

Website-Based E-Commerce Development for MSMEs (Case Study: Batik Wistara, Surabaya)

Adreian Alexander Ardayuputra¹, Rizky Parlika²

^{1,2}Informatics Department, Faculty of Computer Science, East Java Veteran National Development University, Surabaya, Indonesia

Email: 23081010012@student.upnjatim.ac.id¹, rizkyparlika.if@upnjatim.ac.id²

Received: October 20, 2025

Revised: November 1, 2025

Accepted: Dec. 1, 2025

Published: Dec. 20, 2025

Corresponding Author:

Author Name*:

Rizky Parlika

Email*:

rizkyparlika.if@upnjatim.ac.id

DOI: 10.63158/SCD.v3i2.53

© 2025 The Authors. This open access article is distributed under a (CC-BY License)



Abstract. Micro, Small, and Medium Enterprises (MSMEs) play a vital role in supporting the national economy; nevertheless, many continue to encounter challenges in digital adoption and market expansion. Batik Wistara, an MSME engaged in the batik industry, still relies on manual methods for marketing activities and transaction documentation, resulting in limited operational efficiency. This study aims to design and implement a web-based e-commerce system that provides integrated support for Batik Wistara's business processes. The system was developed using the waterfall methodology, which includes the stages of requirements analysis, system design, implementation, and testing. The development utilized the Laravel framework based on the Model-View-Controller (MVC) architecture and was integrated with the Midtrans payment gateway. The evaluation results indicate that the system fulfills all specified functional requirements and achieves a System Usability Scale (SUS) score of 90.8, categorized as grade A. The implemented system facilitates customer transactions while improving the effectiveness of product management and sales reporting for the business owner. Consequently, the system is expected to support Batik Wistara in expanding its market reach and enhancing its competitiveness in the digital economy era.

Keywords: E-Commerce, Website, MSMEs, Batik Wistara

1. INTRODUCTION

Businesses must use information technology to boost their competitiveness and operational efficiency in the age of constantly changing digital transformation. The Micro, Small, and Medium Enterprises (MSMEs) sector is growing thanks in large part to digitalization, particularly when it comes to overcoming the difficulties of a competitive and changing market [1][2]. The growth of website-based e-commerce, which enables MSMEs to market products online, reach a larger market, and expedite transactions between sellers and consumers, is one popular type of digitalization [3][4]. However, due to inadequate infrastructure, a lack of human resources, or a lack of technological knowledge, not all MSMEs are able to put this system into place [5].

Surabaya's famous batik is produced and sold by Batik Wistara, a local MSME. Batik Wistara still uses traditional marketing techniques, such as physical stores and word-of-mouth advertising, despite its exceptional product quality and distinctive themes. As a result, there is a restricted market reach, transaction processes are manual and not systematically documented, and it is challenging for prospective customers from outside the city to obtain product information. As a result, business growth stagnates and it becomes harder to compete in a market that is becoming more and more competitive. These problems show how urgently organizations and consumers need integrated, effective, and user-friendly digital solutions. [6].

The goal of this research is to create a website-based e-commerce system that Batik Wistara may use for online transactions and promotion. This system's features allow business owners to securely accept digital payments, handle transactions automatically, maintain product data, and show catalogs online [7]. This system can enhance operational efficiency and greatly increase the market for Batik Wistara by employing the Waterfall methodology of software development, programming based on the PHP Laravel framework, and the Midtrans payment service [8].

The study's premise is that Batik Wistara's marketing efficacy, transaction process efficiency, and customer satisfaction levels will all improve with the deployment of a web-based e-commerce system. Additionally, as determined by usability and black-box testing, the built system must satisfy functional and user-friendliness requirements. By

putting this theory to the test, the study will demonstrate how much information technology has contributed to the digitization of Batik Wistara's MSMEs [9][10]. The findings of this study will provide a workable way to assist MSMEs in the batik industry with their digital transformation and serve as a template for other MSMEs who are struggling with digitalization.

2. METHODS

Because it provides a logical and methodical work procedure, the waterfall development method was used in this study. During software development, this methodical approach helps lower the possibility of mistakes [11]. Literature review, system requirements analysis, system design, system implementation, and system testing make up the research phases. Figure 1 shows the steps of the research.

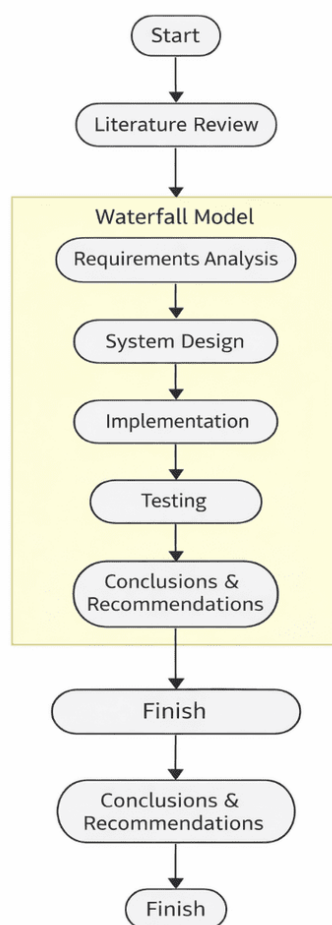


Figure 1. Community services development flow

2.1 Literature Study

The creation of e-commerce systems in MSMEs and the technology that support them, like Laravel, MySQL, and usability testing techniques, were the subject of a literature search [12]. A theoretical and methodological framework is developed based on this literature [13].

