JURNAL RISET INFORMATIKA **P-ISSN: 2656-1743 |E-ISSN: 2656-1735**
Vol. 8, No. 1. December 2025 DOI: https://doi.org/10.34288/jri.v8i1.417
Accredited rank 4 (SINTA 4), excerpts from the decision of the DITJEN DIKTIRISTEK No. 230/E/KPT/2023

DEVELOPMENT OF HYPEBID MARKETPLACE INFORMATION SYSTEM WITH REAL-TIME ONLINE AUCTION FEATURE

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Abstract

Conventional auctions still face a number of challenges, such as limited access, unclear processes, and low time efficiency. Auction participants are generally required to be physically present, which limits the number of participants and reduces transparency and transaction speed. Based on this background, this study aims to develop HypeBid, a web- and mobile-based marketplace information system that supports online and real-time auction processes. This system is built using a client-server architecture with React Native, Express.js, PostgreSQL, and Supabase technologies. Development was carried out through stages of needs analysis, system design, and implementation of key features such as user registration, product verification, live bidding, integrated payment systems, and transaction reports. System testing was conducted using the black box testing method involving two groups of users, namely buyers and auction officers. The test results showed that all features functioned as expected, without any functional errors. Thus, HypeBid is considered to be a clearer, more flexible, and efficient alternative solution compared to conventional auction methods.

Keywords: HypeBid, marketplace, online auction, real-time, information system, black box testing.

Abstrak

Pelelangan konvensional masih menghadapi sejumlah tantangan, seperti keterbatasan akses, ketidakjelasan proses, dan rendahnya efisiensi waktu. Peserta lelang umumnya diharuskan hadir secara fisik, yang membatasi jumlah peserta dan mengurangi transparansi serta kecepatan transaksi. Berdasarkan latar belakang tersebut, penelitian ini bertujuan untuk mengembangkan HypeBid, sebuah sistem informasi marketplace berbasis web dan mobile yang mendukung proses pelelangan secara daring dan real-time. Sistem ini dibangun menggunakan arsitektur client-server dengan teknologi React Native, Express.js, PostgreSQL, dan Supabase. Pengembangan dilakukan melalui tahapan analisis kebutuhan, perancangan sistem, dan implementasi fitur utama seperti registrasi pengguna, verifikasi produk, penawaran harga langsung (live bidding), sistem pembayaran terintegrasi, serta laporan transaksi. Pengujian sistem dilakukan dengan metode black box testing yang melibatkan dua kelompok pengguna, yaitu pembeli dan petugas lelang. Hasil pengujian menunjukkan bahwa seluruh fitur berfungsi sesuai dengan yang diharapkan, tanpa adanya kesalahan fungsional. Dengan demikian, HypeBid dinilai mampu menjadi solusi alternatif yang lebih jelas, fleksibel, dan efisien dibandingkan metode pelelangan konvensional.

Kata kunci: HypeBid, marketplace, lelang online, real-time, sistem informasi, black box testing.

INTRODUCTION

The rapid advancement of digital technologies has transformed various economic activities, including auction mechanisms. This transformation has accelerated the shift from traditional physical auctions toward more flexible, efficient, and accessible online auction systems (Azis & Dwiputri, 2024; Paillin & Widiatmoko, 2021). In Indonesia, these changes are increasingly relevant as digital marketplaces grow and user expectations for speed and transparency rise. To respond to these needs, HypeBid is developed as a real-time online auction platform designed to overcome the limitations of conventional auction systems while supporting a more modern and competitive transaction ecosystem (Joserando, Maskanah, & Fuazi, 2025).

Traditional auction mechanisms still encounter structural challenges such as limited

participant reach, dependence on physical presence, and vulnerability to administrative errors (Masa'deh, Almajali, Alsokkar, Alshinwan, & Shehadeh, 2023; Sutjiadi, Rahmawati, & Halim, 2022). These issues reduce bidding competition and undermine public trust in the fairness of the auction process (Kas, Corten, & van de Rijt, 2023). Online auction systems offer a more scalable and transparent alternative by providing automated bid recording, broader accessibility, and auditable transaction logs (Boumaiza, 2025; Song, 2023). Nevertheless, digitization alone does not guarantee system success.

