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Implementation of a Web-Based E-Commerce Information System for Gold Trading at Bintang Emas Store

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***Abstract* —The development of information technology has encouraged digital transformation in various business sectors, including gold trading businesses. Bintang Emas Kraksaan Store still applies conventional transaction processes, causing limitations in product information delivery, transaction recording, and gold price updates. This study aims to implement a web-based e-commerce information system for gold trading to improve transaction efficiency and digital data management. The system was developed using the Waterfall method, consisting of requirement analysis, system design, implementation, testing, and maintenance stages. The developed system provides several features such as product management, gold price updates, online transactions, user authentication, and sales reporting. System testing was conducted using Black Box Testing and User Acceptance Testing. The results indicate that the system successfully improves transaction efficiency, facilitates digital transaction management, and provides real time gold price information. Based on the User Acceptance Testing (UAT) results, the system is considered acceptable and easy to use by users.**

Keywords—E-commerce, Information System, Gold Trading, Waterfall, Web-based System, User Acceptance Test.

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I. INTRODUCTION

The development of information technology has encouraged digital transformation in various business sectors, including trading businesses[1], [2]. One of the

technologies widely used is e-commerce systems, which enable online transactions to be conducted more efficiently, quickly, and flexibly[3], [4]. The implementation of e-commerce can improve transaction effectiveness, enhance customer service quality, and increase overall business competitiveness in the digital era[5].

Bintang Emas Kraksaan Store still applies conventional transaction methods in managing product data, recording transactions, and updating gold prices. This condition may lead to several operational challenges, such as data recording errors, delays in price updates, and limited customer access to up-to-date product and pricing information. In addition, customers are required to visit the store directly to obtain product details and current gold prices, which reduces convenience and service efficiency[6], [7].

Several previous studies have discussed web-based e-commerce systems for commercial businesses[6], [8]. However, most of these studies still focus on general product sales and do not specifically address gold trading businesses, which require more dynamic price updates, high transaction accuracy, and secure data management due to fluctuating market values.

Therefore, this study implements a web-based e-commerce information system specifically designed for gold trading businesses. The system is developed to overcome the limitations of conventional methods by integrating several key features, including product management, real-time gold price updates, online transaction processing, user authentication, and digital sales reporting. The system also provides a more structured and efficient workflow for both administrators and customers.

Furthermore, the system is developed using the Waterfall method, which consists of sequential stages such as requirement analysis, system design, implementation, testing, and maintenance[9]. To ensure system quality and user acceptance, the system is evaluated using Black Box Testing to verify functional correctness and User Acceptance Testing (UAT) to measure user satisfaction and system usability[9], [10]. The results of these evaluations are expected to confirm that the system meets user needs and can be effectively applied in gold trading business operations.

II. RESEARCH METHOD

A. Literature Review

Literature review in this study is divided into two main parts, namely theoretical review and related studies. The theoretical review explains the fundamental concepts used in the development of the system, while related studies describe previous research that is relevant to this study.

Theoretical Review

1. Information System

An information system is a set of interconnected components that collect, process, store, and distribute information to support decision-making and organizational control[11]. In business environments, information systems play an important role in improving operational efficiency and data management accuracy[11].

2. E-Commerce

E-commerce (electronic commerce) refers to the process of buying and selling goods and services through electronic systems, mainly the internet. E-commerce enables transactions to be carried out without time and location limitations, thereby increasing business efficiency, expanding market reach, and improving customer service quality.[1], [7]

3. Waterfall Model

The Waterfall model is a sequential software development method consisting of several stages, namely requirement analysis, system design, implementation, testing, and maintenance. This model is suitable for systems with well-defined requirements from the beginning of development[9], [12].

4. Black Box Testing

Black Box Testing is a software testing method that focuses on system functionality without considering the internal structure or source code. This testing method evaluates whether the system output matches the expected results based on given inputs.

5. User Acceptance Test (UAT)

User Acceptance Test (UAT) is the final testing phase conducted by end users to determine whether the system meets user requirements. UAT evaluates aspects such as usability, interface design, system effectiveness, and user satisfaction[13].

