

The Tender Auction System: Secure Transactions for Goods and Services

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Abstract

This study examines the development and implementation of a tender auction system designed to enhance the security, transparency, and efficiency of procurement processes. The shift from traditional paper-based tendering to electronic platforms has introduced both opportunities and challenges, particularly concerning transaction security. The research highlights the need for robust security measures to safeguard against fraud, data breaches, and other vulnerabilities that could compromise the integrity of the tendering process. Through a structured approach involving problem identification, literature review, system design, and rigorous testing, the study successfully develops a tender auction system that ensures secure transactions. The system's functionality, including user authentication, data management, and reporting, was validated through blackbox testing, confirming its reliability. The findings underscore the system's effectiveness in maintaining secure and transparent procurement processes, contributing to greater trust among stakeholders.

Keywords: Tender auction system, goods and services, procurement processes

Abstrak

Studi ini meneliti pengembangan dan implementasi sistem lelang tender yang dirancang untuk meningkatkan keamanan, transparansi, dan efisiensi proses pengadaan. Pergeseran dari tender berbasis kertas tradisional ke platform elektronik telah memperkenalkan peluang dan tantangan, khususnya yang berkaitan dengan keamanan transaksi. Penelitian ini menyoroti perlunya langkah-langkah keamanan yang kuat untuk melindungi dari penipuan, pelanggaran data, dan kerentanan lain yang dapat membahayakan integritas proses tender. Melalui pendekatan terstruktur yang melibatkan identifikasi masalah, tinjauan pustaka, desain sistem, dan pengujian yang ketat, studi ini berhasil mengembangkan sistem lelang tender yang memastikan transaksi aman. Fungsionalitas sistem, termasuk autentikasi pengguna, manajemen data, dan pelaporan, divalidasi melalui pengujian kotak hitam, yang mengonfirmasi keandalannya. Temuan tersebut menggarisbawahi efektivitas sistem dalam menjaga proses pengadaan yang aman dan transparan, yang berkontribusi pada kepercayaan yang lebih besar di antara para pemangku kepentingan.

Kata kunci: Tender auction system, goods and services, procurement processes

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1. INTRODUCTION

The tender auction system has become an essential mechanism in procurement processes for goods and services across various sectors [1]-[8]. It offers a structured and competitive environment where suppliers can win contracts, ensuring that organizations achieve the best possible value. However, the process is not just about cost efficiency but also fairness, transparency, and security [9]-[12]. As public and private

entities increasingly rely on these systems, ensuring secure transactions has become a critical priority. This study aims to explore the tender auction system, focusing on how secure transactions can be maintained, thereby fostering trust among all parties involved. In recent years, the evolution of digital platforms has transformed the way tender auctions are conducted. Traditional paper-based systems have given way to electronic tenders, which offer numerous advantages such as speed, accessibility, and reduced administrative burdens. However, this digital shift also introduces challenges, particularly in ensuring the security of transactions. This research will examine the current state of tender auction systems, highlighting the importance of implementing robust security measures to protect against fraud, data breaches, and other vulnerabilities that could undermine the integrity of the procurement process [13]-[15].

The literature on tender auction systems underscores the significant role these mechanisms play in public and private procurement. Early studies highlighted the economic efficiencies achieved through competitive tender processes. They argued that auctions, when properly managed, could lead to substantial cost savings and improved resource allocation. Subsequent research, such as the work by some researchers, expanded on this by examining the legal frameworks governing tender auctions, emphasizing the need for transparency and adherence to regulatory standards to prevent corruption and ensure fair competition. In parallel, the rise of electronic tendering has been a focus of much scholarly attention. Some research explored the benefits of e-tendering platforms, noting their potential to streamline procurement processes and increase accessibility for suppliers. However, these studies also highlighted security concerns, with risks such as unauthorized access, data manipulation, and cyber-attacks posing significant threats.

2. METHOD

The stages shown in [Figure 1](#) are required to build a tender auction system.

