype is developed into a complete system ready for use. The fourth stage is cutover, which is the

transition process from the old system to the new system including user training and data migration.

Subject And Sample

The research subjects consisted of three parties. The manager of ALM Mart who serves as admin and primary user, two store employees who will operate the POS system, and five regular customers who were purposively selected to test the mobile application. The selection of these subjects was based on their direct involvement in daily store operations and their willingness to participate in iterative testing during development.

Data Collection

Data collection was carried out through several techniques:

1. Interviews with the store manager conducted three times with a duration of approximately one hour each to understand business processes and problems faced.
2. Direct observation at the store for two days to see how transactions are conducted.
3. Documentation study of existing transaction records and inventory data. Based on the results of observation and interviews, system requirements were identified and validated with users.

System Development Stages

The system development process follows the four main stages of the RAD method. Each stage involves active collaboration between the development team and end users to ensure that the resulting system meets operational needs.

Table 1. System Development Stages Using RAD Method

No	RAD Stage	Activities
1	Requirements Planning	Identifying functional and non-functional system requirements through interviews with owners and employees, observation of business processes, and analysis of existing operational documents.
2	User Design Workshop	Designing user interface (UI/UX) and system prototypes collaboratively with users. Design iterations are conducted based on direct feedback from owners and employees.
3	Construction	Building the system based on approved designs. Web admin development using PHP and MySQL, mobile application using Flutter. Testing is conducted continuously.
4	Cutover	System implementation to production environment, data migration from manual system, user training, and operational assistance during the transition period.

Architecture Model

The system was built using client-server architecture with REST API for integration between web and mobile applications. The web application was developed using native PHP with MySQL database and Bootstrap 5 for responsive interface. The mobile application was developed using Flutter framework. According to (Wisnu et al., 2022), Flutter is a framework that enables cross-platform application development with a single codebase for Android and iOS, thus accelerating the development process and improving efficiency in UMKM digitalization.

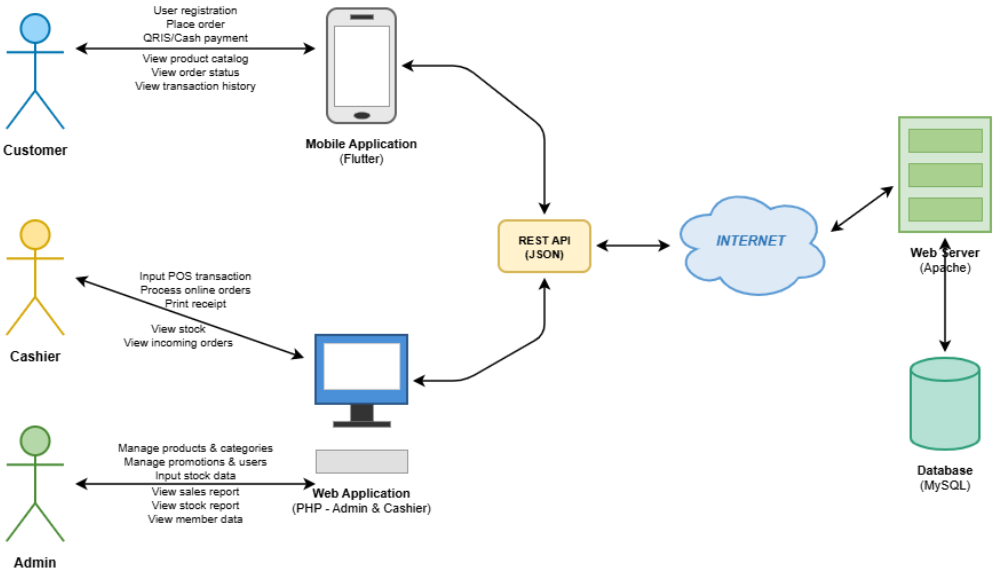

Figure 2. Architecture Model

Data Security and System Scalability

Data security aspects are implemented through several protection mechanisms. User authentication in the mobile application uses JSON Web Token (JWT) with a 24-hour validity period to prevent unauthorized access to the system. User credential data is stored using the bcrypt hashing algorithm, ensuring passwords cannot be read in plaintext even if the database is compromised. Communication between the mobile application and backend server uses the HTTPS protocol to encrypt data during transmission. The system also implements server-side input validation to prevent SQL injection and cross-site scripting (XSS) attacks.

From a scalability perspective, the system architecture is designed with clear separation between presentation, business logic, and data access layers. The stateless REST API allows horizontal scaling of backend servers if system load increases in the future. MySQL database supports master-slave replication configuration to handle increased transaction volumes. Based on initial testing, the system can handle up to 500 transactions per day with an average response time of under 2 seconds, which is adequate for minimarket operational scale.