B. System Development Method

The system development method used in this study is the Waterfall model which can be seen in Fig. 1. The Waterfall model was selected because it provides systematic and structured development stages[9], [12], making it suitable for developing a web-based e-commerce information system. The stages of the Waterfall model consist of requirement analysis, system design, implementation, testing, and maintenance. At the requirement analysis stage, observations and interviews were conducted at Bintang Emas Kraksaan Store to identify user and system requirements. The system design stage was

carried out using Unified Modeling Language (UML) and database design to describe the workflow and structure of the system. The implementation stage involved developing a web-based e-commerce information system featuring product management[7], [9], [11], [14], gold price updates, online transactions, user authentication, and sales reporting. The maintenance stage was conducted to improve system performance and correct possible system errors.

Fig. 1. Waterfall Method Diagram

B. Data Collection Technique

The data collection techniques used in this study include observation, interviews, literature study, and documentation. Observation was conducted to identify the business processes of gold trading activities at Bintang Emas Kraksaan Store. Interviews were conducted with the store owner to obtain information related to system requirements. Literature study was conducted by reviewing journals and references related to e-commerce information systems and software development. Documentation was used to collect supporting research data.

C. Black Box Testing

Black Box Testing was used to evaluate the functionality of the developed system. This testing method focuses on testing system functions without examining the internal source code. The testing process was carried out by providing input data and observing the output generated by the system[15]. The features tested include login, product management, gold price updates, online transactions, and sales reporting. The results of Black Box Testing showed that all system features functioned properly according to the expected requirements.

D. User Acceptance Test (UAT)

User Acceptance Testing (UAT) was conducted to determine the level of user acceptance toward the developed system. The testing process involved users directly using the system and evaluating several aspects such as usability, interface appearance, system functionality, and overall effectiveness[13]. The UAT assessment was conducted using questionnaires distributed to users after using the system. The results of the testing indicated that the developed system was acceptable and capable of supporting gold trading activities effectively and efficiently[13].

III. RESULTS AND DISCUSSION

A. System Implementation Results

This study produced a web-based e-commerce information system designed to support gold trading activities at Bintang Emas Kraksaan Store. The system was developed using the Waterfall method[12], starting from requirement analysis to system testing stages. The developed system aims to facilitate product management, online sales transactions, gold price updates, and digital sales reporting. The system was developed using web-based technology, allowing both administrators and customers to access the system flexibly through computers and smartphones. The implementation process was carried out based on user requirements obtained through observation and interviews conducted at the research location.

B. System Interface Implementation

1. System Flowchart

The system flowchart describes the user authentication process within the web-based e-commerce system. As can be seen in Fig. 2, the process begins when the user accesses the website and the system displays the login page. Users who do not have an account must complete the registration process before accessing the system dashboard.

2. Login Page

The login page is used as a user authentication process before accessing the system which can be seen in Fig. 5. Users are required to enter registered email addresses and passwords to access the application. The implementation of the login page aims to improve transaction data security and restrict unauthorized system access.

3. Admin Dashboard

The admin dashboard displays important system information such as the total number of gold products, transaction data, updated gold prices, and sales reports. The dashboard interface was designed to be simple and user friendly to facilitate system monitoring activities. Fig. 6 is the admin dashboard.