In the context of e-auction platforms, four key factors consistently influence user participation and satisfaction: trust, transparency, service quality, and security. Trust is built through secure transactions, credible reputation mechanisms, and reliable platform behavior (Mazwa, Maskanah, & Fuazi, 2025). Transparency, supported by clear bidding rules and real-time information disclosure, enhances perceived fairness and helps minimize disputes (Deininger, Ali, & Neyter, 2022; Islam et al., 2025). Service quality particularly system reliability, interface usability, and responsiveness plays a critical role in shaping user experience and continued platform adoption (Qin, Yuan, & Wang, 2017). Meanwhile, maintaining system security is essential to protect against shill bidding, identity manipulation, and transactional fraud (Ohize et al., 2025; Polakowski, Broniszewska, Kirczuk, & Kasprzykowski, 2020)

Recent technological developments, such as blockchain and smart contracts, further strengthen the integrity of online auction processes by ensuring immutability, secure bid sequencing, and automated execution of auction rules (Islam et al., 2025; Kumar & Raja Kumar, 2019). These innovations have been shown to improve transparency and user confidence, making them highly relevant to platforms like HypeBid that aim to provide a trustworthy digital environment.

Given the importance of these factors, this study examines how trust, transparency, service quality, and system security collectively influence user participation and satisfaction on the HypeBid platform. The findings are expected to contribute to the development of more reliable and efficient online auction mechanisms and provide practical insights for improving digital marketplaces in Indonesia (Mora Cortez, Cabanelas, & Charterina, 2023).

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RESEARCH METHODS

This study adopts a research and development (R&D) approach to develop HypeBid, a real-time online auction marketplace information system. Data collection was conducted through observation of conventional auction processes, interviews with pawnshop staff conducted from December 5 to December 7, 2024, and a literature review of related studies. System development followed a structured process, and system functionality was evaluated using black box testing involving buyers and auction officers.

Types of research

This study adopts a research and development (R&D) approach, as the goal is to create a mobile-based information system that facilitates users in placing integrated transportation and hotel reservations through the Tiket Extra application. The development process employs the waterfall model because it provides clear, structured, and sequential stages that are suitable for systematic software development.

Reasearch Stage

The research stages in developing this system include the following steps:

1. Observation

The observation was carried out by directly examining the conventional auction process. Its purpose was to evaluate how the auction operates, identify weaknesses and challenges, and review the existing auction system to support future system development. The findings from this observation serve as the foundation for developing a real-time online auction information system that is more efficient and user-friendly.

2. Interview Method

Data collection was carried out through interviews with pawnshop staff to gain a clear understanding of the auction procedures, as well as by reviewing transaction records stored in the pawnshop's system. The primary data source came directly from the pawnshop as the institution responsible for auction activities, supported by additional information from other relevant parties. The data collection process took place from December 5 to December 7, 2024, with the aim of obtaining accurate and comprehensive information.

The interviews were conducted in a structured manner using a set of guided questions that covered key aspects such as the process of

receiving auction items, auction procedures including bidding, determining the auction winner, handling transactions, recording auction activities, and identifying challenges encountered during the auction process.

The outcomes of these interviews were then used as a basis for identifying system requirements and designing an application that is more effective, efficient, and aligned with user needs.

System Architecture Design

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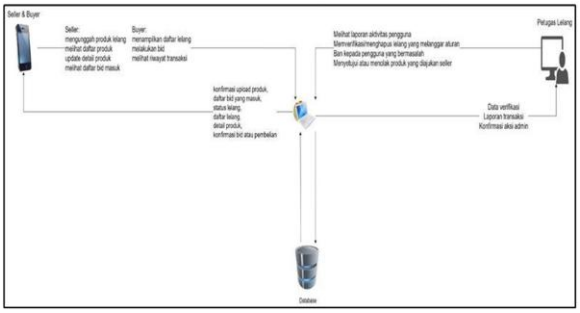

Figure 1. System Architecture Design

The architecture of this model illustrates the workflow of the online auction system, highlighting the interaction between sellers, buyers, devices, the internet network, servers, databases, and administrators. Through this system, sellers can register and list their products after passing the verification process, while buyers can place bids or use the buy-now option at a predetermined price. All requests submitted by sellers and buyers are transmitted to the server, where the system stores, validates, and processes each auction activity, including real-time bid updates via WebSocket or similar push technologies (Qin et al., 2017).