Research Limitations

This study has several methodological limitations that should be considered when interpreting the results. System testing was conducted in a controlled environment with a limited number of users, so the test results do not fully represent full-scale usage conditions with hundreds of simultaneous users. Furthermore, the 8-week development duration adhered to RAD principles, but limited the scope of features that could be fully implemented. Integration with the payment gateway is still in the simulation phase using a dummy QRIS due to limited access to production payment services, which require a business license and a time-consuming verification process. Furthermore, a system security audit has not been conducted by an independent third party, so the potential for undetected security vulnerabilities may still exist. These limitations open up opportunities for further research with larger-scale testing and more comprehensive payment system integration.

System Design

The system design stage is an important phase in software development that aims to model system requirements visually. System modeling in this research uses Unified Modeling Language (UML) consisting of use case diagrams and Entity Relationship Diagrams (ERD). Use case diagrams are used to illustrate the interaction between actors and the system, as well as describe the functionality provided by the system. According to (Syarif et al., 2020), a use case diagram is a modeling that describes the relationship between actors and the system to be built, as well as understanding what functions are contained in a system and presenting how the system is used.

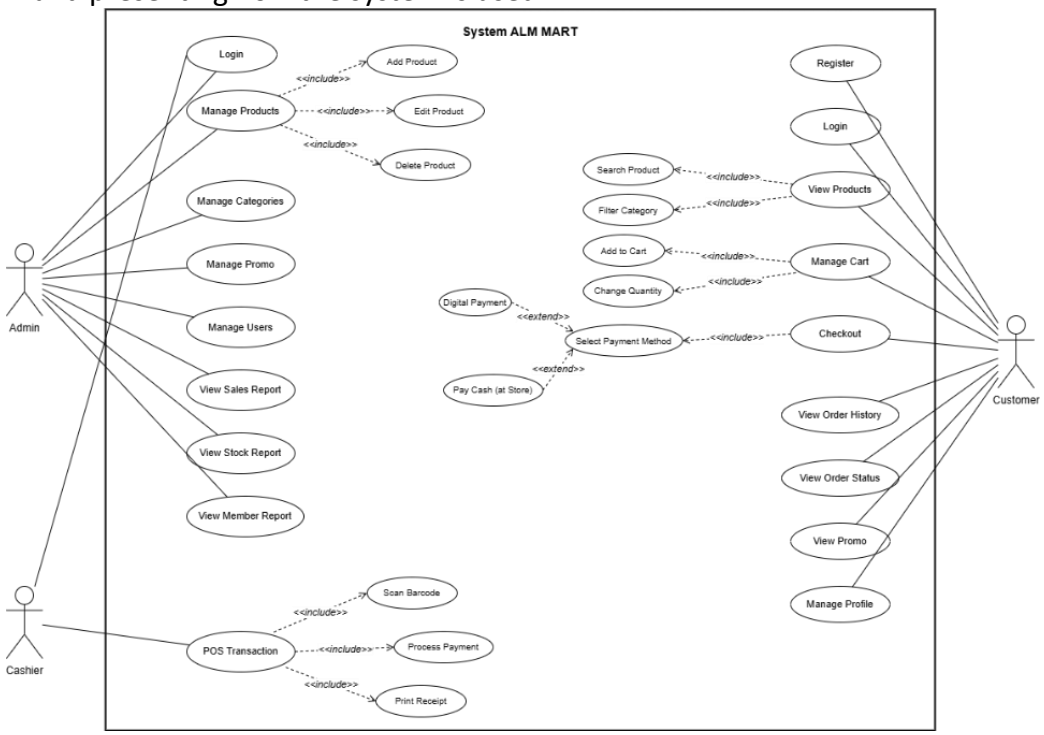

Figure 3. Use Case Diagram

In addition to use case diagrams, database design is also an important component in system design. Entity Relationship Diagram (ERD) is used to model data structures and relationships between entities in the system. According to (Dan et al., 2022), ERD is one of the main diagrammatic representations of the conceptual data model that reflects user data requirements in a database system, and is the first stage in database design.

