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Design of a Web-Based Order Information System for the Digital Market UMKM in Biting

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ABSTRACT

Digital transformation in the Micro, Small, and Medium Enterprises (MSME) sector is very important to increase operational efficiency. At the Biting Village Digital Market, there are around 35 - 40 MSMEs, the majority of which operate in the culinary sector. However, transaction management currently still relies on WhatsApp groups, which are linear and informal. This triggers an order recording error rate of up to 15–20% every week, such as missed orders or recap errors. This research aims to design and build a Web-Based Order Management Information System using the Waterfall method to digitize unstructured transaction data into a structured relational database (MySQL). The research stages include needs analysis, design using UML diagrams (Activity Diagram, ERD), system implementation, and functionality testing using Black Box Testing. Test results show that all functional features run validly and the system successfully integrates product, customer, and transaction data. The implementation of this platform is able to minimize order recording errors and become a centralized collective digitalization model for the rural MSME community.

Keywords: Information System, Orders, UMKM, Waterfall, Web.

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INTRODUCTION

Digital transformation in the Micro, Small, and Medium Enterprises (MSME) sector is an important strategy for increasing operational efficiency and business competitiveness. A web-based information system allows data processing to be carried out in real-time, thereby minimizing recording errors and speeding up information access. With the support of relational databases, information systems can integrate product, customer, and transaction data in one consistent system. However, the implementation of this system has not been fully implemented in MSMEs in rural areas. Based on field observations at the Biting Village Digital Market, this area houses around 35 - 40 MSMEs with more than 60% operating in the culinary sector (food and drinks), which has a fairly high daily order intensity. So far, transaction and promotion processes are still carried out purely through WhatsApp groups.

The use of WhatsApp as the main transaction medium has major limitations in terms of data management because there is no structured and integrated order recording system. Order information

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is sent in the form of linear messages mixed with other chats, making it difficult to trace back when order volume increases. Based on the results of interviews with business actors, the error rate for manually recording orders reaches 15-20% per week, including missed orders, wrong quantities, and manual recap errors. Technically, WhatsApp does not provide a Relational Database Management System (RDBMS) mechanism, relationships between entities, or automatic reporting features. As a result, data recapitulation from conversation history to manual recording triggers data redundancy and inconsistency.

Several previous studies have developed information systems for the MSME sector, but the majority still focus on the functions of promotion, branding, and expanding market reach, such as research (Nurachmad, 2021) and (Setiawan et al., 2025). In terms of objects, research (Arisa & P, 2022) and (Fitria et al., 2025) Also, generally, only design applications for one specific business unit. Meanwhile, research by (Kuswardhani et al., 2025) and (Ali et al., 2025) focuses on digitizing businesses that were initially purely offline or used traditional notebooks. The novelty of this research in Biting Village MSMEs is carrying out a direct technical transformation from unstructured informal transaction data on the WhatsApp platform into structured data in a collective relational database management system for many village MSMEs at once. Therefore, this research aims to build a Web-Based Order Management Information System using the Waterfall method to analyze, design, implement, and test the reliability of the system in minimizing recording errors.

METHODS

This research was carried out at the Biting Village Digital Market using a software engineering approach. The system development method applied is the Waterfall method, which is sequential and sequential. The research stages were carried out in a structured manner, which included four main phases:

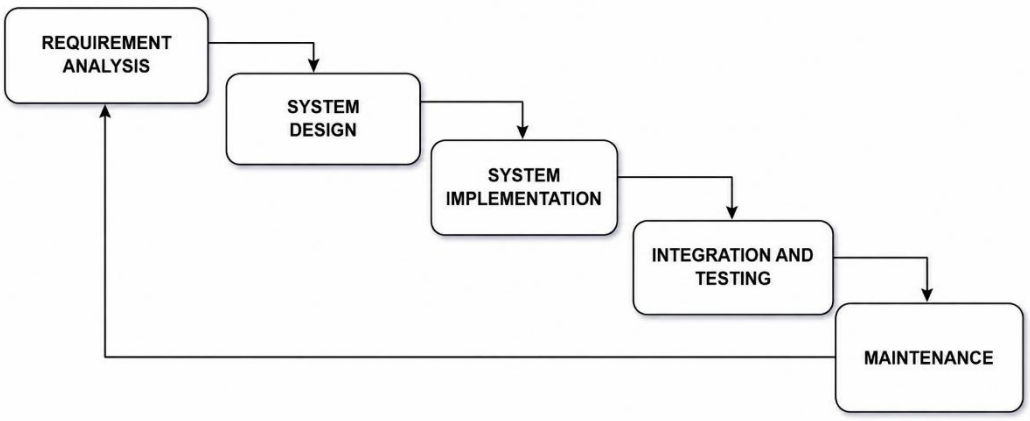

Figure 1. Waterfall Model of System Development
Source: Developed by the authors (2026)

