

SURAT TUGAS
0481/B.01/LPPM-UBSI/III/2026

Tentang

PENELITIAN YANG DIPUBLIKASIKAN DALAM JURNAL ILMIAH
Periode Maret - Agustus 2025

Menulis Pada Journal of Management and Informatics (JMI)
Volume 5 No. 1 April 2026 e-ISSN : 2961-7731 | p-ISSN : 2961-7472)

Judul :

The Application of AJAX Technology in Web-Based Information Systems to Accelerate Decision Making (Case Study: :CV. Suka Mandi)

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2. 200609880 Indra Riyana Rahadjeng
3. 202009160 Syabrinildi
4. 201104434 R. Jatinurcahyo
5. 201108556 Fazhar Sumantri
6. 202109221 Didin Solehudin

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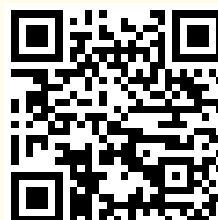
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The Application of AJAX Technology in Web-Based Information Systems to Accelerate Decision Making (Case Study: CV. Suka Mandi)

Melyani^{*1}, Syabrinildi², Indra Riyana Rahadjeng³, R. Jatinurcahyo⁴, Fazhar Sumantri⁵, Didin Solehudin⁶
Email: melyani.myn@bsi.ac.id, syabrinildi.syb@bsi.ac.id, riyana.irr@bsi.ac.id, r.jno@bsi.ac.id,
fazhar.fzs@bsi.ac.id, didin.dol@bsi.ac.id

^{1,2,3,4,5,6}Economy and Business Faculty, Bina Sarana Informatika University, Jakarta, Indonesia, 10450

^{*}Corresponding Author

Abstract

This study evaluates the impact of AJAX technology on managerial decision-making performance in a web-based information system at CV. Suka Mandi. Unlike prior studies that focus primarily on system development, this research incorporates an empirical evaluation using a before-and-after comparison approach. The system was developed using the Waterfall model and integrated with AJAX technology to enhance responsiveness and usability. Data were collected through task completion time measurements, the System Usability Scale (SUS), and user performance evaluations. The results show a significant improvement in operational efficiency. The average task completion time decreased from 15.2 minutes to 8.1 minutes (a 46.7% improvement). The task success rate increased from 68% to 92%, while the error rate decreased from 22% to 8%. The usability evaluation produced a SUS score of 82.5, indicating excellent usability. A paired sample t-test confirmed that the improvements are statistically significant ($p < 0.05$). These findings demonstrate that AJAX technology not only enhances system interactivity but also significantly improves decision-making speed and accuracy. This study contributes by providing empirical evidence that links asynchronous web technology to improvements in managerial performance.

Keywords: *AJAX, Prototype, Script.aculo.us, Web-Based Information System, Decision Making, User Testing.*

Received on February 2026; Revised on March 2026; Accepted on April 2026; Published on April 2026.

I. INTRODUCTION

The rapid advancement of digital technologies has significantly transformed organizational information systems, particularly in supporting managerial decision making (Álvarez & Hassan, 2025; Amen & Ranam, 2025; Dewi et al., 2026). Modern organizations require systems that provide real-time, accurate, and accessible information. However, many small and medium enterprises still rely on manual or semi-digital processes, leading to inefficiencies and delayed decision-making. Previous studies on AJAX-based systems have primarily focused on technical implementation rather than evaluating their impact on decision-making performance. This creates a research gap in understanding how asynchronous web technologies contribute to measurable managerial outcomes. This study addresses this gap by not only developing an AJAX-based web information system but also empirically evaluating its impact on (1) Information processing speed, (2) System usability, and (3) Decision-making performance.