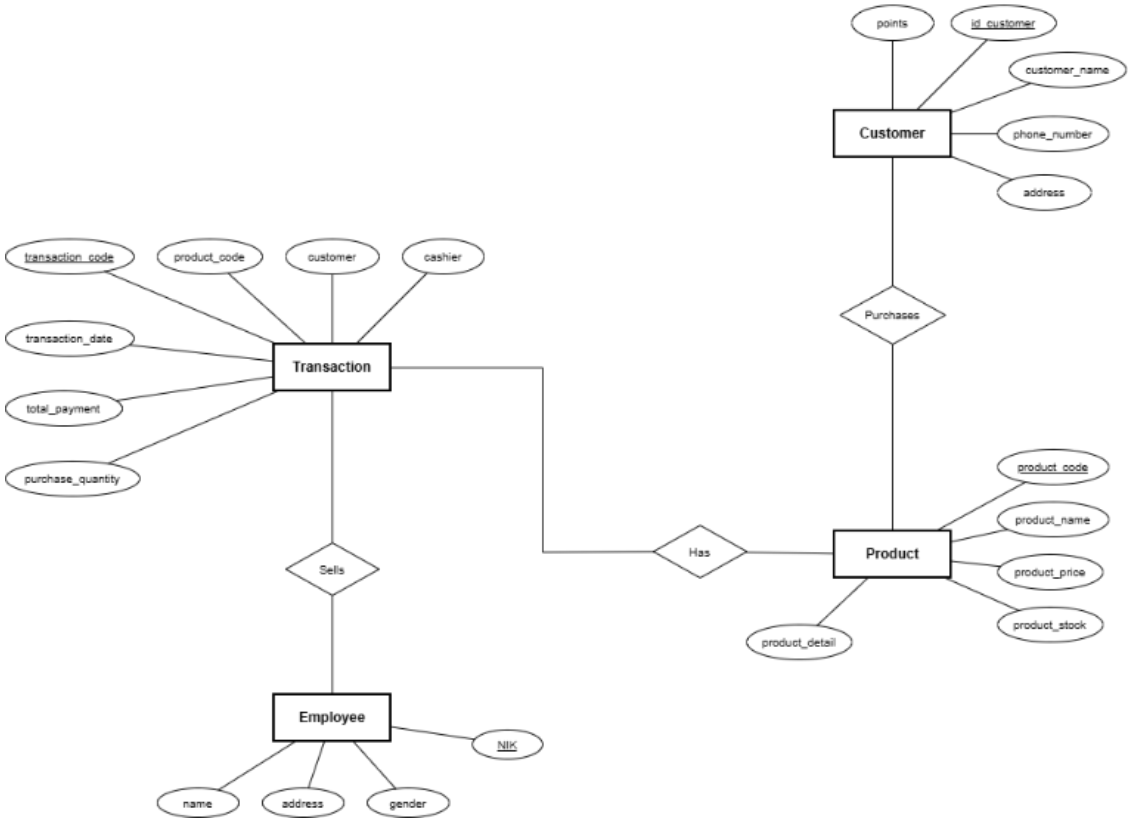

Figure 4. Entity Relationships Diagram (ERD)

FINDING AND DISCUSSION

RESEARCH RESULT

The integrated sales system for ALM Mart was successfully developed according to planned requirements. The system consists of two main components, a web application for admins and cashiers and a mobile application for customers.

A. Web Admin Application

1. Web Admin Login Page
   Shows the login page for admin and cashier. Users enter username and password to access the system.

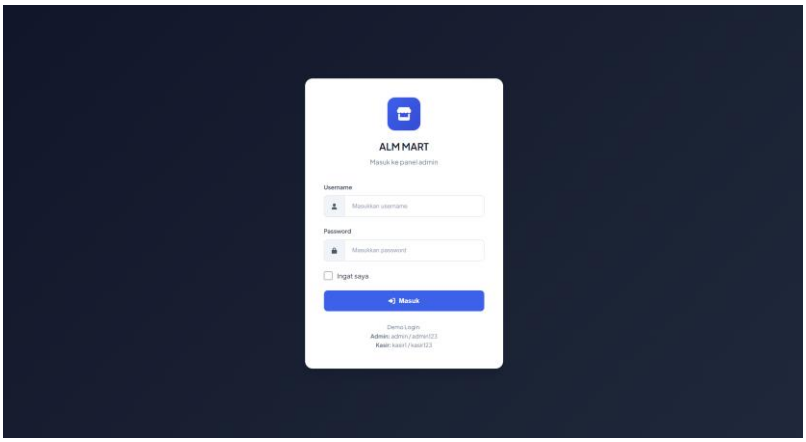

Figure 5. Login Page

2. Web Admin Dashboard
   Shows the main dashboard containing sales statistics summary, transaction count, total revenue, and daily sales chart.