1. Needs Analysis: Data collection stage through direct observation and interviews with MSME actors in Biting Village to map the current business flow and detail the required feature data. From this stage, system requirements were identified in the form of database-based recording, multidimensional data integration, input validation, and automatic reports.
2. System Design: Carrying out visual modeling of system diagram architecture using Unified Modeling Language (UML), such as Activity Diagrams, as well as designing logical data

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structures using Entity Relationship Diagrams (ERD) to ensure the integrity of relationships between entities.

3. Implementation (Coding): Translating logical designs into web-based computer programming instructions. The system was built using a combination of web programming languages for admin, seller (MSME partner), and buyer modules, with MySQL as a centralized relational database management system (RDBMS).
4. Testing: Verifying software performance after all components have been integrated. Testing is carried out using the Black Box Testing method to test the functionality of all features and ensure system validity without operational input errors.
5. System Correction: Final post-test evaluation stage to track and eliminate code errors (debugging). This phase focuses on fixing interface malfunctions, adjusting inaccurate input validation logic, and optimizing database queries before the system is handed over to the MSME partner community.

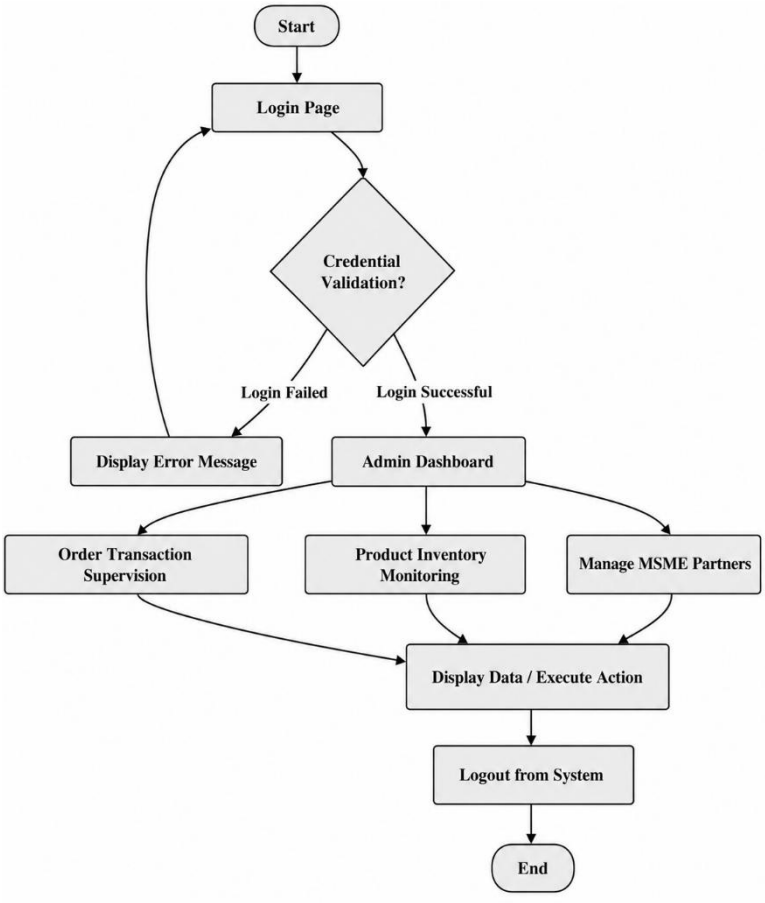

Figure 2. Administrator Flowchart
Source: Developed by the authors (2026)