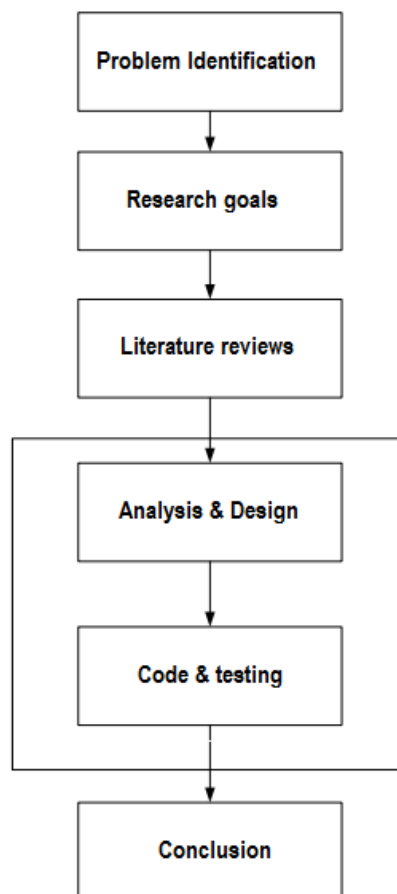


Figure 1 – The stages to built the system

1. **Problem Identification:** The first step is to identify the core problem that needs addressing. In the context of tender auctions, this might involve recognizing issues such as fraud, lack of transparency, or inefficiencies in current systems for securing transactions during the tender process. The goal

here is to clearly define what challenges or vulnerabilities exist within the current tender auction system.

2. **Research Goals:** Once the problem is identified, the next step is to set clear research goals. For this topic, the goals might include developing a more secure system for conducting tender auctions, ensuring that transactions are transparent and tamper-proof, and enhancing trust among participants. These goals will guide the direction of the research.
3. **Literature Review:** A thorough review of existing literature is essential to understand what has already been done in this area. You'll explore previous studies on tender auctions, secure transaction methods, and any relevant technologies such as blockchain or cryptographic techniques. This step helps in identifying gaps in the current knowledge and informing the design of your solution.
4. **Analysis-Design:** With a solid understanding of the problem and existing research, you can now move on to the analysis and design phase. This involves analyzing the requirements for a secure tender auction system and designing a solution that meets these needs. For example, you might design a system that uses encrypted communication and digital signatures to ensure secure and verifiable transactions.
5. **Code-Testing:** After designing the system, the next step is to implement it in code. This stage involves developing the software and then rigorously testing it to ensure it works as intended. Testing might include checking for security vulnerabilities, ensuring the system handles different types of auctions correctly, and verifying that transactions are recorded accurately and cannot be tampered with.
6. **Conclusion:** This stage involves summarizing the effectiveness of the new tender auction system, discussing its strengths and any areas for improvement, and suggesting possible directions for future research.

3. RESULTS AND DISCUSSION

Figure 2 shows the tender auction system interface. The system interface has several menus, such as a dashboard, offers, and reports. The dashboard menu has several tabs, such as procurement, offers, vendors, and managers. This interface also displays the auction chart for the procurement of goods and services.