Administrators play a crucial role in overseeing and managing auction operations. Using a dedicated web interface, administrators are responsible for monitoring transactions, validating new auction entries, reviewing reported violations, and taking necessary actions such as account suspension or auction rejection, ensuring that the auction process remains secure, transparent, and aligned with established guidelines (Achieng, Ogundaini, & Mlitwa, 2024).

This architecture model provides an integrated, modular approach often implemented using microservices to support a reliable real-time online auction environment. Core functionalities such as authentication, auction management, bidding, payment processing, and administration are separated into independent modules, which improves scalability, maintainability, and performance under load (Sutjiadi et al., 2022). Security and fairness are enforced through encryption, bid validation, and secure transaction handling to prevent fraud and ensure data integrity.

Context Diagram

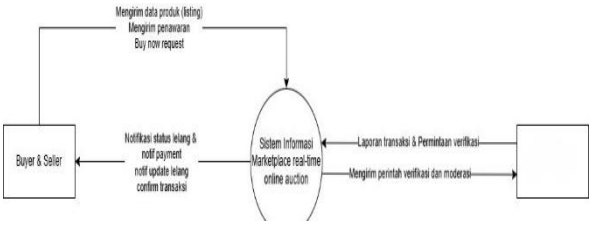

Figure 2. Context Diagram

This context diagram outlines the main interactions among buyers and sellers, the real-time online auction marketplace system, and the auction administrator. Buyers and sellers act as external entities that send product listing data, place bids, and submit buy-now requests to the system. In response, the system delivers auction status updates, payment notifications, bidding activity changes, and transaction confirmations back to the users.

On the other side, the auction administrator serves as the party responsible for verification and moderation. The admin receives transaction reports and verification requests from the system, and in turn issues approval commands or moderation actions according to established policies. This interaction ensures that the auction process remains secure, accurate, and properly monitored. The online auction marketplace system processes all inputs in an integrated manner, allowing real-time handling of product registration, bidding activities, and transaction completion.

This approach aligns with modern digital auction system architectures that emphasize synchronous interaction, transparency, and structured administrative oversight (Sutjiadi et al., 2022).

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Tiered Diagram

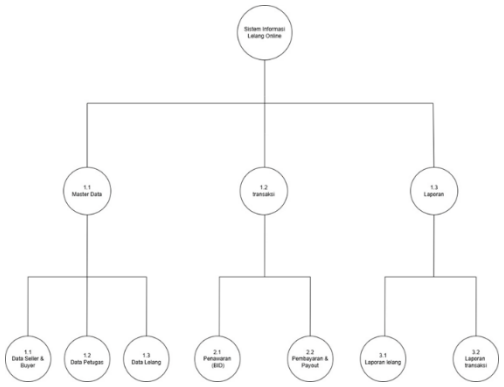

Figure 3. Tiered Diagram

This diagram outlines how the Online Auction Information System organizes its main functions into three core areas: master data, transactions, and reporting. The master data layer contains essential records such as seller and buyer information, staff data, and auction item details, all of which form the foundation of system operations. The transaction layer handles the real-time activities that occur during the auction process, including bid submissions and the flow of payments and payouts once a winner is confirmed. The reporting layer summarizes the outcomes of these activities, producing auction and transaction reports that help administrators monitor performance and maintain oversight. Altogether, the diagram illustrates a structured workflow that enables the system to operate efficiently, remain well-organized, and support a smooth auction process from start to finish**.**

