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# Development of a Web-Based Printing Service Application Using the Waterfall Model

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**ABSTRACT**
The rapid growth of the creative industry has increased the demand for printing services that are fast, accurate, and consistent in quality. However, many printing businesses still rely on manual operational processes, including order recording, design verification, cost estimation, and production monitoring. These limitations often result in delays, miscommunication with customers, and difficulties in tracking incoming orders. This study focuses on the development of a web-based information system designed to automate the ordering process and enhance communication between customers and printing service providers. The system was developed using the Waterfall model, which consists of requirement analysis, system design, implementation, testing, and maintenance. Data were collected through field observations and interviews with the owner of a local printing business. The results indicate that the developed system provides online ordering features, design file uploads, automatic cost estimation, job status tracking, and real-time process update notifications. The implementation of this system not only improves production efficiency but also reduces recording errors and enhances customer satisfaction. This web-based solution is expected to support the digital transformation of printing service businesses in the modern industrial era.



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## INTRODUCTION

The development of information technology encourages various business sectors to digitize their services in order to adapt to increasingly dynamic market demands. The printing service industry, as part of the creative sector, is required to provide fast, accurate, and easily accessible services for customers. However, in practice, many printing businesses still carry out ordering processes manually, such as recording in notebooks, communicating through private messages, and reviewing designs without a centralized documentation system. These conditions lead to several issues, including the risk of order misrecording, delays in production processes, unmanaged job queues, and limited transparency of information received by customers. Digitization through the use of web-based information systems becomes a strategic solution for improving service effectiveness, enabling customers to place orders

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online, upload design files, obtain automatic cost estimates, and monitor job status in real-time (Stair & Reynolds, 2021).

In response to these problems, this study aims to address the need for a system capable of simplifying and automating workflow processes within printing service businesses. The problem formulation in this context includes how to design a web-based information system that facilitates more structured ordering processes, how such a system can reduce the risks of misrecording and production delays, and what features customers require to obtain more transparent and efficient services. Moreover, this study also examines how the chosen development method can produce a reliable system that aligns with user requirements.

Based on these research questions, the objective of this study is to design and implement a web-based printing service information system that can optimally support ordering and production processes. The system is expected to improve operational efficiency through more accurate data recording, more structured workflows, and enhanced process tracking capabilities. For customers, the system is intended to provide convenience in placing orders, obtaining cost estimates, and monitoring progress transparently. Methodologically, this study applies the Waterfall model, which is considered suitable for systems with specific and well-documented requirements (Sommerville, 2016).

The benefits of this study include both theoretical and practical contributions. Theoretically, this study can serve as a reference for information system development in micro, small, and medium enterprises, particularly within the context of business process digitalization. Practically, the research findings provide a solution for printing businesses in enhancing service effectiveness, reducing recording errors, and improving the quality of customer relationships by offering responsive digital service features. For customers, the system delivers faster, clearer, and more accessible service experiences. As the scope of the study, system development focuses on core features such as ordering, design uploading, cost estimation, job status tracking, and transaction history storage. Online payment processes and integration with other systems are not included in the scope of the research and are recommended for future development. Additionally, system testing is carried out using the Blackbox Testing approach to ensure the conformity of system functions with user needs without examining the internal code structure (O'Brien & Marakas, 2020).

## METHODS

The present study adopts a descriptive and developmental research design to construct a web-based information system tailored to the operational needs of printing service businesses. This design was selected because it aligns with the objective of producing a functional digital solution while simultaneously documenting the processes involved in its creation. The methodological orientation emphasizes clarity, traceability, and systematic development to ensure that the resulting application reflects both technical feasibility and user expectations.

The Waterfall model was chosen as the primary development framework, as it provides a structured sequence of stages that support comprehensive documentation and controlled progression. Each phase must be completed before moving to the next, allowing researchers

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to maintain methodological rigor. This model is especially suitable for projects in which system requirements are identifiable from the outset and are unlikely to undergo major changes during development.

The first phase involved a detailed needs analysis to capture the workflow of conventional printing services. Data were gathered through observations, informal interviews, and reviews of existing manual documentation. This step enabled the research team to identify operational bottlenecks, user pain points, and essential features required in a digital environment. The resulting requirement specification served as the foundation for all subsequent design decisions.