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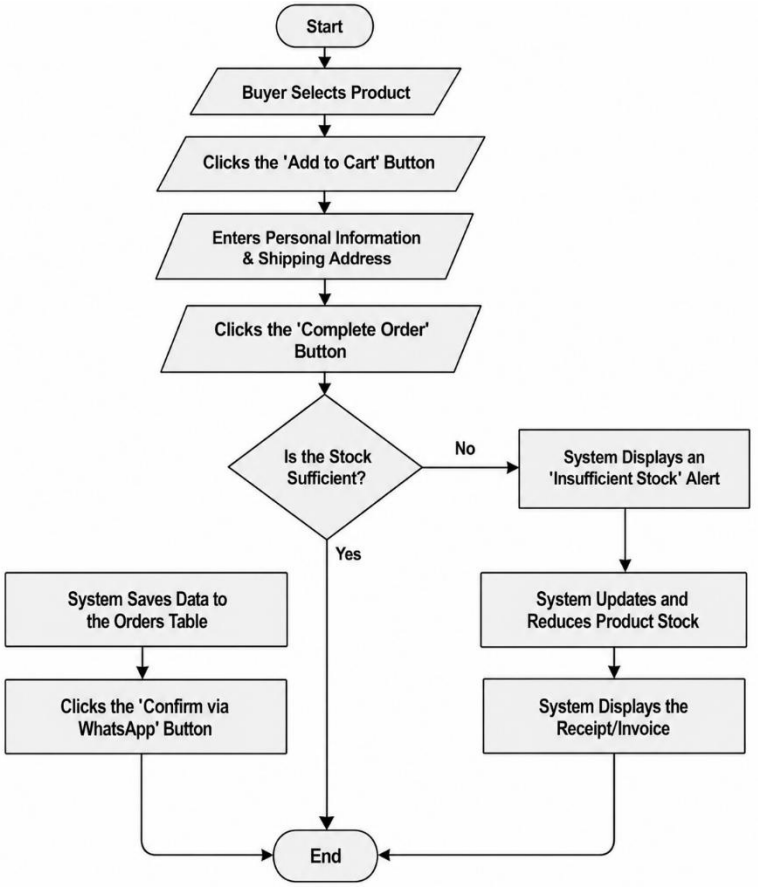

Figure 3. Customer Order Processing Flowchart
Source: Developed by the authors (2026)

RESULTS AND DISCUSSION

Based on the stages of the Waterfall method that have been implemented, this research produces a prototype of a fully integrated Web-Based Order Management Information System. At the needs analysis stage, three main actors were identified who would interact directly with the system, namely the Village Admin (Digital Market Manager), the Seller (MSME Partners of Biting Village), and the Buyer. The presence of this information system facilitates buyers to browse culinary product catalogs and place orders in an organized manner without having to interact linearly through group chat conversations. *After the functional flow of the system is formed, the data architecture is designed to create logical relationships between the main tables in the system. This relational database structure is modeled through an Entity Relationship Diagram (ERD). This structured relationship consistently integrates product data entities, seller data, customer data, and order transaction data to ensure data integrity and prevent redundancy in shared data storage.*

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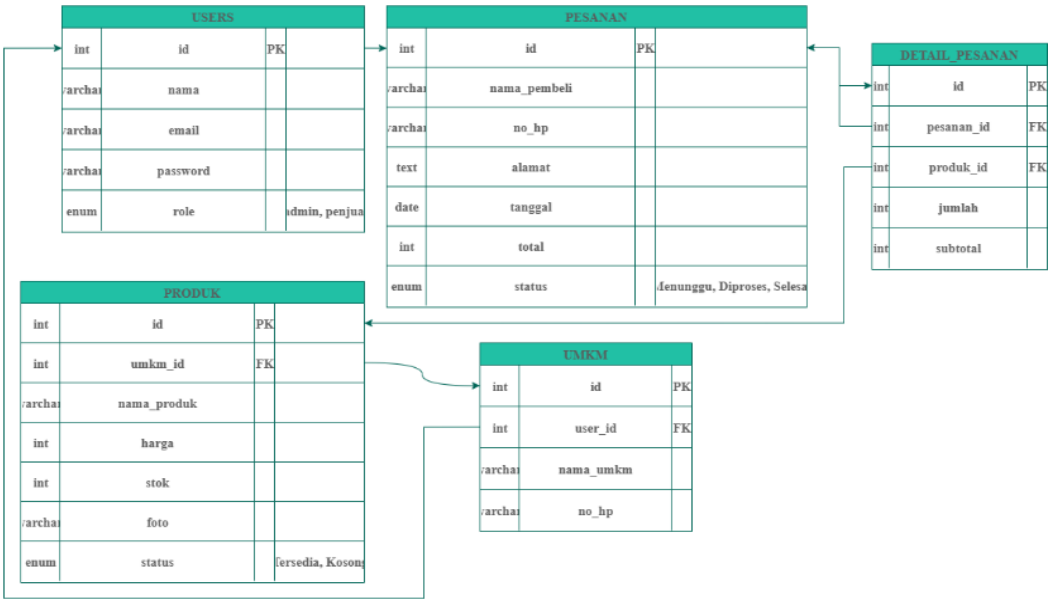