Based on observations of the existing system, several problems were identified. The company did not have a structured database for managing purchase orders; invoice preparation was still

performed manually using spreadsheet applications; and financial reporting required searching transaction documents one by one in hard copy. These limitations resulted in inefficiencies, delayed information retrieval, and slower managerial decision-making. Conventional web development using HTML and PHP alone is often insufficient to create highly interactive and responsive applications similar to desktop-based systems. One of the main challenges in web development is implementing dynamic visual effects, interactive components, and asynchronous data processing while maintaining cross-browser compatibility.

To overcome these limitations, AJAX (Asynchronous JavaScript and XML) technology can be applied. AJAX enables asynchronous communication between client and server, allowing data to be processed and displayed without reloading the entire webpage, thereby improving system responsiveness and user experience. In this study, AJAX technology is implemented using the Prototype and Script.aculo.us JavaScript libraries. Prototype simplifies JavaScript development and AJAX requests, while Script.aculo.us provides high-level features such as drag-and-drop, visual effects (Effect.Appear and Effect.Highlight), and in-place editing (inPlaceEditor). These features enable the development of a more dynamic and interactive web-based information system that resembles desktop applications with minimal coding complexity.

The system development process follows the waterfall methodology, including requirements analysis; system design using Data Flow Diagrams (DFD) and Entity-Relationship Diagrams (ERD); implementation using PHP and MySQL database integration; and system testing through alpha and beta user testing. The developed system includes modules for purchase order management, inventory control, sales processing, operational cost recording, user management, and financial reporting. The objective of this research is to analyze how AJAX can accelerate information processing and enable faster response times in a web-based information system. By integrating interactive web technologies, the system is expected to improve operational efficiency, reduce manual processing errors, and provide timely information for managerial evaluation and strategic planning.

II. LITERATURE REVIEW

A. Web-Based Information Systems and Decision Support Systems

Web-based information systems have become a fundamental component in modern organizational environments, particularly in supporting decision-making processes. These systems are typically developed using web technologies such as HTML, PHP, and JavaScript, along with relational databases like MySQL, enabling centralized data management and broad accessibility via standard web browsers (Rainer & Cegielski, 2021; Stair & Reynolds, 2020). Compared to conventional desktop-based systems, web-based systems offer greater flexibility,

scalability, and ease of access, which are essential for organizations that require real-time operational data.

In the context of decision support systems (DSS), the availability of accurate, timely, and integrated information is a critical factor influencing managerial effectiveness. Strategic information systems have been shown to provide competitive advantages by enabling decision-makers to access up-to-date operational data and perform evaluations more quickly (Pearlson & Saunders, 2020). However, traditional web-based systems often face limitations in terms of responsiveness, as they rely on synchronous communication models that require full page reloads for every user interaction. This limitation reduces system efficiency and negatively affects user experience, particularly in environments that demand rapid information processing (Roberts & Zhang, 2024). Therefore, enhancing the interactivity and responsiveness of web-based systems is essential to improve their effectiveness as decision support tools.

B. AJAX Technology and System Performance

To overcome the limitations of conventional web applications, asynchronous web technologies such as AJAX (Asynchronous JavaScript and XML) have been widely adopted. AJAX enables communication between the client and the server without requiring a full page reload, allowing partial updates to web content and significantly improving system responsiveness (Crane & Pascarello, 2016; Darie et al., 2016). This approach reduces latency, optimizes bandwidth usage, and creates a more dynamic and interactive user experience.

In high-demand information environments, system responsiveness plays a crucial role in user productivity and operational efficiency. Studies have shown that asynchronous frameworks can enhance real-time data visualization and accelerate information processing in decision support systems (Chen & Wang, 2023). Additionally, performance optimization techniques in AJAX-based applications have proven effective in handling large-scale data processing, making them suitable for enterprise-level systems (Kumar & Gupta, 2023). By enabling background data retrieval and dynamic interface updates, AJAX allows users to interact with the system more efficiently, reducing delays in accessing critical information.

