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RESEARCH ARTICLE

Evaluation and Design of a Tender Document Information System, Aceh Public Works Department

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Abstract
This study aims to evaluate and design an Auction Document Data Collection Information System at the Aceh Bina Marga Service. With the background of rapid development of information technology, there are still challenges in the effectiveness and efficiency of auction document data collection in the institution. The data collection method was carried out through field studies and literature studies. The results of the study indicate the need for the development of an effective and efficient information system to improve performance and competitiveness. The proposed system uses Visual Basic 6.0 as a development platform. This study is expected to contribute to improving auction document data management at the Aceh Bina Marga Service.

Keywords
Auction Documents, Information Systems, Effectiveness, Efficiency, Visual Basic 6.0, Aceh Highways Service.

1 | INTRODUCTION

Information technology has become an integral part of modern governance systems, transforming traditional administrative processes into more efficient digital workflows (Mukhsin, 2020). In the context of public infrastructure development, particularly within government agencies responsible for road construction and maintenance, the management of tender documentation represents a critical administrative function that directly impacts transparency, accountability, and operational efficiency. The Aceh Public Works Department (Dinas Bina Marga Aceh), as the government institution responsible for infrastructure development in Aceh Province, faces significant challenges in managing tender documentation efficiently in today's rapidly evolving technological landscape. Despite the widespread adoption of information technology across government sectors, many public institutions still rely on manual or semi-computerized processes for managing tender documents. According to Pattianakotta *et al*. (2015), government offices managing state assets and auction processes often struggle with document archiving systems that are not fully integrated, leading to inefficiencies in information retrieval and document management. This observation applies to the Aceh Public Works Department, where tender document management continues to be performed predominantly through manual processes supplemented by basic Microsoft Excel spreadsheets, without a comprehensive integrated information system.

The absence of a properly structured information system for tender document management creates several operational challenges. Document retrieval becomes time-consuming, human errors occur more frequently, and data analysis capabilities remain limited. These challenges ultimately undermine the department's ability to make timely decisions and maintain transparency in the tender process. As noted by Hutasuhut *et al*. (2021), web-based executive information systems for auction processes can significantly improve management efficiency and decision-making capabilities in government institutions. Their study on the implementation of such systems at PT. Pelindo I demonstrated tangible improvements in auction management through the adoption of the ICONIX Process methodology. The digitalization of auction and tender processes has proven beneficial across various sectors. Gabels *et al*. (2016) documented the successful implementation of a web-based fish auction information system in Situbondo, East Java, which streamlined operations and improved market transparency. Similarly, Amalia *et al*. (2020) described the development of a centralized fish auction management information system in Batang Regency that enhanced administrative efficiency and market coordination. These examples illustrate how sector-specific information systems can address unique operational requirements while delivering broader benefits in terms of transparency and efficiency.

In the context of tender evaluation and winner selection, Nugraha *et al*. (2012) demonstrated the effectiveness of decision support systems using the Simple Additive Weighting (SAW) method for asset procurement evaluation. Their research highlighted how structured information systems can support complex decision-making processes in procurement activities, ensuring more objective and transparent outcomes. This approach is particularly relevant to the Aceh Public Works Department, where tender document management directly influences procurement decisions and project implementation.

The development of an effective tender document information system requires careful consideration of both technological capabilities and user requirements. Mukhsin (2020) emphasized that information and communication technology plays a crucial role in village information systems, enabling better publication of information in the globalization era. This principle extends to government departments like the Aceh Public Works Department, where effective information dissemination is essential for maintaining transparency in public procurement processes. The current tender document management practices at the Aceh Public Works Department reveal several limitations that impact operational efficiency. Staff members spend considerable time searching for specific documents, data consolidation for reporting purposes is labor-intensive, and the risk of data loss or corruption remains significant due to inadequate backup systems. Furthermore, the limited analytical capabilities of the current system hinder management's ability to identify patterns, track performance metrics, and make data-driven decisions regarding tender processes. To address these challenges, this research aims to evaluate the existing tender document management practices at the Aceh Public Works Department and design an improved information system using Visual Basic 6.0 as the development platform. The proposed system will incorporate features for efficient document registration, storage, retrieval, and reporting, with particular attention to user interface design and system security. By implementing a structured database using Microsoft Access, the system will enable better data organization and facilitate more sophisticated analytical capabilities.

