
Optimizing Food Business Operations Through Web-Based Systems: The Case of Bakso Bytes

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Abstract

The food and beverage industry faces numerous operational challenges that require innovative solutions to ensure sustainability and growth in an increasingly competitive environment. In this context, web-based systems have emerged as a technological solution with the potential to optimize operations, improve customer satisfaction, and expand market reach. This study aims to develop a web-based system, Bakso Bytes, specifically designed to assist food businesses in managing order operations and enhancing user experience through efficient and innovative order processing. The research employs a system development approach, focusing on the phases of planning, design, development, testing, and feedback, guided by the Agile methodology. The study integrates user needs analysis, intuitive user interface (UI/UX) design, and order processing technologies to develop a system that meets the operational requirements of food and beverage businesses. The findings indicate that Bakso Bytes not only accelerates the order processing workflow but also provides customers with the convenience of making quick and efficient reservations. Furthermore, the research highlights that web-based systems like Bakso Bytes can minimize delays in order processing and help business owners manage inventory and customer feedback more effectively. However, challenges such as data security risks and the ability to accommodate increasing user demand were identified as critical aspects requiring attention in this solution. Overall, this study demonstrates the immense potential of web based systems in enhancing operational scalability and efficiency within the food and beverage industry. Through this research, Bakso Bytes is expected to serve as a model for other businesses in embracing digital transformation to ensure sustainability and competitiveness in a rapidly evolving market.

Keywords : *Web based system; Ordering system; inventory*

I. INTRODUCTION

The rapid advancement of technology has transformed the food and beverage industry, fostering the emergence of digital solutions to enhance operational efficiency and customer satisfaction. Bakso Bytes is a web based system designed to streamline the ordering process for bakso, a popular Indonesian meatball dish, while providing a seamless experience for both customers and vendors. This system aims to address common challenges in the traditional food ordering process, such as long waiting times, manual errors in order management, and limited accessibility to menus.

The Bakso Bytes web based system integrates core functionalities such as online ordering, real-time menu updates, and order tracking. Customers can place their orders remotely,

customize their preferences, and track the preparation process, all through an intuitive user interface. For vendors, the system offers tools to

manage orders efficiently, monitor inventory, and generate sales reports. By leveraging web based technology, Bakso Bytes promotes operational convenience, enhances customer engagement, and reduces the reliance on manual processes.

This paper explores the development of Bakso Bytes, focusing on its design, implementation, and testing phases. The discussion also highlights the methodologies employed, challenges encountered, and the potential impact of this system on the food industry. By providing a case study of Bakso Bytes, this research contributes to the growing body of knowledge on web-based systems tailored for food service businesses.

II. LITERATURE REVIEW

This literature review examines recent advancements in web based systems development, particularly within the food and beverage industry, emphasizing their effectiveness in enhancing operational efficiency and customer satisfaction.

Web based systems have gained significant attention over the past few years due to their ability to streamline operations and improve service delivery. According to [1], online food ordering systems have positively impacted small and medium enterprises (SMEs), particularly by expanding market reach and simplifying order management. Similarly, [2] highlighted the effectiveness of real-time order processing systems in addressing common challenges in traditional food businesses, such as manual errors and delivery delays, resulting in faster service and higher customer satisfaction. Web-based systems also modernize food businesses by providing centralized platforms to manage orders, inventory, and customer feedback, as observed by [3]. These systems reduce dependency on manual operations, ensuring faster response times and consistent service, especially during peak hours.

[4] emphasized the importance of web-based systems in improving customer relationship management, as these platforms utilize data analytics to understand purchasing patterns and preferences, enabling businesses to deliver personalized experiences and foster customer loyalty. Moreover, [5] demonstrated that web-based systems support scalability, allowing businesses to handle growing customer demands without incurring significant operational costs. Automation provided by these systems reduces overhead expenses, making them cost-effective for small-scale enterprises. Additionally, [6] pointed out that web-based platforms enhance visibility, especially in competitive markets, through integration with social media and search engine optimization (SEO) strategies, enabling businesses to reach broader audiences. The flexibility of web-based systems has also proven essential in dynamic market environments. For instance, [7] noted that during the COVID-19 pandemic, businesses using web-based systems could quickly transition to delivery and takeout models, ensuring continuity despite dine-in restrictions.