Level 1 Data Flow Diagram (DFD) Process 1

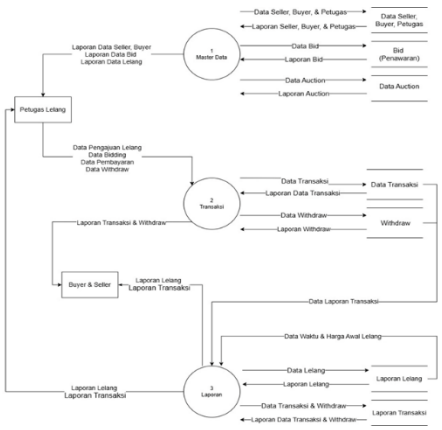

Figure 4. Level 1 Data Flow Diagram

The Level-1 Data Flow Diagram illustrates how the online auction system breaks down its core processes into three focused components: Master Data, Transactions, and Reports. The Master Data process manages fundamental information such as seller, buyer, officer, and auction item data, serving as the foundational source for other processes. The Transaction process handles dynamic auction activities, including auction submissions, bidding, payments, and withdrawal requests, producing transaction outputs needed by users and administrators. Meanwhile, the Report process compiles results from both master data and transactional activities to generate auction and transaction reports that support monitoring and decision-making. Together, these interconnected processes describe a structured data flow that ensures the system operates efficiently, maintains accurate information, and supports real-time auction activities in an organized manner, aligning with the principles of modern information system analysis (Sutjiadi et al., 2022).

Level 2 Data Flow Diagram (DFD) Process 2

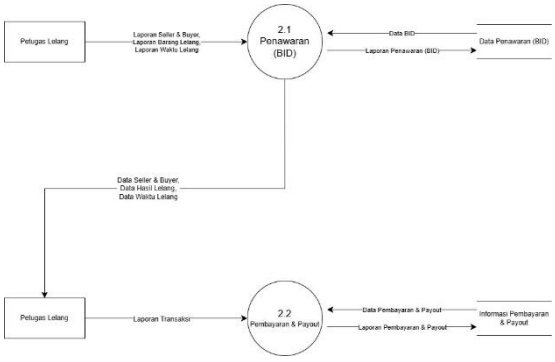

Figure 5. Data Flow Diagram Proccess 2

DAD Level 2 for Process 2 provides a more detailed view of two key stages in the online auction system, namely Bidding and Payment & Payout. In the bidding stage, the auction officer inputs essential information such as seller and buyer data, bid values, and auction timing, which the system processes into structured bid reports. The payment and payout stage then handles the financial flow after a winner is determined, including buyer payments and seller withdrawals, producing corresponding transaction and payout reports. These two subprocesses illustrate how the system captures, processes, and outputs data in a structured manner to support a transparent and reliable real-time auction workflow, consistent with modern digital auction system designs

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Level 2 Data Flow Diagram (DFD) Process 3

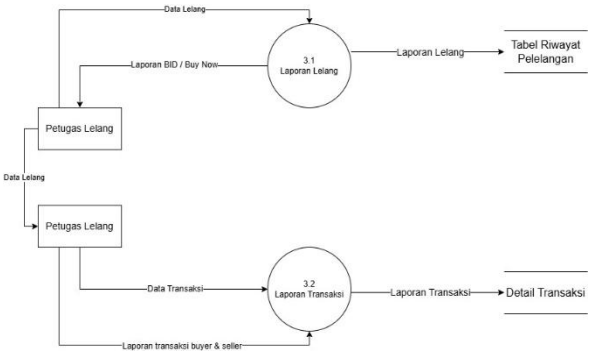

Figure 6. Level 2 Data Flow Diagram (DFD) Process 3

The process shown in DAD Level 2 Process 2 illustrates the data flow related to the Payment & Payout stage, which can be integrated with the explanation of DAD Level 2 Process 3. In an online auction system, once the auction is completed and the BID or Buy Now records are stored in the auction history table, the system proceeds to Process 2, where payment data from buyers and payout data for sellers are verified by the auction officer. This verification produces valid payment reports. The verified payment and payout information then flows into Process 3, where the officer further processes auction, buyer, and seller data to generate more detailed transaction reports. These reports are then stored as complete documentation covering the auction activity, payment processes, and overall transaction records.

BLACKBOX TESTING

Blackbox testing is a software testing method that focuses on the inputs given to the system and the resulting output, without looking at the internal structure or source code (Azis & Dwiputri, 2024). The tester only knows the functional specifications of the system, and checks whether the system meets those specifications

RESULTS AND DISCUSSION

Implementation Hypebid Marketplace Application

This section describes the implementation process of the HypeBid system that was designed in the previous stage. The implementation was carried out to ensure that all system components could operate according to the design and meet user requirements. At this stage, testing was conducted on each key feature, from the initial display of the application to the online auction transaction process (Table 1). This section also explains the use cases that illustrate the interactions between users and the system throughout the auction process (Table2).