The significance of this research extends beyond the immediate operational improvements at the Aceh Public Works Department. As noted by Pattianakotta *et al*. (2015), effective document management systems in government offices contribute to better public service delivery and institutional accountability. Similarly, Hutasuhut *et al*. (2021) highlighted how web-based executive information systems for auctions can enhance transparency and efficiency in government operations. By developing a tailored information system for tender document management, this research contributes to the broader goal of improving governance practices through technology adoption. This research

addresses a critical gap in the operational capabilities of the Aceh Public Works Department by evaluating current tender document management practices and designing an improved information system. Drawing on insights from successful implementations in related contexts (Gabels *et al*., 2016; Amalia *et al*., 2020; Nugraha *et al*., 2012), the research aims to deliver a practical solution that enhances efficiency, transparency, and decision-making capabilities in tender management. The findings and system design will provide valuable insights for other government departments facing similar challenges in document management and public procurement processes.

2 | BACKGROUND THEORY

2.1 Information Systems and Data Management in Organizations

Information systems play a crucial role in modern organizational management, particularly in streamlining operational processes and enhancing decision-making capabilities. According to Nugraha (2013), an effective information system design requires careful consideration of both technical requirements and organizational needs. In his study on asset management information systems for higher education institutions, Nugraha emphasized the importance of implementing analytical methods such as Simple Additive Weighting (SAW) to support complex decision-making processes. This approach enables organizations to evaluate multiple criteria systematically when making asset-related decisions, which can be adapted to various contexts including tender document management. The fundamental components of an effective information system include data management, user interface design, and reporting capabilities. Khalis and Prabowo (2018) demonstrated the practical application of these principles in their development of an inventory and transaction information system for PT. Daya Kobelco CMI SAMPIT. Their implementation using Java NetBeans and MySQL highlighted the importance of selecting appropriate development tools based on organizational requirements and technical constraints. The desktop-based approach they adopted provided robust functionality while addressing the specific needs of inventory management, showcasing how tailored solutions can significantly improve operational efficiency.

2.2 E-Procurement and Tender Management Systems

The evolution of procurement processes from manual to electronic systems represents a significant advancement in public and private sector management. Anugrah (2013) conducted a comprehensive analysis and design of an auction information system for goods/services procurement at the Regional Secretariat Office of Central Bangka Regency. His research highlighted the transformative potential of structured information systems in enhancing transparency and efficiency in government procurement processes. The systematic approach to system analysis and design outlined in his study provides valuable insights for developing similar systems in other government contexts. Building on this foundation, Brianu (2018) explored the implementation of an e-procurement system using the FAST (Framework for the Application of Systems Thinking) model at PT. Pelabuhan Indonesia II (Persero) Pangkalpinang Branch. The FAST methodology emphasizes iterative development and stakeholder involvement, ensuring that the resulting system aligns closely with organizational requirements. Brianu's research demonstrated how structured methodologies can guide the development of complex procurement systems, addressing both technical and organizational considerations throughout the development lifecycle.

2.3 Project Management Information Systems

Project management represents another domain where information systems can deliver significant benefits. Robbani *et al*. (2020) designed and developed a web-based project information system that facilitated better coordination and monitoring of project activities. Their implementation highlighted the advantages of web-based architectures in providing accessibility across different locations and devices, a consideration particularly relevant for government agencies with distributed operations. The system components they developed, including project registration, progress tracking, and reporting modules, offer valuable reference points for designing tender document management systems. Complementing this perspective, Anisah and Kuswaya (2017) analyzed and designed an information system for processing expenditure data, material usage, and debt management in project implementation at PT Banamba Putratama. Their research emphasized the importance of integrating financial and operational data within a unified system, enabling more comprehensive analysis and decision-making. The data flow diagrams and entity-relationship models they developed illustrate effective approaches to modeling complex business processes and data relationships in project-related information systems.