Figure 4. Entity Relationship Diagram (ERD)
Source: Developed by the authors (2026)

All transactions are recorded automatically into the MySQL database, which immediately breaks the chain of conventional manual recapitulation. The reporting feature in this system is able to provide sales reports automatically and in real-time for MSME players, making it easier to monitor the financial circulation of their business operations. Evaluation of system functionality is carried out using the Black Box Testing method. Test scenarios focus on the validity of product data input, the accuracy of shopping cart calculations, order form submission functionality, and transaction status updates by sellers. Black Box testing results show that all main features run 100% validly without any operational system failures. Documentation of the interface implementation of the buyer product catalog module and the seller order recapitulation management module that has been built can be seen in Figure 3.

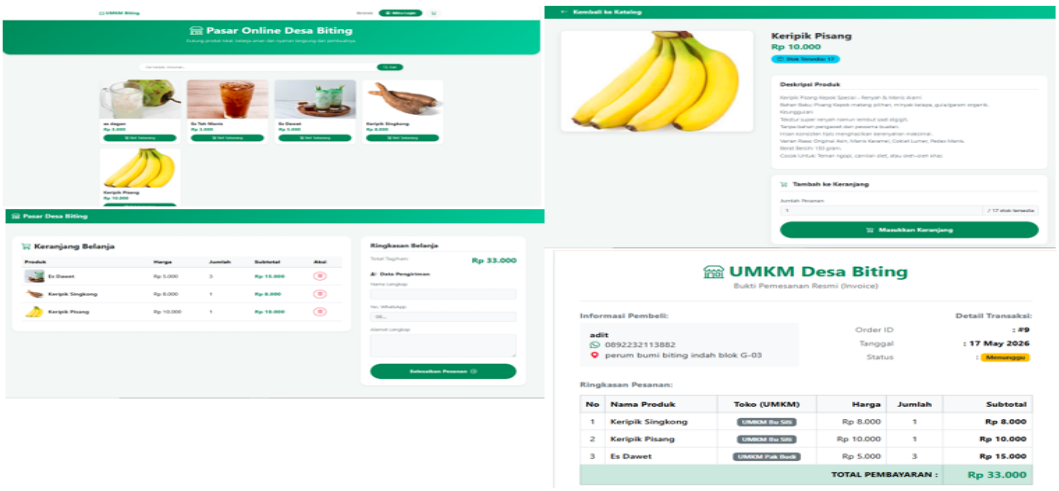

Figure 5. Combined Web Interface Pages
Source: Developed by the authors (2026)

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Through the implementation of this web-based system, the technical gap that previously existed in WhatsApp groups was successfully bridged. The transformation of unstructured chat data into relational database records has been proven to minimize transaction recording errors, which previously reached 15–20%. The risk of missed orders, incorrect input of product quantities, and manual recap inconsistencies has been successfully eliminated thanks to a strict system validation mechanism. However, this system has several operational limitations that are noted for further development, including: storing password credentials which are still in plain text, payment verification which is still checked manually outside the system, and the absence of an automatic calculator to determine geographic logistics courier costs.

CONCLUSION

This research succeeded in designing and implementing a Web-Based Order Management Information System using the Waterfall method for MSMEs in the Biting Village Digital Market. The system built was proven functional through Black Box Testing and was able to operate validly in integrating product, seller, customer, and transaction data into the MySQL database. The presence of this platform has succeeded in transforming informal order management from the WhatsApp platform into structured data, thereby effectively minimizing the error rate in manual transaction recording, which previously ranged between 15-20%. This system not only makes internal operations easier for business partners, but has also successfully become a model for implementing collective digitalization that can be replicated in other village MSME communities. For further system development, it is recommended to apply hashing encryption (such as BCRYPT) to user passwords for credential security, integrate an automatic Payment Gateway (such as Midtrans or Xendit) for payment verification, and insert a dynamic courier logistics API (such as RajaOngkir) for precise shipping cost calculations.

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