The initial display interface design was created with user-centered design principles in mind, ensuring that visual elements such as colors, icons, and button layouts are designed to be easily understood by new users. This is important to provide an intuitive, simple, and efficient user experience.

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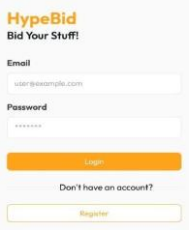
Table 1. Implementation Hypebid

Implementation	Description
 Initial Page	a. When users use the HypeBid application for the first time, they will be on the splash screen display and then enter the login and registration page. b. Users must log in or register first before they can conduct buying and selling activities.
 Register Menu	a. A register button for new users who do not yet have an account. b. On the registration page, users will fill in several fields such as name, email, mobile number, and password. Then press register and you will be immediately directed to the dashboard.

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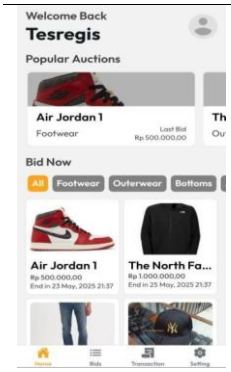
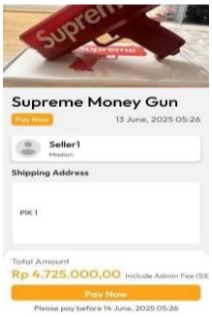
 Dashboard Page	1. This is the main page after users successfully log in to the application. 2. Displays popular auctions, i.e., auction products that are in high demand. 3. Provides a Bid Now feature, which displays products available for auction. 4. Products displayed in bids contain the following information • Item name • Current price or bid • Auction end date and time 5. Provides a Bottom Navigation Bar consisting of: • Home • Bids (user's active auction list) • Transactions (transaction history or status) • Settings (account and application settings)
 Order/Auction Information Page	Order/Auction Information Page This page contains information showing the details of products currently being auctioned in the application. 1. Product Information 2. Seller Information 3. Auction Schedule 4. Bid History or Latest Bids 5. Interactive User Features
	After the auction ends or the buyer clicks Buy Now, they will be directed to the transaction details page containing the shipping address, total order price, and payment button.

The black box testing method was chosen because it can assess the suitability of system functions to user needs without having to understand the code implementation within it (See table 2 result box testing). This approach focuses on the input and output generated by the system, so that it can identify whether the developed features are working according to specifications. In the context of the HypeBid application, testing is focused on validating key processes such as user authentication, auction data management, and real-time bidding mechanisms.

Table 2. Result black box testing

Customer Feature Testing			
Activity	Information	Expected result	Conclusion
Registration	Users fill out the registration form with valid data	Account successfully created and redirected to the dashboard	Valid
Login	Customer logs in using a registered account	Successfully enters the dashboard page	Valid
View Auction List	Buyer opens the main page and views the list of auction products	Auction products are displayed completely with starting price, time, etc.	Valid
Filter & Search Products	Buyer uses the search and auction category filter features	Displayed products match the keywords or applied filters	Valid
Bidding	Buyer enters a bid amount or uses auto-bid according	Bid amount is recorded and displayed in the bid history	Valid

	to bid increments		
Buy Now	Buyer clicks the "Buy Now" button	System redirects directly to the checkout page	Valid
Transaction Checkout	Buyer makes payment and selects shipping address	Transaction successful, receipt and payment status displayed	Valid
Transaction History	Buyer views auction and transaction history	History appears according to the user account	Valid
Logout	Buyer logs out from the system	System returns to the login page	Valid
Ticket Staff Feature Testing			
Activity	Information	Expected result	Conclusion
Staff Login	Staff logs into the system	Successfully enters the staff dashboard	Valid
Auction Product Verification	Staff verifies products submitted by sellers	Product receives "accepted" or "rejected" status	Valid
User Moderation	Staff bans or warns users who violate rules	User account is deactivated or banned	Valid
Monitor Transactions & Violations	Staff views transaction activities and customer reports	Data is displayed completely with status	Valid
Auction & Withdraw Reports	Staff views reports of auction results and fund withdrawals	Reports are displayed completely and accessible according to transaction data	Valid
Logout	Staff logs out of the system	System returns to the login page	Valid