C. Usability and Decision-Making Performance

System usability is a key determinant of how effectively information systems support decision-making processes. High usability reduces cognitive load, improves task completion speed, and minimizes user errors, thereby enhancing overall system performance (Roberts & Zhang, 2024). In decision-making contexts, the speed and accuracy of information delivery directly influence the quality of managerial decisions. Systems that provide intuitive interfaces and real-time

feedback enable users to process information more efficiently and respond more quickly to operational changes.

The integration of AJAX technology into web-based information systems significantly improves usability by enabling smoother interactions and reducing wait times. Dynamic user interface components, such as real-time updates, in-place editing, and interactive visual feedback, have been shown to improve user experience and decision speed (Lee & Tan, 2024). As a result, managers can access critical data, such as sales performance, inventory levels, and financial reports, without interruption, enabling faster, more informed decision-making. This suggests that the effectiveness of decision support systems is not only determined by data availability but also by the responsiveness and usability of the system interface.

III. RESEARCH METHOD

This study employs a quantitative case study approach with a before–after comparison design to evaluate the impact of AJAX technology on a web-based information system in supporting managerial decision-making. The research was conducted at CV. Suka Mandi, a supplier company responsible for managing purchase orders, inventory, sales transactions, and financial reporting. The system development and evaluation were carried out over three months, from June to August 2023. The study involved 20 users, including administrative staff, warehouse personnel, and managers, who actively interacted with the system.

Data collection was conducted using multiple techniques to ensure comprehensive analysis. Direct observation was performed to examine existing business processes, including purchase order handling, inventory management, invoice preparation, and financial reporting workflows. In addition, interviews were conducted with key users to identify system requirements and operational challenges. A literature review was also conducted to support system design and development by reviewing relevant theories on information systems, AJAX technology, and system development methodologies. System testing was implemented to evaluate performance and usability after development.

The system was developed using the Waterfall model, which consists of sequential stages including requirements analysis, system design, implementation, and testing. During the requirements analysis phase, several limitations of the existing system were identified, including the absence of structured purchase order documentation, manual invoice preparation in spreadsheets, difficulties generating financial reports, and slow information retrieval. These findings were used to define system requirements for three main user roles: administrative staff, warehouse staff, and managers. The system design phase used modeling tools such as Context Diagrams, Data Flow Diagrams (DFDs), and Entity-Relationship Diagrams (ERDs) to structure

system processes and database architecture. The database was designed to manage key entities, including user data, purchase orders, inventory, sales transactions, and operational costs.

System implementation was carried out using PHP for server-side programming, JavaScript for client-side interaction, and MySQL as the database management system. AJAX technology was integrated using Prototype and Script.aculo.us libraries to enable asynchronous communication and enhance system interactivity. This implementation allows partial page updates without full reloads, thereby improving responsiveness. Interactive features such as drag-and-drop, in-place editing, and visual feedback were incorporated to simplify user interaction and reduce processing time.

System evaluation was conducted through both technical and user-based testing. Developers conducted alpha testing to ensure that all system functions worked correctly, including authentication, data processing, and report generation. Beta testing was conducted with end users using a structured Likert-scale questionnaire to assess usability aspects such as ease of use, system usefulness, information accuracy, and processing speed. In addition, system performance was measured using several evaluation metrics, including task completion time, task success rate, error rate, and System Usability Scale (SUS).

Data analysis was conducted using both descriptive and quantitative approaches. Descriptive analysis was used to evaluate system functionality and user interaction, while quantitative analysis was applied to measure system performance improvements before and after implementation. A paired sample t-test was used to determine whether the observed differences in performance metrics were statistically significant. The independent variable in this study is the application of AJAX technology, while the dependent variables include information processing speed, ease of access to reports, user satisfaction, and operational efficiency.

The system is considered successful if it meets several criteria, including functional reliability, ease of use, information accuracy, faster processing time than the previous manual system, and the ability to effectively support managerial decision-making. These evaluation criteria ensure that the developed system is not only technically sound but also provides practical value for organizational operations.