The second phase consisted of system design, during which the architectural structure, interface layout, and data flow were formulated. Unified Modeling Language diagrams were used to visualize system interactions, user roles, and backend processes. The design phase also included the development of wireframes to illustrate how users would navigate the application. The emphasis at this stage was on creating an intuitive, aesthetically consistent, and accessible interface for a diverse range of users.

Following the completion of the design, the implementation phase translated all conceptual artifacts into functioning components. The system was developed using standard web technologies suitable for lightweight business applications. The coding process adhered to documented specifications to minimize inconsistencies and ensure the system's alignment with its intended purpose. Throughout implementation, maintainability and scalability were considered in anticipation of potential future enhancements.

The testing phase focused on validating system behavior using the Blackbox Testing approach. Rather than examining internal code structures, this method evaluates whether functions operate according to user expectations and predefined requirements. Each feature, such as order submission, design uploading, cost estimation, and status tracking, was subjected to scenario-based testing to ensure reliability, usability, and responsiveness. Any issues identified were resolved before deployment.

The deployment phase involved hosting the system on a web server and conducting limited user trials within a small printing business setting. Feedback was collected from both customers and staff to evaluate practicality and ease of use. These insights were essential for refining system features, correcting minor usability concerns, and ensuring that the application performs effectively under real operating conditions.

## RESULTS AND DISCUSSION

The results of this study show the successful development of a web-based printing service information system designed to facilitate ordering, design uploading, and production status tracking more efficiently. The system features a simple and responsive interface accessible to both customers and administrators. Its main components include a Home page that presents an overview of services, a Services menu displaying various printing products along with design upload options, and a Gallery showcasing completed work as a visual portfolio. Additional sections include an About page describing the business profile, a Testimonials page containing customer reviews, and a Contact menu that provides communication

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channels through address information, phone numbers, social media links, and a message form. Overall, the integrated menu structure enhances order accuracy, improves workflow efficiency, and increases transparency and accessibility for users.

The discussion presents an overview of the research process, starting from system design based on the needs analysis to the final stage of system testing. It describes how user requirements were identified, translated into system features, implemented through structured development steps, and evaluated to ensure that all functions operated correctly and met user expectations.

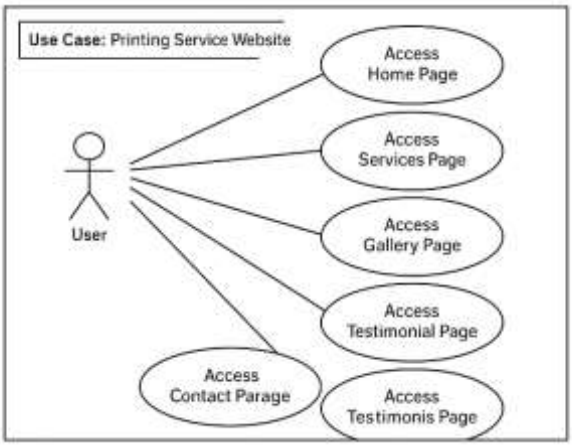


**Figure 1.** Use Case Diagram of the Printing Service Website

This use case diagram illustrates the interactions between a user and the web-based printing service application. The user can access all main pages of the system, including the home page, services menu, gallery, about section, testimonials, and contact information. The diagram highlights the basic navigation functions that support user engagement with the website.

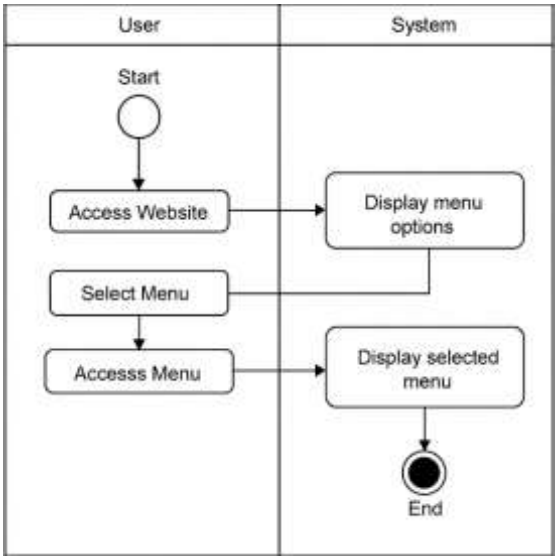


**Figure 2.** Activity Diagram of the Study

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The implementation stage utilizes a framework to simplify code management and enhance security. It also includes the design of a user-friendly interface that aligns with user needs.