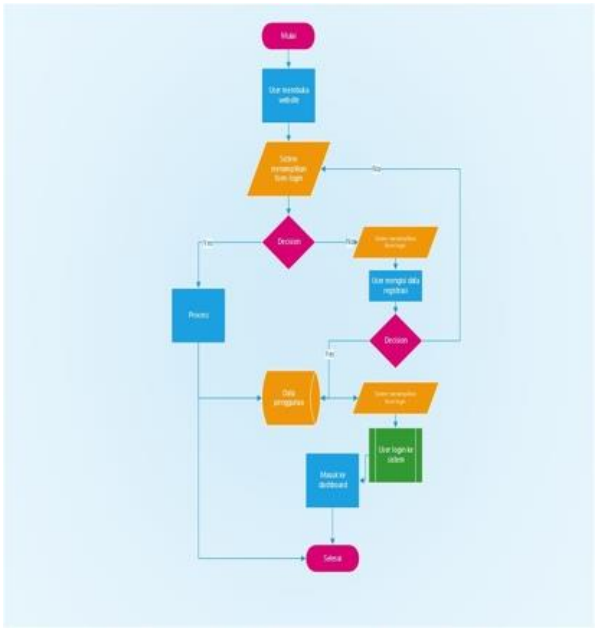

Fig. 2. System login Flowchart

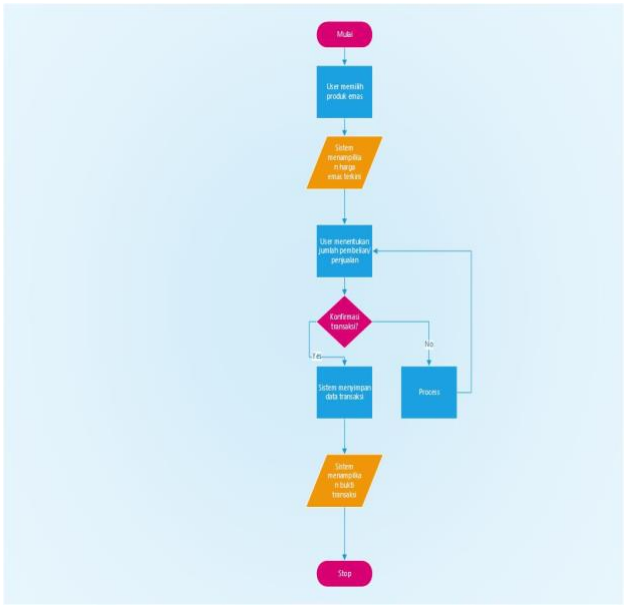

Fig. 3. System User Activity Flowchart

4. Gold Product Menu

The product menu is used to manage gold product data consisting of product names, gold weight, prices, stock availability, and product images. Administrators can add, edit, and delete product data according to system requirements. Fig. 7 display the product menu.

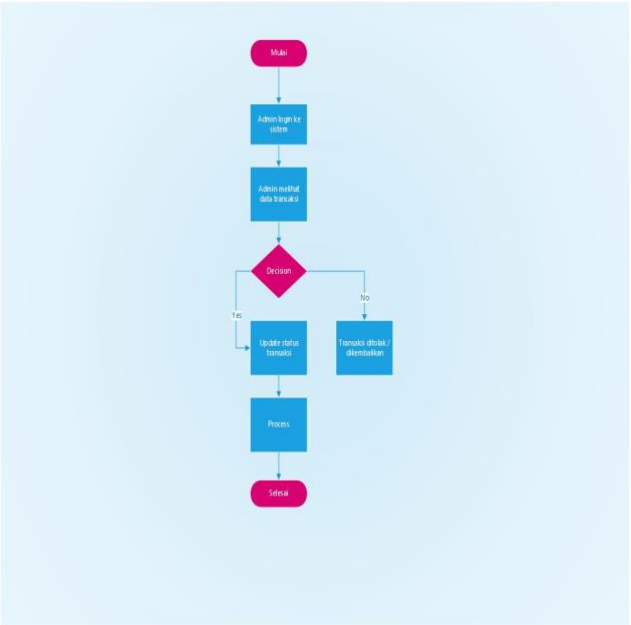

Fig. 4. System Sales Transaction Flowchart

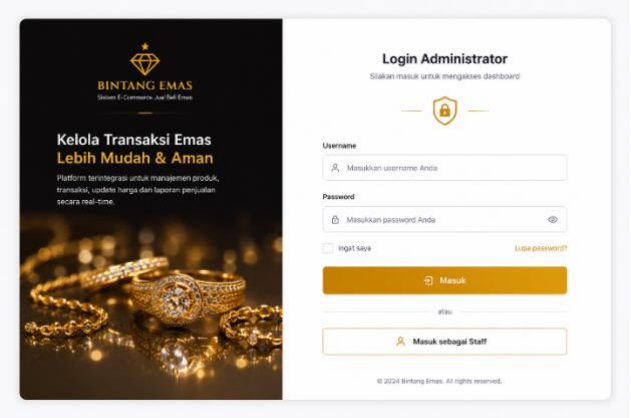

Fig. 5. Login Page

5. Transaction Menu

The transaction menu is used to manage online gold purchasing activities. The system automatically records customer data, transaction totals, payment status, and transaction history to improve transaction management efficiency. Fig. 8 shows the transaction menu.