IV. RESULT

The results in Table 1 show a significant improvement in system performance following the implementation of AJAX technology. The average task completion time decreased by 46.7%, indicating a substantial increase in information processing efficiency. At the same time, the task success rate improved from 68% to 92%, while the error rate was reduced from 22% to 8%. These

results demonstrate that the system not only accelerates operational processes but also enhances the accuracy and reliability of task execution.

Table 1. System Performance Comparison

Indicator	Before System	After System	Improvement
Processing Time	15.2 min	8.1 min	↓ 46.7%
Task Success Rate	68%	92%	↑ 24%
Error Rate	22%	8%	↓ 14%

To further validate these findings, a paired sample t-test was conducted. The statistical results show a t-value of 4.87 and a p-value of 0.001 ($p < 0.05$), indicating that the difference between the manual and AJAX-based systems is statistically significant. This confirms that the observed improvements are directly attributable to the implementation of asynchronous processing, rather than to random variation.

From a usability perspective, the system achieved an average System Usability Scale (SUS) score of 82.5, which is categorized as “excellent.” This indicates that users perceive the system as easy to use, efficient, and supportive of their operational tasks. High usability indicates that the system effectively reduces cognitive load, enabling users to complete tasks more quickly and accurately.

In terms of operational efficiency, the system's implementation significantly improves workflow performance. Previously, processes such as purchase order management, invoice preparation, and financial reporting were handled manually, resulting in delays and increased risk of errors. After implementation, these processes are automated and integrated within a centralized database, allowing faster data retrieval and real-time updates. This reduces administrative workload and improves data consistency across the system.

The application of AJAX technology plays a key role in enabling these improvements. By eliminating the need for full-page reloads, the system enables continuous interaction between users and the application. Data input, editing, and retrieval processes become more efficient, resulting in faster information availability. This improvement in responsiveness directly supports managerial activities that require timely and accurate data.

As a result, decision-making processes are significantly enhanced. Managers can promptly access critical operational information, including sales data, inventory levels, outstanding payments, and financial reports. The availability of up-to-date, reliable information enables quicker, more informed decisions, particularly in areas such as procurement, pricing, and financial planning.

User acceptance results further support these findings. Most users reported positive responses regarding system usefulness and effectiveness in supporting their tasks. Although a small proportion of users expressed neutral perceptions regarding processing speed, the majority confirmed that the system performs better than the previous manual approach. This indicates that

the system not only improves technical performance but also delivers practical benefits in real operational environments.

V. DISCUSSION

The findings of this study demonstrate that implementing AJAX technology significantly improves the performance of web-based information systems, particularly in processing speed, task success rate, and error reduction. The substantial decrease in task completion time indicates that asynchronous processing effectively reduces system latency and enhances operational efficiency. This result is consistent with the fundamental concept of AJAX, which enables partial page updates without requiring full reloads, thereby improving responsiveness and user interaction (Crane & Pascarello, 2016; Darie et al., 2016). In this study, the improved responsiveness is not only a technical enhancement but also a functional improvement that directly supports faster access to information required for managerial activities.

The improvement in task success rate and the reduction in error rate further suggest that system interactivity plays a critical role in enhancing user performance. Unlike conventional web systems that rely on static interactions, the AJAX-based system provides dynamic feedback and real-time updates, thereby reducing user errors and streamlining task execution. This finding aligns with previous research indicating that interactive user interfaces can improve efficiency and reduce cognitive load in web-based enterprise systems (Lee & Tan, 2024). Similarly, Roberts and Zhang (2024) emphasize that increased system interactivity enhances managerial efficiency, particularly in small and medium-sized enterprises where rapid and accurate data processing is essential.