2.4 Tender and Project Documentation Systems

Focusing specifically on tender documentation, Ningsih (2014) conducted an analysis and design of a project tender information system for CV. Sinar Mentari Sungailiat Bangka. Her research highlighted the unique requirements of tender management, including document tracking, evaluation criteria management, and decision recording. The

system design approach outlined in her study demonstrates how tender-specific processes can be effectively modeled and implemented within an information system framework, providing valuable guidance for similar implementations in government contexts.

2.5 Data Collection and Inventory Management Systems

Effective data collection represents a foundational aspect of any information system. Supriati and Sari (2019) developed an application for consumable goods data collection to improve stock quality management at PT. Angkasa Pura II Tangerang. Their implementation demonstrated how structured data collection processes can enhance inventory visibility and management decision-making. The system architecture and data models they developed offer practical insights for designing document management systems that require similar tracking and reporting capabilities. Similarly, Norhan and Kustandi (2019) developed a web-based information system for Indonesian migrant worker data collection at PT. Laatansa Lintas Internasional. Their research highlighted the advantages of web-based architectures in facilitating data collection across distributed locations, as well as the importance of designing user-friendly interfaces for data entry personnel. The database design and system architecture they implemented demonstrate effective approaches to managing large volumes of personal and administrative data, which can be adapted to tender document management contexts.

2.6 Integration of Theoretical Perspectives

The integration of these theoretical perspectives provides a comprehensive foundation for developing an effective tender document management system for the Aceh Public Works Department. Drawing from Nugraha's (2013) emphasis on analytical methods, Khalis and Prabowo's (2018) focus on appropriate technology selection, and the various approaches to system analysis and design outlined by Anugrah (2013), Brianu (2018), and others, a holistic approach to system development can be formulated. This integrated approach should address the specific requirements of tender document management, including document registration, storage, retrieval, and reporting, while incorporating best practices from related domains such as e-procurement, project management, and inventory control. By leveraging the insights from these diverse but complementary theoretical perspectives, the development of a tender document information system can be guided by established principles and methodologies, increasing the likelihood of successful implementation and adoption.

3 | METHOD

This research employs a Research and Development (R&D) approach focusing on the development of a tender document management information system for the Aceh Public Works Department. This approach was selected for its ability to produce specific products and test their effectiveness in real-world contexts. The research was conducted over a 6-month period, from January to June 2022, with the primary location being the Aceh Public Works Department office in Banda Aceh. Data sources in this research consist of both primary and secondary data. Primary data was collected through interviews with 5 key informants comprising the Department Head, Head of Procurement, Tender Administration Staff, IT Staff, and Archive Staff. Direct observation of the tender document management process was also conducted to understand workflows and operational constraints. Meanwhile, secondary data was gathered from relevant documents such as SOPs for tender document management, procurement reports, and existing system documentation. In addition to interviews and observations, questionnaires were distributed to 20 staff members involved in tender document management to identify user requirements and measure satisfaction levels with the current system.

The development of the tender document information system utilized the System Development Life Cycle (SDLC) methodology with a modified Waterfall model. This model was chosen based on the project's characteristics, which included clearly defined requirements and well-defined scope. The system development stages encompassed requirements analysis, system design, development, testing, and implementation. During the requirements analysis phase, Business Process Model and Notation (BPMN) was used to model existing and proposed business processes, while the design phase employed Unified Modeling Language (UML) including Use Case Diagrams, Activity Diagrams, Sequence Diagrams, and Class Diagrams. The system was developed using Visual Basic 6.0 as the programming language and Microsoft Access as the database management system, considering resource availability and compatibility with the existing infrastructure at the Aceh Public Works Department. Testing was conducted in several stages, including unit testing, integration testing, system testing, and user acceptance testing to ensure the system functioned according to requirements and was free from errors.