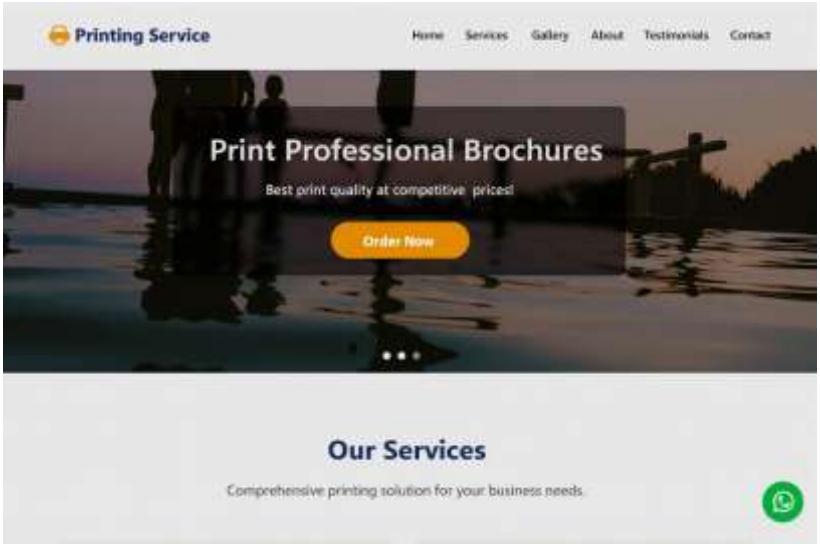


**Figure 3.** Printing Service Homepage

The homepage displays a clean and modern layout featuring a full-width banner image with a dark overlay. At the center, a bold headline promotes professional brochure printing, accompanied by a subheading highlighting high-quality and competitive pricing. A prominent "Order Now" button is positioned below the text. The navigation menu at the top provides access to the Home, Services, Gallery, About, Testimonials, and Contact pages. Further down, the "Our Services" section begins, introducing the various printing solutions offered.

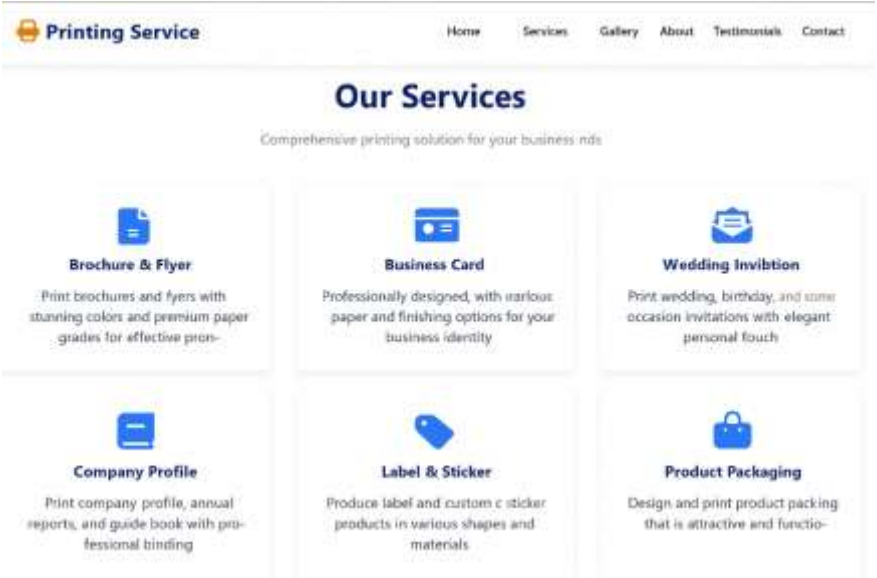


**Figure 4.** Our Services Page

The image shows the "Our Services" page of a printing service website, presented in a clean and modern grid layout. At the top, the page title and a short subtitle introduce the available printing solutions. Below, six service cards are displayed, each featuring an icon, a

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service title, and a brief description. The services include brochures and flyers, business cards, wedding invitations, company profiles, labels and stickers, and product packaging. The overall design is minimal, organized, and easy for users to navigate.