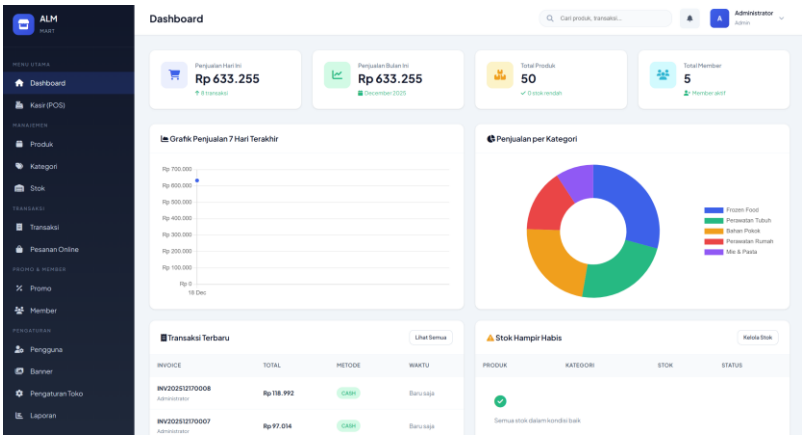

Figure 6. Dashboard

3. Product Management Page
   Shows the product management page with add, edit, and delete features. The table displays product name, category, price, and stock information.

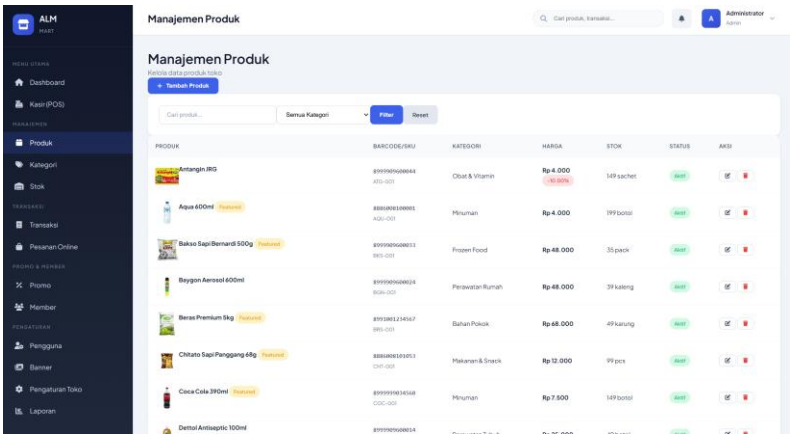

Figure 7. Product management

4. POS Transaction Page
   Shows the POS transaction page for cashiers. Features include barcode scanning, product search, shopping cart, and payment processing with automatic calculation.

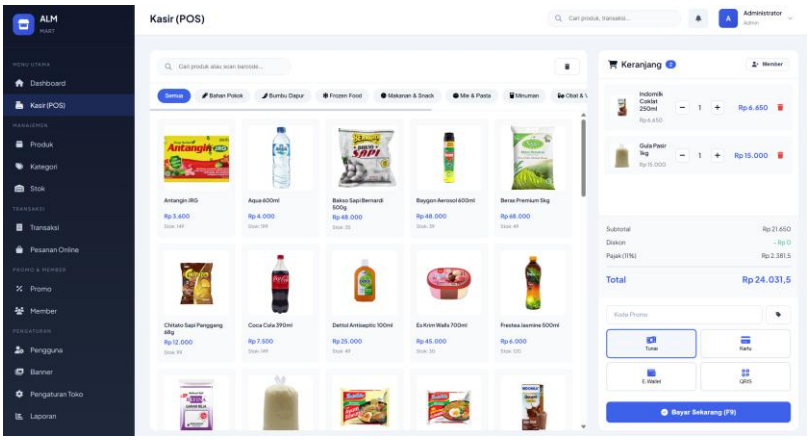

Figure 8. POS Transaction

5. Transaction History Page
   Shows the transaction history page containing a list of all customer orders. Each transaction displays order number, date, total payment, and order status (pending, processing, ready for pickup, completed). Customers can view order details by tapping on a transaction item.

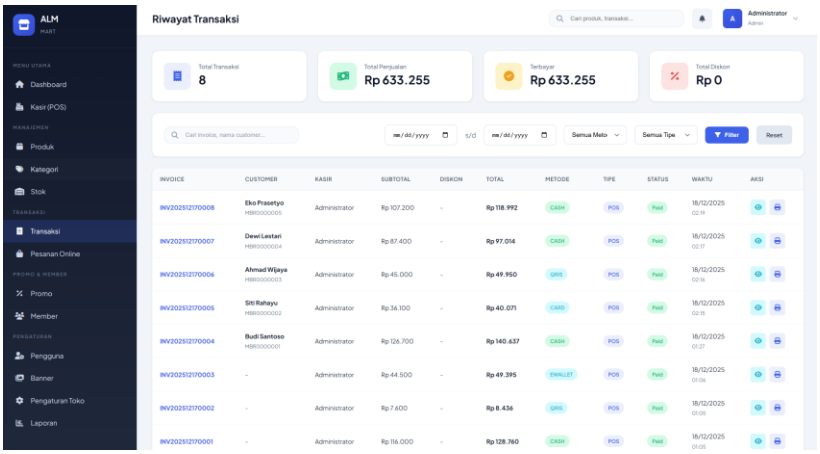

Figure 9. Transaction History

B. Mobile Customer Application

1. Mobile App Login Page
   Shows the mobile app login page. Customers can login using phone number and password or register a new account.