From a usability perspective, the high System Usability Scale (SUS) score indicates that the system is well accepted by users and effectively supports their operational tasks. This finding reinforces the argument that system usability is a key factor in determining the success of information systems. According to Pearlson and Saunders (2020), information systems provide strategic value by enabling users to access relevant information efficiently and without unnecessary complexity. In line with this, Rainer and Cegielski (2021) and Stair and Reynolds (2020) highlight that accessibility, ease of use, and responsiveness are critical components of effective information systems. Therefore, the high usability score observed in this study confirms that the system successfully translates technical improvements into practical user benefits.

The results also indicate that implementing AJAX improves decision-making performance. By providing real-time access to operational data, the system allows managers to monitor key indicators such as sales performance, inventory levels, and financial status more efficiently. This supports faster, more informed decision-making, particularly in operational and tactical contexts. The findings are consistent with Chen and Wang (2023), who report that asynchronous

frameworks enhance real-time data availability and improve decision support capabilities. Furthermore, Álvarez and Hassan (2025) suggest that digital technologies can improve the quality of managerial decision-making when information is delivered in a timely and accessible manner. In this study, improved system responsiveness directly strengthens the information flow required for effective decision-making.

Another important contribution of this study is its empirical validation of AJAX technology in an organizational context. While many previous studies focus primarily on system design and technical implementation, this research provides quantitative evidence demonstrating the impact of asynchronous web technology on both system performance and managerial outcomes. The use of before–after comparison and statistical testing strengthens the validity of the findings and highlights the practical relevance of the proposed system. However, the results should be interpreted with caution, as the evaluation was conducted in a single organizational setting with a limited number of users. Future research could extend this work by applying the model in larger organizations, integrating advanced analytical features, or exploring the long-term impact of system adoption on organizational performance.

VI. CONCLUSION AND RECOMMENDATION

This study demonstrates that implementing AJAX in a web-based information system significantly improves system performance and supports managerial decision-making. The results show substantial improvements in processing time, task success rate, and error reduction, indicating that asynchronous data processing enhances both efficiency and accuracy. In addition, the high usability score confirms that the system is well accepted by users and effectively supports their operational tasks.

The findings highlight that system responsiveness and real-time data availability play a crucial role in improving decision-making performance. By enabling faster access to accurate and up-to-date information, the system allows managers to make more timely and informed decisions. This suggests that the integration of AJAX technology is not only a technical enhancement but also a practical solution for improving organizational performance, particularly in small and medium-sized enterprises.

Despite these positive results, this study is limited to a single case study with a relatively small number of users. Future research is recommended to evaluate the system across broader organizational contexts, integrate advanced analytical features, such as decision-support dashboards, and explore long-term impacts on managerial effectiveness. Such developments would further strengthen the role of web-based systems in supporting data-driven decision making.

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The Application of AJAX Technology in Web-Based Information Systems to Accelerate Decision Making (Case Study: CV. Suka Mandi)

Publication Link JMI for ID paper 334

Link Publication:

<https://jmi.stekom.ac.id/index.php/jmi/article/view/334>

Link PDF: <https://jmi.stekom.ac.id/index.php/jmi/article/view/334/160>

ISSUE Link: <https://jmi.stekom.ac.id/index.php/jmi/issue/view/13>

DOI: <https://doi.org/10.51903/jmi.v5i1.334>



Kementerian Pendidikan Tinggi,
Sains, dan Teknologi

SERTIFIKAT Akreditasi Jurnal



No. SK : 355/DST/D.D1/HM.01.01/2026

Tanggal : 24 Juli 2026

Direktur Penelitian, dan Pengabdian kepada Masyarakat
dengan ini memberikan kepada

Journal of Management and Informatics

EISSN : 29617472

Publisher : Universitas Sains Dan Teknologi Komputer

Peringkat Akreditasi Jurnal Ilmiah Periode II 2025

Akreditasi Ulang di Peringkat 3 mulai
Volume 3 Nomor 1 Tahun 2024 Sampai Volume 7 Nomor 2 Tahun 2028



I Ketut Adnyana
NIP 196805151994031004