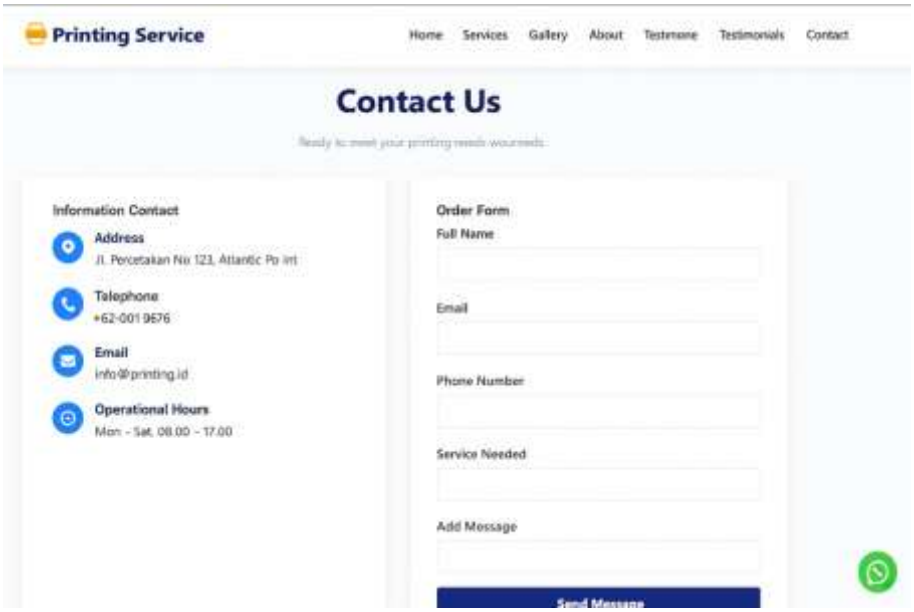


**Figure 5.** Contact Us Page & Social Media

The image shows the "Contact Us" page of a printing service website. On the left side, contact details such as address, telephone number, email, and operational hours are displayed. On the right side, there is an order form where users can enter their name, email, phone number, required service, and additional messages. The layout is clean and easy to navigate.

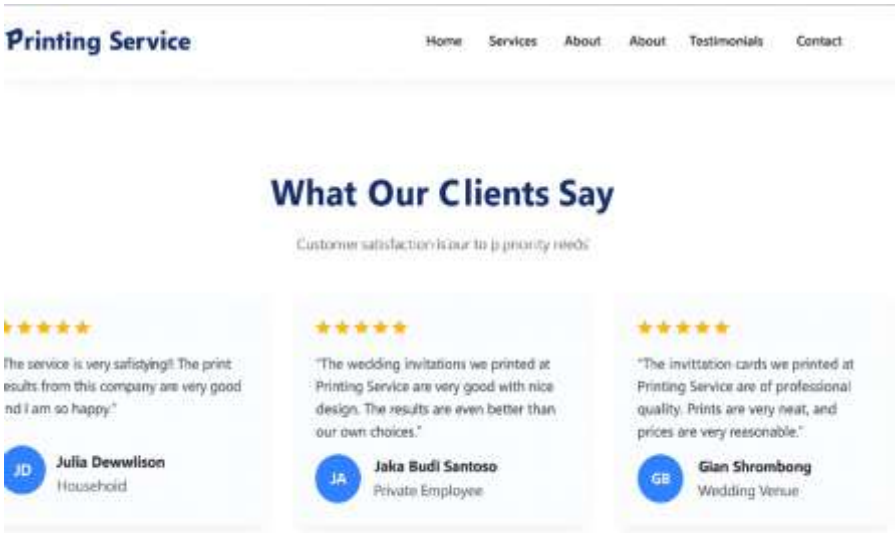


**Figure 6.** Testimonial Page

The testing was carried out using Blackbox Testing, which showed that all features functioned according to the specifications. For example, users were able to access specific

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features on the website successfully, the information system operated without errors, and all content could be accessed without interruptions.

**Table 1.** Company Profile Website Testing

| Test Scenario | Expected Result | Actual Result | Conclusion |
|---|---|---|---|
| Accessing the Home Page | Main page appears with slider and brief information | Home page displays completely | Valid |
| Opening the "Our Services" menu | Displays a list of printing service types | System displays all services according to the data | Valid |
| Accessing the Gallery menu | Displays the printing portfolio | All portfolio photos appear correctly | Valid |
| Accessing the About menu | Displays business profile, vision, and general information | Information appears completely as provided | Valid |
| Opening the Testimonial page | Displays customer reviews | Testimonials appear correctly | Valid |
| Sending a message via Contact menu | Submission notification appears & data is sent | Contact page displays correctly | Valid |

The development of this web-based printing service information system has successfully provided a digital solution capable of addressing various issues that previously occurred in the manual ordering process. The resulting system offers easy access, a more structured ordering flow, and centrally stored documentation, thereby improving work efficiency and service quality for customers. With features such as online ordering, design uploading, portfolio galleries, testimonials, and a contact page, the website functions not only as an informational medium but also as a modern and professional interaction platform between customers and the printing service provider. These results demonstrate that the use of information technology can positively impact service quality, competitiveness, and the overall image of printing businesses in the digital era.