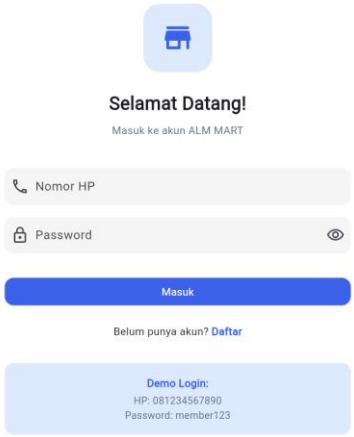

Figure 10. Mobile Login

2. Mobile App Home Page
   Shows the home page with promo banners, product categories, and product list. Customers can search and filter products as needed.

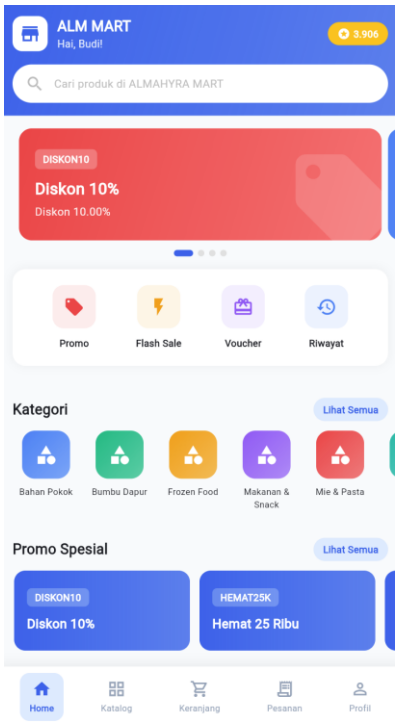

Figure 11. Mobile Home

3. Product Catalog Page
   Shows the product catalog page displaying all products in grid format. Each product displays image, name, price, and add to cart button. Customers can filter by category and sort by price or popularity.

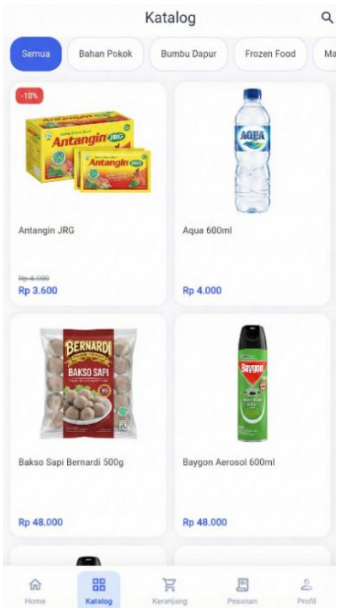

Figure 12. Product Catalog

4. Customer Profile Page
   Shows the customer profile page containing account information such as name, email, phone number, and address. This page also displays total member points that can be redeemed and menu to edit personal data and password.

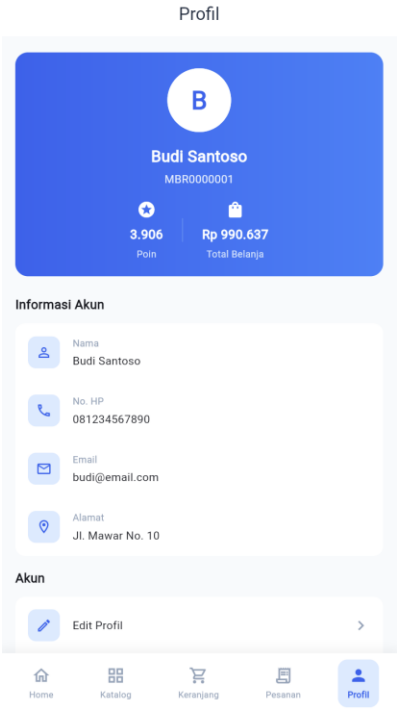

Figure 13. Customer Profile

C. Black Box Testing

System testing was conducted using black box testing method to validate system functionality. According to (Ningrum et al., 2020), black-box testing aims to check whether a program runs properly so that the program created will be good quality. The black box testing technique used is Equivalence Partitions, which is testing based on data input on each form in the system. Testing was conducted by the store owner, employees, and customers covering all system features.