Data analysis in this research used both qualitative and quantitative approaches. Qualitative data from interviews and observations was analyzed descriptively to identify patterns, themes, and insights relevant to

system development. Quantitative data from questionnaires was analyzed using descriptive statistics to measure user satisfaction with both the existing and new systems. Comparative analysis was also conducted to compare the efficiency and effectiveness of tender document management processes before and after system implementation. System evaluation was performed using the Technology Acceptance Model (TAM) framework to measure user acceptance of the new system. The evaluation aspects included perceived usefulness, perceived ease of use, attitude toward using, behavioral intention to use, and actual system use. Evaluation data was collected through questionnaires distributed to users one month after implementation, with the results used for further system improvement and development. To ensure research validity and reliability, several strategies were implemented, including data triangulation, expert validation, instrument reliability testing, and member checking.

4 | RESULT

System development is an important step in developing or improving a system to improve organizational performance and efficiency. In the context of the Aceh Highways Agency, system development is carried out to overcome several problems faced, such as the length of the report preparation process and the need for improved information technology to support management decision making. The system development stage includes a feasibility study, preliminary plan, system analysis, system planning, and system implementation. A feasibility study is conducted to assess whether system development is feasible, while the preliminary plan aims to understand user needs and determine the scope of the system to be developed. System analysis involves collecting needs from various system elements, both users and the software and hardware needed. The system planning stage includes creating a general structure of the system to be built, such as a login chart, main menu, master menu, search menu, report menu, and exit menu. Furthermore, the system implementation stage involves program coding, program testing, program installation, and user training. The design of the information system at the Aceh Highways Agency includes creating folders, projects, and databases. Folders are created to store system development projects, while projects are created using Microsoft Visual Basic 6.0 for application development. The database was created using Microsoft Access 2010 with a suitable table structure to store user data and auction data. Each table in the database has a relationship that allows users to access and manipulate data more efficiently. The application form design includes a login form, main menu form, auction data input form, user data input form, auction data search form, auction data report form, and auction data recap report form. Each form is designed by considering user needs and using the right symbols in the flow chart to facilitate understanding. The results of the auction document data collection information system design at the Aceh Bina Marga Service include a system flow chart, application form design, and auction data report. The system flow chart provides a visual depiction of the system's work process, while the application form design displays the interface that will be used by users to access and manage data. The auction data report presents relevant information about the auction documents that have been input into the system.