2.2 Needs ANALYSIS

In order to determine what e-commerce system functionalities Batik Wistara actually needs to support its digital business processes, a needs study phase was carried out. Both functional and non-functional requirements as well as business concerns were identified as part of the needs analysis methodology [14].

2.2.1 Identification Of Business Problems

In its marketing and sales operations, Batik Wistara encounters a number of challenges, including a narrow customer base, a lack of a digital catalog, disjointed transaction procedures, and a lack of a system that can automatically track inventory and sales. Through surveys, visits, and interviews, the investigation determined business mechanisms.

Table 1 Analysis of MSME Business Process Problems

Aspect	As-Is	To-Be
Marketing	Oral/manual promotion through physical stores	Web-based online product catalog
Booking	Manual ordering	Automated Checkout system via website
Payments	Manual bank transfer	Integrated Midtrans with automatic transaction status
Transaction Recording	Manual recording in logbooks	Automatically stored in the system and displayed as reports
Product Information	Only available directly in the physical store	Accessible anytime and anywhere by customers
Sales Reporting	Must be manually recapped	Automated real-time sales reports

Table 1 summarizes the problem analysis by contrasting the intended system following digitalization (To-Be) with the existing business process (As-Is).

2.2.2 Identification Of Functional And Non-Functional Requirements

The focus of functional and non-functional criteria differs significantly. Non-functional requirements describe how the device or software system should function or have certain features, whereas functional requirements deal with what the equipment or program should accomplish [15]. The functional needs of the system are listed in Table 2.

Table 2 System Functional Requirements

Code	Feature	Description
F01	Registration and Login	Users create an account and log in to the system
F02	View Product Catalog	Users browse the list of available products
F03	Product Details	Users view complete information about a product
F04	Add to Cart	Users select and save products for purchase
F05	Checkout	Users fill in data and process orders
F06	Midtrans Integration	The system is connected to a payment gateway for automated payments
F07	Order History	Users track order status and transaction history
F08	Product Management (Admin)	Admins can add, edit, and delete products
F09	Order Management (Admin)	Admins monitor order status and update shipment information
F10	Sales Reports (Admin)	Admins view daily, weekly, and monthly sales data

After analysing the functional system table, the next step is to create a non-functional system table, as shown in Table 3.

Table 3 System Non-Functional Requirements

Code	Feature	Description
NF01	Responsiveness	The system interface must be compatible with various devices (smartphones, tablets, and PCs)
NF02	Usability (UX)	The interface navigation is intuitive and suitable for novice users
NF03	Security	Login encryption, input validation, and transaction security
NF04	Access Speed	Pages must load within a maximum of 3 seconds
NF05	Scalability	The system can be further developed as needed

2.3 System Design

System design is the next stage after the requirements analysis process. Its purpose is to technically describe how the Batik Wistara e-commerce system will be built. This design process converts functional and non-functional requirements into technical specifications in the form of diagrams, system architecture, interface design, and database design.

2.3.1 System Architecture

The Batik Wistara e-commerce system is designed with a Model View Controller (MVC) architecture, implemented because of its ability to separate the user interface, application logic, and data management [16].

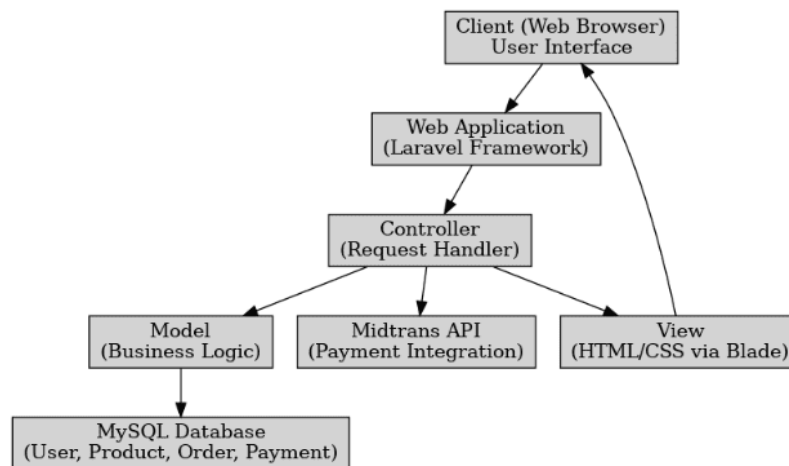


Figure 2 System Architecture

Figure 2 shows a system architecture diagram depicting the relationships between the user, application interface, Controller, model, and database. The diagram shows that each user request does not interact directly with the database, but rather through the Controller as the primary controller.

2.3.2 Use Case Diagram

By illustrating the requirements and capabilities of actors according to their roles, use case diagrams show how actors and systems interact [17].