The effectiveness of web-based systems is further supported by advancements in user interface (UI/UX) design, which significantly influence customer experiences. [8] emphasized that intuitive and user-friendly designs enhance technology adoption and foster trust among users, [9] highlighted that responsive interfaces improve task efficiency and accommodate customers with varying levels of digital literacy. However, the

implementation of web-based systems is not without challenges. [10] noted the increasing prevalence of cyber threats, including hacking and data breaches, in applications that manage sensitive user

information. To address these risks, they recommended multi-layer authentication and data encryption. [11] added that regular security testing and real-time monitoring are essential for safeguarding systems from potential cyberattacks.

The digitalization of the food industry has accelerated significantly since 2020, driven by changing consumer behavior and the global COVID-19 pandemic. [12] observed a rapid increase in the adoption of digital platforms among small food businesses, particularly in Indonesia, as a response to growing demand for online ordering. These systems simplify operations while enabling vendors to adapt to evolving customer expectations. Similarly, [13] emphasized that web technologies provide valuable opportunities for food businesses to maintain competitiveness and expand market reach in the digital age. Overall, web-based systems are proving indispensable in transforming food businesses, offering cost-effective, scalable, and customer-focused solutions that address the needs of both vendors and consumers. The development of platforms like Bakso Bytes is therefore crucial to supporting businesses in navigating the increasingly competitive and technology-driven food industry.

III. RESEARCH METHODOLOGY

The development of Bakso Bytes will occur in multiple phases, utilizing the Agile methodology. This approach promotes continuous delivery and progress, offering flexibility and iterative improvements. The project will proceed through the following phases:

Figure 1 Agile Methodology

The development process will begin with stakeholder meetings, where discussions with the café staff and manager will be held to gather specific requirements and gain a clear understanding of their business needs. Following this, user stories will be created to represent the desired functionalities and features that stakeholders want included in the system. Finally, the items in the backlog will be prioritized based on their business value and



feasibility, ensuring that the most critical features are addressed first.

During the design phase, our team will start by creating wireframes and user interface mockups, with a strong emphasis on user experience and ease of navigation. The goal is to ensure the interface is intuitive and user-friendly. Following this, we will define the system architecture, specifying how the front-end, back-end, and database components interact. This will include outlining the data flow and interactions within the prototype design.

In the development and coding phase, we will begin by building the front-end interface using HTML and CSS, ensuring it is responsive and easy to use. PHP will be utilized for back-end development, focusing on data processing and applying business logic. The database will be set up and developed using Apache to ensure data integrity and efficient query handling. Throughout this process, we will take an iterative approach, making continuous modifications based on feedback to ensure the system meets all the requirements we have gathered.

The deployment phase will involve careful planning, including user training, data migration, and server configuration. Once these steps are completed, the system will be deployed in a production environment to ensure that it does not cause any significant disruptions to current operations. The system's stability and performance will be closely monitored, and any issues that arise will be addressed promptly to ensure a smooth user experience.

In the review phase, user feedback will be collected to assess the functionality and performance of the system. This feedback will be used to make continuous improvements by adding suggestions and areas for enhancement to the product backlog for future sprints. Bakso Bytes will undergo ongoing refinement to ensure it aligns with the changing needs of the stakeholders at Gerai Ina Bakso Singkawang.

A. FUNCTIONAL REQUIREMENT

The functional requirements for the system encompass several key areas to ensure efficient and user-friendly management. Figure 2, show a Use Case Diagram of Bakso Bytes. User Management is a foundational feature, enabling users to create accounts and log in, with role-based access controls

distinguishing functionalities for customers, staff, and admins. Menu Management allows customers to view available menu items with details such as

names and prices, while admins and staff can add, edit, and remove items. Additionally, the system supports the creation and display of promotional offers alongside regular menu items for customers.

The Ordering System provides customers with the ability to place orders by selecting menu items, specifying quantities, and reviewing or modifying orders before final submission. On the other hand, Order Management ensures that staff can manage incoming orders and update their statuses, as well as track table availability in real-time.