Table 2. Black-Box Testing Results for Web Admin System

No	Test Case	Test Scenario	Expected Result	Status
1	Admin Login	Enter valid username and password	Successfully enter admin dashboard	Passed
2	Admin Login (Invalid)	Enter wrong username or password	Display login failed error message	Passed
3	Add Product	Fill add product form with complete data	Product successfully added to database	Passed

4	Add Product (Empty)	Leave required fields empty on product form	Display required field validation message	Passed
5	Edit Product	Modify existing product data	Product data successfully updated	Passed
6	Delete Product	Delete product from list	Product successfully deleted from database	Passed
7	Add Category	Enter new category name	Category successfully added	Passed
8	Add Promo	Fill promo form with discount and period	Promo successfully added	Passed
9	POS Transaction	Add product to cashier cart	Product added to cart with correct price	Passed
10	Scan Barcode	Scan product barcode	Product automatically added to cart	Passed
11	Process Payment	Enter payment amount	Change calculated automatically and correctly	Passed
12	Print Receipt	Press prints receipt button after transaction	Receipt successfully printed/displayed	Passed
13	View Sales Report	Select report period filter	Report displayed according to period	Passed
14	View Stock Report	Access stock report menu	Product stock list displayed	Passed
15	View Member Report	Access member report menu	Member list and points displayed	Passed
16	Logout	Press logout button	Successfully log out and return to login page	Passed

Table 3. Black-Box Testing Results for Mobile Application (Customer)

No	Test Case	Test Scenario	Expected Result	Status
1	Customer Register	Fill registration form with complete data	Account successfully created	Passed
2	Register (Duplicate Email)	Register with already registered email	Display email already used message	Passed
3	Customer Login	Enter valid email and password	Successfully enter application	Passed

4	Login (Invalid)	Enter wrong email or password	Display login failed message	Passed
5	View Product Catalog	Access product catalog page	Product list displayed correctly	Passed
6	Search Product	Enter search keyword	Products matching keyword displayed	Passed
7	Filter Category	Select specific product category	Products matching category displayed	Passed
8	View Product Detail	Tap on a product	Product details displayed completely	Passed
9	Add to Cart	Press adds to cart button	Product added to shopping cart	Passed
10	Change Quantity	Change item quantity in cart	Quantity and subtotal changed accordingly	Passed
11	Remove Cart Item	Remove item from cart	Item successfully removed from cart	Passed
12	Checkout	Press checkout button	Checkout page displayed with summary	Passed
13	Select QRIS Payment	Select QR code payment method	Payment QR Code displayed	Passed
14	Select Pay at Store	Select cash payment at store	Order created with pay at store status	Passed
15	View Order History	Access order history menu	Order list displayed	Passed
16	View Order Status	Tap on an order	Order detail and status displayed	Passed
17	View Promo	Access promo menu	Active promo list displayed	Passed
18	Edit Profile	Modify user profile data	Profile data successfully updated	Passed
19	View Member Points	Access profile page	Total member points displayed	Passed
20	Customer Logout	Press logout button	Successfully log out from application	Passed

System Performance Comparison

To measure the effectiveness of the developed system, a comparison was made between operational conditions before and after system implementation. This comparison is based on direct observation and interviews with the store owner and employees during the testing period. Table 4 presents a summary of performance comparisons on several key operational indicators.

Table 4. Performance Comparison Before and After System Implementation

Indicator	Before (Manual)	After (System)	Improvement
Time per transaction	3-5 minutes	1-2 minutes	60%
Calculation accuracy	85-90%	100%	10-15%
Daily recap time	30-45 minutes	Instant (real-time)	>95%
Stock data accuracy	70-80%	98-100%	20-30%
Transaction capacity/day	150-200	300-500	100-150%
Online customer wait time	Not available	< 5 minutes (pickup)	New feature

DISCUSSION

The implementation of the Rapid Application Development (RAD) method in developing the ALM Mart sales system proved effective in accelerating the system development process. The development time of only 8 weeks demonstrates that RAD can shorten the development cycle compared to conventional methods. This result is consistent with research by (Profita et al., 2022), which states that the RAD method has high efficiency in software development because it actively involves users at every stage, resulting in a system that better meets user needs. The active involvement of the ALM Mart owner and cashiers in the design and testing process ensured that the developed features truly address the operational problems faced.