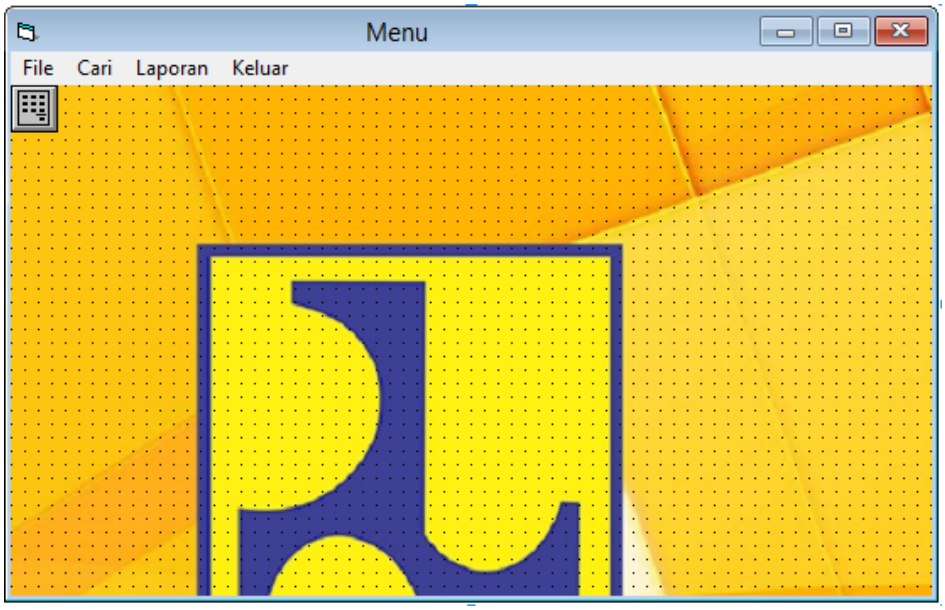

Figure 1. Main Menu Form Design

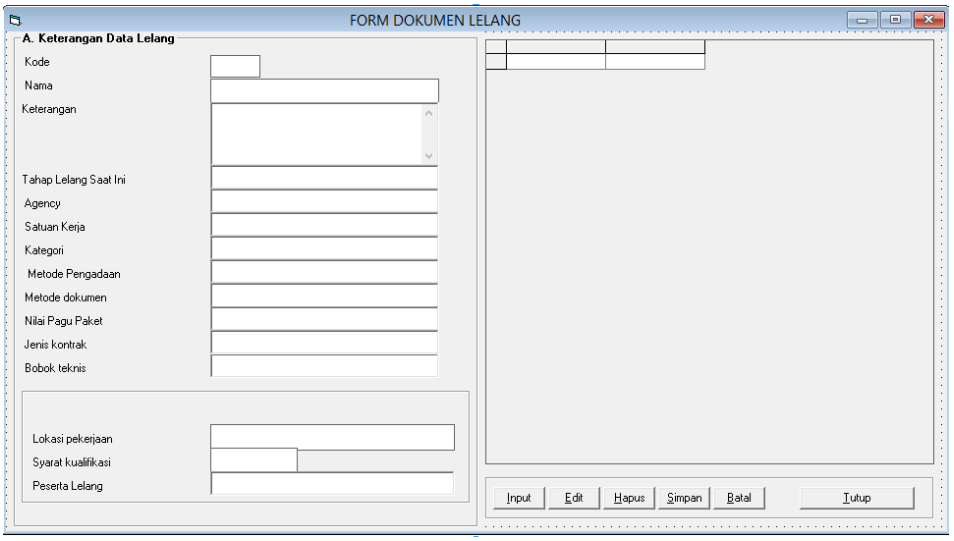

Figure 2. Design of Auction Data Input Form

Each element in the system design has been carefully considered to ensure integration and sustainability in application development. Users are given access to input data, search data, and create reports according to their needs. In addition, the system design also pays attention to data security aspects by providing a login form to access the system. The discussion of the results of the system design shows that the auction document data information system at the Aceh Bina Marga Service has been well designed and meets the needs of the organization. Effective system implementation is expected to increase efficiency and effectiveness in managing auction documents and support infrastructure development in Aceh better.

5 | CONCLUSIONS AND FUTURE WORK

Based on the research and analysis that has been done, it can be concluded that the implementation of the Auction Document Data Information System at the Aceh Bina Marga Service has a significant impact on the preparation of more accurate and efficient rice allocation reports. This system provides convenience for the Service in the flow of information, reduces the risk of errors, and increases the effectiveness of data management. By using Microsoft Visual BASIC 6.0 and Microsoft Office Access as a database, the design of this system has proven to be reliable and effective in improving organizational performance. However, to further optimize the use of computers, the Aceh Bina Marga Service is advised not to only rely on Microsoft Office software, but also to utilize all available software. In addition, it is necessary to pay attention to the addition of human resources who have the skills and knowledge to interact with computers. By implementing these suggestions, it is hoped that the Aceh Bina Marga Service can continue to improve its performance and services in managing rice allocation information more efficiently and effectively.

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