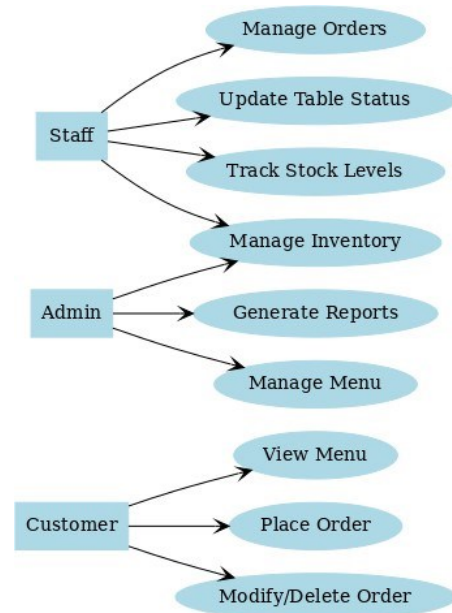
The system also incorporates Inventory Management, where staff and admins can maintain inventory by adding, updating, or deleting items and tracking ingredient quantities. Ingredient stock levels automatically update based on menu orders, ensuring real-time inventory accuracy.

Finally, Reporting and Analytics are available to admins, offering insights into sales performance, order volumes, and revenue statistics. Together, these features create a robust, integrated system designed to enhance operational efficiency and customer satisfaction.

Figure 2 Use Case diagram

B. SYSTEM ARCHITECTURE

The system architecture for Bakso Bytes adopts a multi-tier structure, which includes the Client Layer, Web Server, Application Layer, and Database Layer. This architecture is designed to ensure flexibility, performance, and scalability,



particularly for small-scale food businesses that require efficient yet affordable digital solutions.

The Client Layer serves as the main access point for users including customers, staff, and administrators. These users interact with the system through standard web browsers on desktop computers or mobile devices. The system's responsive web interface ensures seamless usability across various screen sizes, enabling users to place orders, update inventory, and view reports with ease.

The Web Server Layer acts as a communication bridge between the client and the backend application. It processes HTTP requests, maintains session control, and forwards valid inputs to the application logic. Apache is utilized as the web server due to its high compatibility with PHP and MySQL, ensuring smooth integration across system layers.

The Application Layer contains the core business logic of the system, developed using PHP. It handles all critical processes such as order validation, inventory deduction, report generation, and user authentication. This layer also supports role-based access control, enabling different user

experiences depending on the user's responsibilities. Its modular design allows future upgrades like payment gateway integration or delivery tracking to be implemented efficiently.

The Database Layer is powered by MySQL and stores all structured data, including customer profiles, menu details, ingredient stocks, and transaction history. The database schema is normalized to reduce redundancy and ensure data consistency. Foreign key constraints are applied to maintain referential integrity across multiple tables, and indexing is used to optimize query performance during high-traffic operations.

The system is deployed on a cloud-compatible server, enabling centralized access, remote management, and potential scalability as the user base expands. Figure 3 illustrates the flow of interaction and data exchange between each architectural layer. This architecture is strategically designed to align with the operational needs of traditional food vendors while enabling them to transition smoothly into digital management systems.