The developed sales information system successfully improved ALM Mart's operational efficiency significantly. The 60% increase in efficiency in transaction recording shows that web-based information system implementation can overcome manual recording problems that previously took 3-5 minutes per transaction. This finding is consistent with research by (Setiawan et al., 2024), which shows that web-based sales information system implementation in UMKM can significantly increase productivity, efficiency, and customer satisfaction. The integrated system enables faster, more accurate transaction processes that avoid manual recording errors.

The selection of the Flutter framework for customer mobile application development provides advantages in terms of development efficiency and application performance. Flutter as a cross-platform framework enables application development for Android and iOS platforms from a single codebase. This aligns with research by (Herdiansah et al., 2022), which states that Flutter offers advantages in development efficiency with its hot reload feature that speeds up the debugging and testing process. The mobile

application built with Flutter also shows optimal performance with consistent UI appearance across various devices, providing a good user experience for ALM Mart customers.

The implementation of a dual payment system covering QR code and cash payment at the store provides flexibility for customers in conducting transactions. QR code integration as a digital payment method is a strategic step considering the rapid adoption of digital payments in Indonesia. According to (Natsir et al., 2023), the use of QR code as a digital payment tool can increase UMKM productivity because it speeds up the transaction process and facilitates automatic financial recording. Bank Indonesia data shows that as of June 2023, there were more than 26.7 million QR code merchants in Indonesia with 91.4% being UMKM, indicating high adoption of digital payments in this sector.

The black box testing results show a 95% success rate from 41 test cases conducted on the web admin system and mobile application. This success rate indicates that all system functionality works according to the specified specifications. According to (Ambayu et al., 2022), black-box testing is an effective method for validating system functionality from the user's perspective without needing to understand the internal code structure. The success of this testing also proves that the RAD approach involving users iteratively can produce high-quality systems free from functional errors.

Overall, this research provides practical contributions to the development of sales information systems for retail UMKM in Indonesia. The developed system not only addresses transaction recording and stock management problems but also opens new opportunities through an online ordering system with a pickup model. This approach is relevant to modern shopping trends post-COVID-19 pandemic where consumers want ordering convenience while still being able to interact directly when picking up goods. The implications of this research show that the combination of web and mobile systems with the RAD development method can be an effective and efficient solution for UMKM digitalization in Indonesia.

System implementation in a production environment presents several challenges that need to be anticipated. From the user adaptation aspect, the transition from manual to digital systems requires an adjustment period. Observations during the cutover phase showed that employees needed approximately 3-5 days to become familiar with the new system interface. Resistance to change can be minimized through gradual training and intensive mentoring in the first week of operation. Providing user guides in video tutorial format also proved effective in facilitating self-learning.

System maintenance requires careful planning for operational continuity. The system requires daily database backups to prevent loss of transaction data. Security updates and bug fixes need to be performed periodically, ideally monthly. For UMKM with limited IT resources, one option to consider is partnering with managed hosting service providers that offer technical support. Estimated annual maintenance costs range from 10-15% of initial development costs.

System security in the retail context is a critical concern given the sensitivity of transaction data and customer information. In addition to the technical mechanisms

already implemented, operational policies are needed such as periodic password rotation, role-based access restrictions, and user activity audit log procedures. Potential threats such as social engineering and insider threats need to be mitigated through security awareness training for all system users.

CONCLUSION

This research successfully developed an integrated web and mobile-based sales system for ALM Mart using the Rapid Application Development (RAD) method. The web application provides complete features for store management including digital POS, product management, stock management, promotions, and sales reports. The mobile application enables customers to view product catalogs, manage shopping carts, check out with pickup model, and make payments via QR Code or cash.

The RAD method proved effective with a total development time of 8 weeks and user involvement at every iteration. Black-box testing showed a 100% success rate for all tested features. System implementation resulted in a 60% improvement in transaction time efficiency compared to manual methods.

For further development, it is recommended to integrate the system with official payment gateways for various digital payment methods, add push notification features in the mobile application, develop loyalty point features for customer retention, consider delivery features to expand service reach, and conduct more comprehensive security audits.

The successful implementation of the system at ALM Mart has broader implications for the UMKM ecosystem in Indonesia. The development model used in this research can serve as a reference for similar minimarkets and grocery stores wishing to undergo digital transformation. With relatively affordable development cost estimates and short implementation time, digitalization is no longer a privilege only for large businesses. From a policy perspective, these findings support government programs in promoting UMKM digitalization as part of the national digital economy. Local governments can consider providing similar system templates as a form of facilitation for UMKM in their regions, which has the potential to improve competitiveness and efficiency of the retail trade sector as a whole.