## CONCLUSION

This study concludes that the development of a web-based printing service information system has successfully addressed the limitations commonly found in traditional manual ordering processes. By integrating digital features that support online ordering, design submission, portfolio display, customer testimonials, and direct communication channels, the system enhances both operational efficiency and user experience. The structured workflow offered by the platform simplifies interactions between customers and service providers, reduces the likelihood of administrative errors, and ensures that essential information is stored and retrieved more effectively. The findings also demonstrate that a well-designed interface and transparent navigation contribute significantly to customer satisfaction, enabling users to access services quickly and confidently. From a business perspective, the system provides a competitive advantage by projecting a more professional and modern

brand image. It also supports better decision-making through organized data management and clearer documentation of service requests. Overall, the implementation of this system highlights the important role of information technology in strengthening service quality in the printing industry. The digital transformation achieved through this platform shows strong potential for continued enhancement as customer needs evolve. Future developments may further expand the system's capabilities, contributing to sustainable growth and long-term service improvement.

## REFERENCE

Afifi, M. Z. (2022). Perancangan Layanan Print Online Berbasis Website. *JATISI*, *9*(1), 520-532.

Ardian, A. S. (2021). Rancang Bangun Aplikasi Percetakan Tiga Bersaudara Berbasis Web dengan Metode Waterfall. *Jurnal Informatika Teknologi dan Sains (Jinteks)*, *3*(2), 354-361.

Booch, G., Rumbaugh, J., & Jacobson, I. (2017). *The unified modeling language user guide*. Addison-Wesley.

Destiarini, D. (2024). Sistem Informasi Percetakan Mandiri Creative Berbasis Website Dengan Menggunakan Codeigniter. *Intech*, *5*(1), 28-34.

Fiqryansyah, M. R., & Hermawan, I. (2020). Rancang Bangun Aplikasi Website Percetakan Printop Pada Modul Costumer Dan Editor Dengan Metode Pengembangan Waterfall. *Jurnal Teknologi Terpadu*, *6*(2), 72-78.

Kurniawati, D. (2021). Digitalisasi layanan percetakan untuk meningkatkan efisiensi operasional. *Jurnal Teknologi Informasi, 12*(2), 55–63.

Lubis, W., & Harahap, M. K. (2020). Perancangan Aplikasi Pemesanan Jasa Percetakan Berbasis Web Menggunakan Metode Waterfall. *Jurnal Minfo Polgan*, *9*(1), 1-8.

Myers, G., Sandler, C., & Badgett, T. (2012). *The art of software testing* (3rd ed.). Wiley.

O'Brien, J. A., & Marakas, G. M. (2020). *Management information systems*. McGraw-Hill.

Prasetyo, B. (2020). Perancangan sistem informasi UMKM menggunakan UML. *Jurnal Rekayasa Sistem, 6*(1), 22–30.

Rahmawati, F., & Lestari, M. (2022). Implementasi sistem pemesanan berbasis web pada UMKM percetakan. *Jurnal Teknologi & Sistem Informasi, 8*(3), 145–153.

Saputra, A., Safitri, C. F. I., Fitriyani, Y. G., & Desyani, T. (2021). Pengembangan Aplikasi Kasir Menggunakan Model Waterfall. *Jurnal Teknologi Sistem Informasi dan Aplikasi ISSN*, *2654*, 3788.

Sharma, P., & Gupta, V. (2019). The role of web applications in modern business processes. *International Journal of Web Engineering, 4*(1), 13–22.

Sommerville, I. (2016). *Software engineering* (10th ed.). Pearson.

Stair, R., & Reynolds, G. (2021). *Principles of information systems*. Cengage Learning.

Whitten, J., & Bentley, L. (2020). *Systems analysis and design methods*. McGraw-Hill.