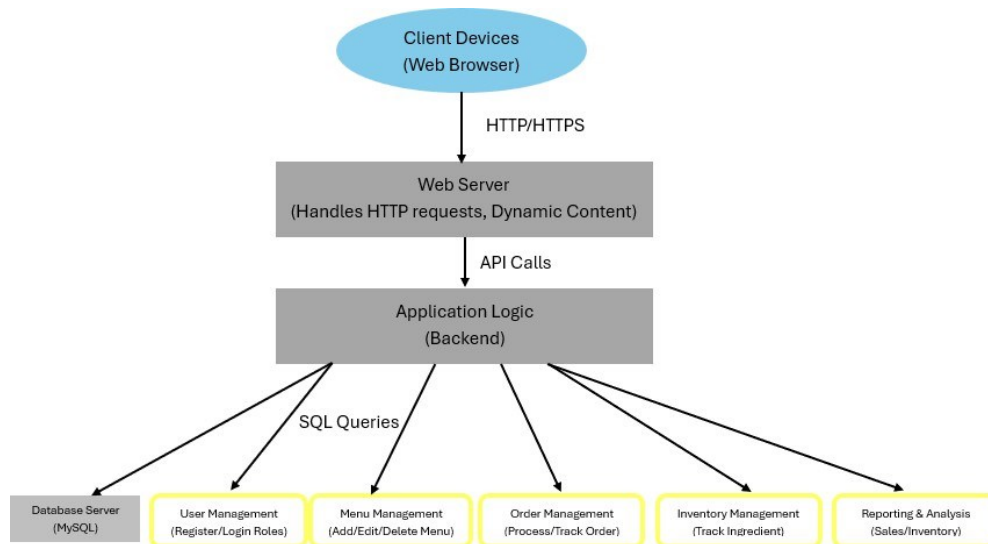


Figure 3 System Architectural Diagram

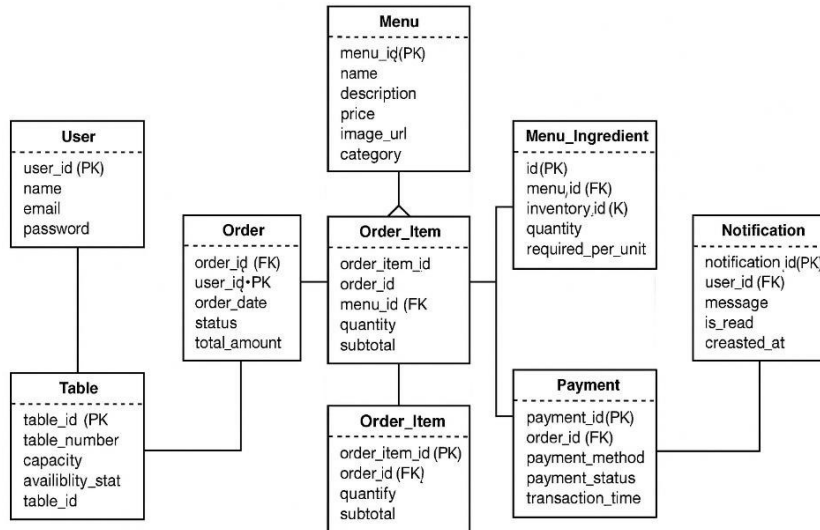


Figure 4 Entity Relationship Diagram

The Entity-Relationship Diagram (ERD) in Figure 4 illustrates the database design for the cafe management system, encompassing the key entities and their relationships to fulfill the system’s functional requirements. The Customers entity captures user details, including their name, contact information, and login credentials, with a one-to-many relationship to the Orders entity, as each customer can place multiple orders. The Orders entity records essential order details, such as menu items, quantities, payment methods, and dining options, while also linking to the Tables entity for dine-in orders. The Menu entity maintains a comprehensive list of menu items, including their names, prices, images, and promotional details, with a many-to-many relationship to the Orders entity and a connection to the Grocery entity to track ingredients.

The Tables entity represents seating arrangements, capturing details like table capacity and availability, which integrates with the Orders entity for efficient table management. The Staff entity stores employee information, including roles, enabling role-based system access and management of various operations. The Grocery entity is crucial for inventory management, tracking ingredient quantities and automatically updating stock levels based on menu orders. This ERD ensures streamlined order management, real-time inventory

tracking, and effective table assignments while supporting dynamic menu updates and promotional offers. It is designed for operational efficiency, scalability, and enhanced user satisfaction, aligning with both business and customer needs.

C. **HARDWARE AND SOFTWARE REQUIREMENT**

To develop and run the Bakso Bytes web-based system, certain hardware and software requirements must be met to ensure optimal performance. Hardware requirements include a device capable of browsing the web, such as laptops, tablets, or mobile phones. The system should be operated on a device with at least a dual-core processor, such as an Intel Core i3 or an AMD equivalent, to ensure smooth operation, especially when browsing or interacting with the system. A minimum of 4 GB of RAM is recommended for handling basic operations, particularly if multiple browser tabs are open. For storage, a 128 GB SSD is ideal, offering speed and efficient performance for quick data retrieval and system responsiveness. A reliable internet connection with at least 50 Mbps is also essential for smooth data transactions and uninterrupted online activities.