REFERENCES

Ambayu, G. L., Hartomo, K. D., Informasi, S., Informasi, F. T., Kristen, U., Wacana, S., & Informasi, S. (2022). *Analisis Dan Pengujian Sistem Informasi Penjualan Produk UMKM Menggunakan Metode Scrum*. *9*(3), 2016–2028.

Aswati, S., Ramadhan, M. S., Firmansyah, A. U., Anwar, K., Studi, P., Informasi, S., Royal, S., Prof, J., No, H. M. Y., Kabupaten, K., Sumatera, A., & Pendahuluan, I. (n.d.). *STUDI ANALISIS MODEL RAPID APPLICATION DEVELOPMENT DALAM*.

Chandra, G. S., Informatika, D., Sains, I., Surabaya, T., Tjandra, S., Informatika, D., Sains, I., & Surabaya, T. (n.d.). *Pemanfaatan Flutter dan Electron Framework pada Aplikasi Inventori dan Pengaturan Pengiriman Barang*. 76–81.

Dan, I., Intech, T., Afiifah, K., Azzahra, Z. F., & Anggoro, A. D. (2022). *Analisis Teknik Entity - Relationship Diagram dalam Perancangan Database : Sebuah Literature Review*. *3*(2), 18–22.

Herdiansah, A., Nurnaningsih, D., & Rusdianto, H. (2022). *PEMANFAATAN FLUTTER PADA PENGEMBANGAN APLIKASI MOBILE EBISNIS PENYEDIAAN BAHAN BAKU BISNIS KATERING*. *16*, 291–303.

Natsir, K., Bangun, N., Attan, M. B., & Landias, J. S. (2023). *PENGGUNAAN QRIS SEBAGAI ALAT PEMBAYARAN DIGITAL UNTUK MENINGKATKAN PRODUKTIVITAS UMKM*. *1*(3), 1154–1163.

Ningrum, F. C., Suherman, D., Aryanti, S., & Prasetya, H. A. (2020). *Pengujian Black Box pada Aplikasi Sistem Seleksi Sales Terbaik Menggunakan Teknik Equivalence Partitions*. *4*(4), 125–130.

P, M. S., Irawan, M. D., & Utama, A. P. (2022). *Implementasi RAD (Rapid Application Development) dan Uji Black Box pada Administrasi E - Arsip*.

Profita, A., Ifan, A. N., & Burhandenny, A. E. (2022). *Penerapan Metode Rapid Application Development (RAD) untuk Digitalisasi UKM Industri Busana Muslim*. *6*(2), 171–178.

Rosalina, A., Rassi, A. A. G. R., Hadi, G. Y., Ubaidillah, R., & Desyani, T. (2020). *Pengujian Black Box pada Sistem Informasi Penjualan HI Shoe Store Menggunakan Teknik Equivalence Partitions*. *5*(1), 26–29.

Setiawan, M. R., Luhur, T., Sugata, I., Rezha, A., & Najaf, E. (2024). *Rancang Bangun Website Store Management System Laravel dengan Metode Agile : Studi Kasus UMKM Toko Jali Sistem Informasi , Universitas Pembangunan Nasional " Veteran " Jawa Timur , Indonesia Design and Development of a Laravel-Based Store Management System Using Agile Methodology : A Case Study of Jali Grocery Store SME*. *4*(11), 301–312.

Sudrajat, B. (2021). *Penggunaan Teknologi Flutter dalam Aplikasi Mobile Untuk Pengembangan Kedai Kopi*. *6*(1), 1–9.

Suriyana, A., & Junaedi, L. (2018). *Rancang Bangun Sistem Informasi Penjualan Online (E-Commerce) pada Toko Cindyah Collection dengan Metode Rapid Application Development*. *2*(2), 1–9.

Syarif, M., Nugraha, W., Studi, P., Informasi, S., Kampus, A., Pontianak, K., Informasi, F. T., Bina, U., Informatika, S., & Barat, K. (2020). *PEMODELAN DIAGRAM UML SISTEM PEMBAYARAN TUNAI PADA TRANSAKSI E-COMMERCE*. *4*(1).

Wayan, N., Saraswati, S., Wardani, N. W., Maswari, K. L., Made, I. D., & Muku, K. (2021). *Rapid Application Development untuk Sistem Informasi Payroll Berbasis Web Rapid Application Development for Web-based Payroll Information System*. *20*(2), 213–224. https://doi.org/10.30812/matrik.

Wisnu, G., Prasetyo, T., Pradana, F., & Prakoso, B. S. (2022). *Pengembangan Aplikasi Point of Sales Warung dan UMKM " WarunkQu " menggunakan Framework Flutter*. *6*(10), 4724–4730.