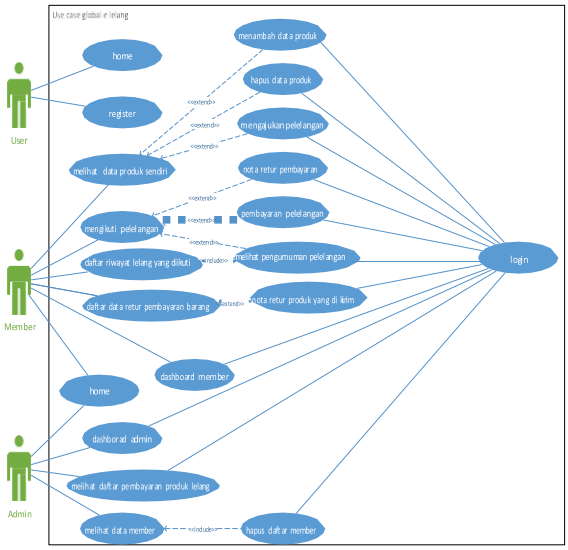
The implementation of the HypeBid system aims to create an efficient, transparent, and real-time online auction process. The implementation stage is carried out to ensure that all system components run according to design and meet user needs. The interface design was developed based on user-centered design principles so that new users can easily understand the navigation and main features (Paillin & Widiatmoko, 2021). On the initial screen, users are directed to the splash screen, login, and registration pages as a form of initial authentication, which is important in building digital trust (Joserando et al., 2025).

The main dashboard displays a list of popular auctions, the Bid Now feature, and real-time price updates. This is in line with the research by (Ragin-Skorecka & Hadaś, 2024), which states that a transparent and responsive online auction system increases user participation and market effectiveness. The auction process is carried out using a real-time bidding mechanism that ensures every bid is immediately recorded on the server, supporting the principles of transparency and time accuracy.

The black box testing method is used to assess the suitability of system functions to user requirements without looking at the code structure (Achieng et al., 2024; Deininger et al., 2022). Testing was carried out on two roles, namely customers and auction officers, covering the registration, bidding, transaction, and moderation processes. The results showed that all features functioned properly and produced the expected output. This success demonstrates that the implementation of data security, input validation, and automatic notifications has supported the reliability of the system as described by (Kumar & Raja Kumar, 2019) in a study on digital system integrity.

The use case diagram illustrates the interactions among the three main actors User, Staff, and Admin within the system. Users can perform activities such as logging in, registering, viewing and managing their own product data, and carrying out transactions such as viewing payment lists or monitoring incoming orders. Staff members act as operational managers who can verify payments, process orders, manage customers, and review and update product data submitted by users. Meanwhile, the Admin has the highest level of access, including managing the dashboard, verifying auction product payments, and managing or deleting member data.

All actors are connected through the login process as the main entry point to the system, ensuring that each role performs its functions according to the assigned authority within a structured and controlled working environment.



CONCLUSIONS AND SUGGESTIONS

Conclusion

Based on the research and development that has been carried out, it can be concluded that the HypeBid real-time online auction marketplace has successfully delivered a more practical, efficient, and modern approach to auction-based buying and selling. This system enables users to join auctions, manage their products, track bidding activity, and complete transactions entirely online without needing to be physically present. With features such as instant bid updates, organized product management, and digital transaction processing, the platform effectively supports users from account registration and item submission to bidding and payment confirmation in a structured and accessible workflow.

Moreover, the system provides significant benefits for sellers and administrators by improving operational efficiency. All data related to products, users, and transactions is recorded and handled through a centralized platform, which simplifies monitoring and management tasks. With its intuitive interface and essential features, HypeBid demonstrates its value as a reliable digital solution for improving the quality of auction services in today's digital environment.

Suggestion

Although the system functions well and meets its core objectives, there are several areas that could be refined in future development. Enhancing data security especially for user accounts, payment information, and live bidding activities should be a priority to ensure secure and trustworthy transactions. Expanding payment integration to include additional options such as e-wallets, QRIS, and virtual accounts would also offer greater convenience for users.

Introducing features like automated auction reminders, analytics for seller performance, and better interface responsiveness across various devices could further strengthen the user experience. Regular performance reviews, particularly focusing on system stability during high-volume real-time bidding, are also important to maintain consistent service quality and ensure the system remains dependable and easy to use.

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