In terms of software requirements, the system should be accessible via modern web browsers such as Google Chrome, Mozilla Firefox, Safari, or Microsoft Edge, with the latest versions for compatibility and security. It is designed to work on any operating system that supports these browsers, including Windows 10+, macOS for desktops, and Android or iOS for mobile devices. For development, tools like Visual Studio Code or Notepad, optimized for PHP and HTML development, are necessary. Database handling requires XAMPP, which includes Apache, PHP, and MySQL, to support local development and manage

the backend data. Finally, for hosting the web application, a shared hosting plan that supports PHP 8.0+ and MySQL with phpMyAdmin access is recommended for production, providing a reliable and scalable platform to run the system. These hardware and software specifications are crucial to ensure Bakso Bytes runs smoothly and efficiently, meeting both the business needs and user expectations.

IV. DATA ANALYSIS AND TESTING

During the system development phase, the integration and testing process plays a crucial role in ensuring that each system component functions smoothly and meets the specified requirements. The front-end, back-end, and database modules were fully integrated to enable seamless data flow and effective communication between all components.

A comprehensive testing approach was employed, including Unit Testing, Integration Testing, System Testing, and User Acceptance Testing (UAT). This iterative testing process helped to identify and resolve defects early, ensuring a stable and reliable system. The primary objective of the testing phase is to validate that the system operates as intended and fulfills all performance criteria.

The overall testing process, which includes Unit Testing and Integration & System Testing, confirms that the system components perform reliably and meet the expected functional requirements. All test cases were executed successfully, as summarized in Table 1.

Table 1 Unit Testing

Test Category	Test Area	Key Functionality Tested	Expected Outcome	Result
Unit Testing	User Login	Authentication using valid credentials and handling login errors	Redirects to homepage upon successful login	Pass
	Staff Page	Access to authorized staff tasks only	Staff can perform tasks based on access level	Pass
	Customer Page	Order placement, viewing, and editing based on menu	Customer can manage and place orders effectively	Pass
Integration & System	Application Access	Launch and navigation of the web-based system	Smooth access and transition between pages	Pass
	Order Processing	Order creation, processing, and display	Orders are accurately recorded and shown in the database	Pass
	Database Interaction	Retrieval and update of user data	Data matches input and updates are reflected in real-time	Pass
	Payment Gateway	Payment processing with third-party integration	Transactions complete successfully with confirmation	Pass
	API Connectivity	Front-end and back-end communication	API returns correct and expected responses	Pass
	User Notification	Delivery of real-time status updates	Notifications are sent to users accordingly	Pass

V. CONCLUSION

In conclusion, this research highlights the significant

role of web-based systems in transforming the food and beverage industry by improving operational efficiency, customer satisfaction, and business

scalability. The findings underscore that web-based platforms, such as online food ordering and real-time order processing systems, effectively address traditional operational challenges like delivery

delays, manual errors, and limited market reach. Furthermore, web-based systems enable SMEs to streamline inventory management, process customer feedback, and leverage data analytics for personalized customer experiences.

The review also demonstrates that user-friendly interface design (UI/UX) is crucial in encouraging technology adoption and enhancing customer interactions with these systems. Despite

the benefits, challenges such as data security risks and system scalability must be carefully managed through strategies like encryption, multi-layer authentication, and continuous system monitoring.

Digitalization has proven vital in ensuring business continuity, particularly in adapting to shifts in consumer behavior post-pandemic. By implementing web-based solutions, food businesses can maintain competitiveness, optimize operations, and expand their customer base. The development of systems like Bakso Bytes is a response to these needs, offering innovative, efficient, and customer-centric solutions in a dynamic market environment.

Ultimately, the study concludes that the adoption of web-based systems provides a strategic advantage for food businesses by streamlining operations, improving customer experience, and ensuring sustainability. Moving forward, continuous innovation, strategic investment in security, and attention to user design will be key to maximizing the potential of web-based systems in the food and beverage sector.



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