6. Sales Report Menu

The sales report menu is used to display sales transaction data based on a certain period which can be seen

in Fig. 9. This feature helps administrators monitor sales activities and manage transaction records digitally.

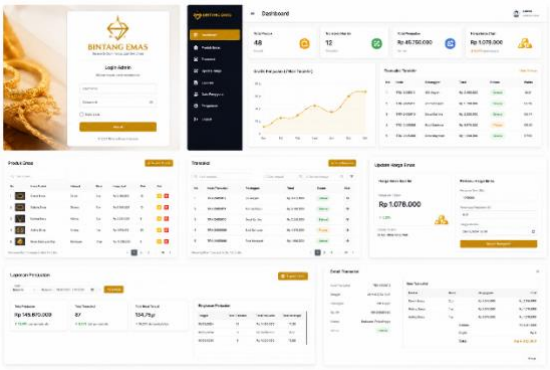

Fig. 6. Admin Dashboard

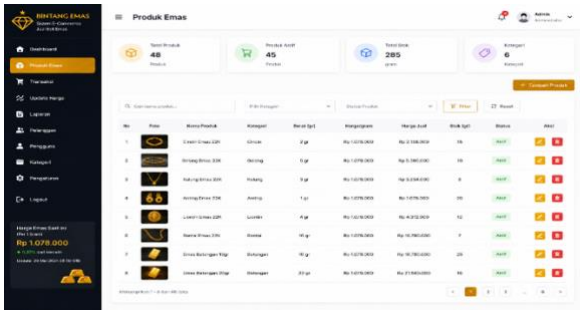

Fig. 7. Product Menu

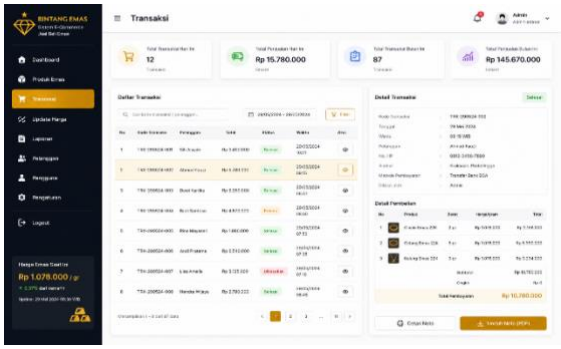

Fig. 8. Transaction Menu

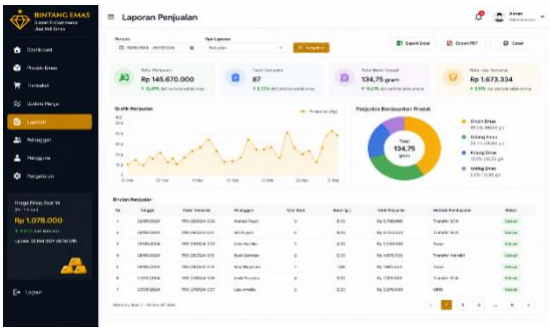

Fig. 9. Sales Report Menu

C. Black Box Testing

TABLE 1 is the result of the system testing. The testing was conducted using the Black Box Testing method to ensure that all system functions operated according to user requirements. Testing was performed on the main features of the system, including login, product management, online transactions, gold price updates, and sales reporting[15].

TABLE 1. Results of System Black Box Testing

No	System Feature	Expected Result	Actual Result	Status
1	Login System	User can access the system dashboard	User successfully logged in	Pass
2	Product Management	Admin can add, edit, and delete products	Product data processed successfully	Pass
3	Online Transaction	System processes customer transactions	Transactions recorded correctly	Pass
4	Gold Price Update	System updates gold price automatically	Price updated successfully	Pass
5	Sales Report	System displays sales report accurately	Report generated correctly	Pass

Based on the Black Box Testing results, all system features functioned properly according to the expected functional requirements. The testing results indicate that the developed system is capable of operating effectively without functional errors.

D. User Acceptance Test (UAT)

User Acceptance Testing (UAT) was conducted to evaluate the level of user acceptance and satisfaction toward the developed e-commerce information system. This testing aims to ensure that the system meets user requirements and is suitable for implementation in real business operations at Toko Bintang Emas Kraksaan[13].