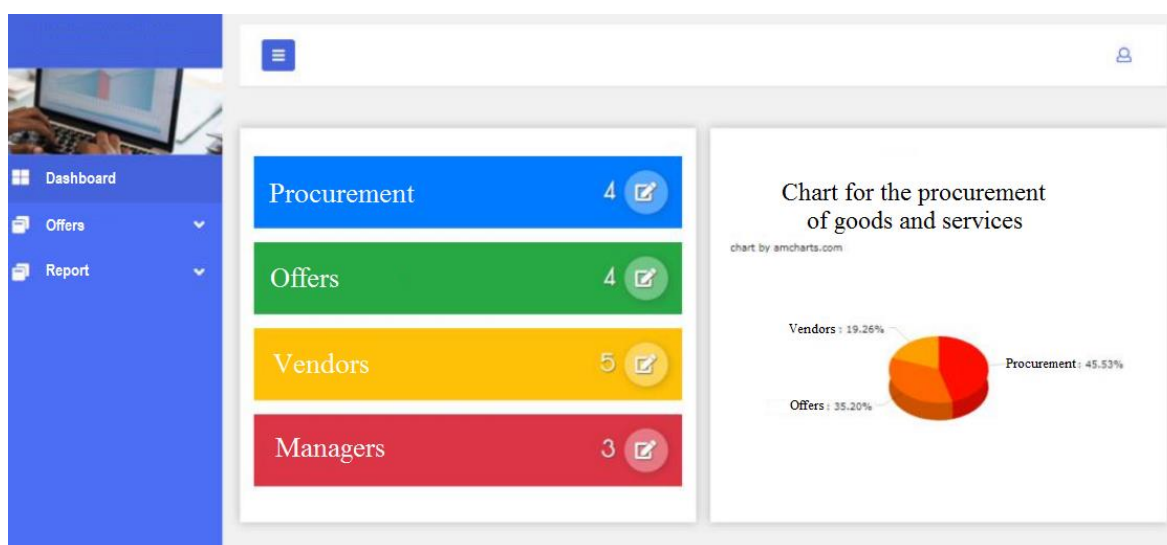


Figure 2 – The tender auction system interface

The next stage is blackbox testing. Blackbox testing is a software testing method where the tester evaluates the functionality of an application without peering into its internal code structure, implementation details, or internal paths. Blackbox testing involves actors who will use the system that has been built such as Manager, Purchasing staff, and Vendor. The results of blackbox testing are shown in Table 1. The tender auction system has undergone thorough testing to ensure its functionality, particularly in providing secure transactions for goods and services. In the initial stages, the system was tested for basic user interactions such as the login process and the display of the dashboard menu. When a user first runs the application, the system successfully displays a login screen where the user can enter their username and password. Upon successful login, the system then correctly navigates to a dashboard menu, tailored to the specific user's access rights. These tests confirmed that the system reliably handles user authentication and initial navigation, marking these scenarios as valid.

Table 1 - The results of blackbox testing

No	Models tested	Testing Scenario	Results	Valid/No Valid
1	Run the Login menu when the user first runs the system	When the user runs the application for the first time, a login will appear with username and password input and a Login button.	The system can display the login screen.	Valid
2	Displays the Dashboard menu when the user has logged in.	When the user successfully logs in, a dashboard menu will appear according to the authority of the logged-in user.	The system can display the Dashboard page.	Valid
3	Running the vendor data menu	When the user runs the vendor data menu.	The system has displayed vendor data.	Valid
4	Running the procurement master data menu.	When the user runs the procurement data menu.	The system can display procurement data.	Valid
5	Running the bidding master data menu.	When the user runs the bidding data menu.	The system can display bidding data.	Valid
6	Running the report menu.	When the user presses the report menu.	The system can display a report.	Valid

Further testing focused on the system's core functionalities related to tender management. The system was tested for its ability to display critical data menus, including vendor data, procurement master data, and bidding data. Each menu was successfully displayed when the corresponding action was performed by the user, confirming the system's capability to present essential information needed for secure and efficient tendering processes. Additionally, the system's reporting functionality was tested and found to be valid, as it correctly generated and displayed reports upon user request. These results demonstrate that the tender auction system is robust in handling key operations, ensuring that all necessary data is accessible and secure for users involved in the tendering process.

4. CONCLUSION

The tender auction system has proven to be an effective tool in modernizing procurement processes by ensuring secure, transparent, and efficient transactions. The system's ability to manage critical functions such as user authentication, data handling, and reporting has been validated through rigorous blackbox testing, confirming its reliability and robustness. The research highlights the importance of implementing strong security measures within digital tender systems to protect against potential vulnerabilities. As organizations continue to adopt electronic tendering platforms, this system serves as a critical framework for fostering trust among participants and maintaining the integrity of procurement activities. Future research should focus on further enhancing security features and exploring the integration of advanced technologies like blockchain to bolster the system's capabilities.

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