1. Respondents

The UAT involved 10 respondents, consisting of:

- 1 store owner (admin)
- 2 staff members
- 7 customers/users

These respondents were selected because they directly interact with the system in daily operations.

2. Assessment Method

The evaluation was conducted using a structured questionnaire based on a 5-point Likert scale, defined as TABLE 2:

3. Evaluation Aspects

The system was evaluated based on the following aspects:

- Ease of Use (kemudahan penggunaan sistem)
- Interface Appearance (tampilan antarmuka)
- System Effectiveness (efektivitas sistem)
- User Satisfaction (kepuasan pengguna)

TABLE 2. Assement Method

Scale	Description
5	Strongly Agree
4	Agree
3	Neutral
2	Disagree
1	Strongly Disagree

4. Calculation Method

The percentage of user acceptance is calculated using the following formula:

$$Presentase = \frac{\text{Totsl Score}}{\text{MAximum Score}} = 100\%$$

Where :

- Total Score Obtained = sum of all respondent scores
- Maximum Score = number of respondents × number of questions × 5

5. UAT Results

TABLE 3 is the User Acceptance Test result.

TABLE 3. User Acceptance Test Results

No	Evaluation Aspect	Percentage	Interpretation
1	Ease of Use	88%	Very Good
2	Interface Appearance	85%	Very Good
3	System Effectiveness	87%	Very Good
4	User Satisfaction	89%	Very Good

6. Average Score

The overall average UAT score is calculated as:

$$Average = \frac{85 + 85 + 87 + 89}{4} = 100\%$$

Thus, the system achieves an average score of 87.25%, which is categorized as Very Good.

7. Discussion

The UAT results indicate that the developed system is highly acceptable to users. The highest score is obtained in user satisfaction (89%), indicating that users are satisfied with system performance and functionality. The lowest score is interface appearance (85%), which suggests that minor improvements can be made in UI design. Overall, the system is considered effective, easy to use, and suitable for supporting digital gold trading activities at Toko Bintang Emas Kraksaan.

IV. CONCLUSION AND SUGGESTIONS

A. Conclusion

The development of the e-commerce information system at Toko Bintang Emas Kraksaan can be concluded that the developed system has been successfully implemented in accordance with user requirements. The system is designed to support the store's business processes, particularly in product data management, sales transactions, gold price updates, and structured sales reporting. The implementation of this system has positively improved the efficiency and effectiveness of the store's operational processes, as activities that were previously carried out manually can now be performed in a digital and integrated manner. This helps accelerate work processes and reduce errors in data processing.

The testing results using the Black Box Testing method indicate that all system functions work as expected without any errors found in each tested feature, such as login, product management, transactions, price updates, and reporting. In addition, the User Acceptance Test (UAT) results show that the system has a high level of user acceptance. This is reflected in ease of use, good interface appearance, system effectiveness in supporting tasks, and a high level of user satisfaction.

A. Research Limitation

As shown in TABLE 4, this study is limited to the implementation of a web-based e-commerce information system at Toko Bintang Emas Kraksaan. The developed system has not yet integrated digital payment gateway services, mobile based platforms, and real time gold price synchronization features. In addition, the system testing process was conducted on a limited number of users and within a local business environment.

TABLE 4. Research Limitations

No	Research Limitation	Description
1	Web Based System	The system is limited to web-based implementation.
2	Payment System	The system has not integrated online payment gateways.
3	Testing Scope	Testing was conducted on limited users.

B. Future Work

As shown in TABLE 5, the future work recommended to be enhanced by adding digital payment features such as e-wallets or payment gateways to make transactions more convenient, faster, and more modern. In addition, the development of a mobile based application (Android/iOS) is highly recommended so that the system can be accessed anytime and anywhere by users. Furthermore, the integration of automatic notification features such as SMS or WhatsApp is suggested to provide real time information regarding gold price updates and transaction status to customers. From a security perspective, the system should also be improved by implementing data encryption, user access control, and a stronger authentication system to ensure data security and prevent unauthorized access.

TABLE 5. Research Future Work

No	Future Work	Description
1	Mobile Application Development	Development of Android and iOS applications.
2	Payment Gateway Integration	Integration with QRIS and e-wallet payment systems.
3	Real Time Gold Price API	Automatic synchronization of gold prices.

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