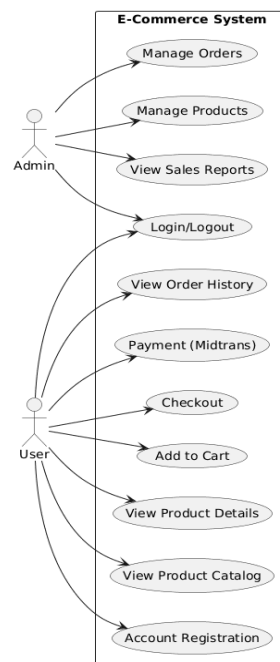


Figure 3 Use Case diagram

The buyer (user) and the seller (admin) are the actors in this instance, Figure 3 shows the diagram.

2.3.3 Activity Diagram

We utilize an activity diagram to illustrate the steps involved in placing an order, starting with the user opening the website, choosing a product, adding it to their basket, and finishing the payment process.

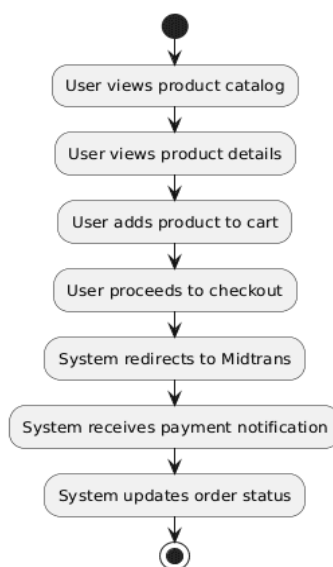


Figure 4 Activity diagram

As shown in Figure 4, the activity diagram also has logical branches for successful or unsuccessful payments as well as notifications sent to the buyer and seller.

2.3.4 Entity Relationship Diagram (ERD)

The data structure and connections between the entities that comprise an information system are depicted using an ERD diagram. Developers can more easily create a structured database that satisfies the requirements of the system by using ERDs [18].



Figure 5 Entity Relationship Diagram

In the Batik Wistara e-commerce system, the ERD was designed based on the results of a needs analysis and actual implementation on the Laravel platform, as well as the table structure in the MySQL database. Figure 5 is the ERD for the Batik Wistara website that has been created.

2.3.5 Interface Design

Interface design refers to the process of designing the visual appearance and user interface interactions within an application or system. The main goal is to create an interface that is easy to use and enjoyable for users [19]. The user interface design is structured with minimalist and mobile-friendly principles, using the Bootstrap framework to maintain consistency and responsiveness. The main page design includes:

- 1) Home Page: Display banners, featured products, and main navigation.

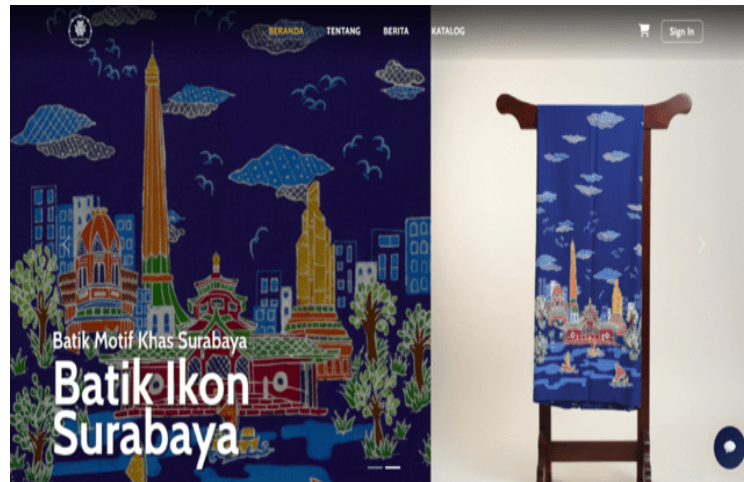


Figure 6 Home Page

- 2) Product Catalog Page: Product grid view with filter/sort feature

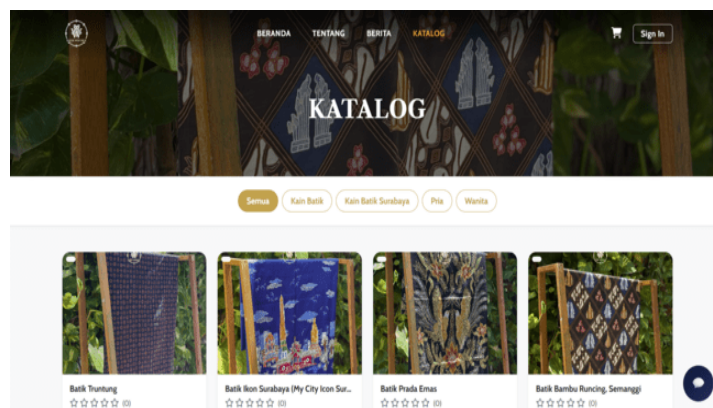


Figure 7 Product Catalog Page

- 3) Product Detail Page: Large image, full description, "Buy Now" button.

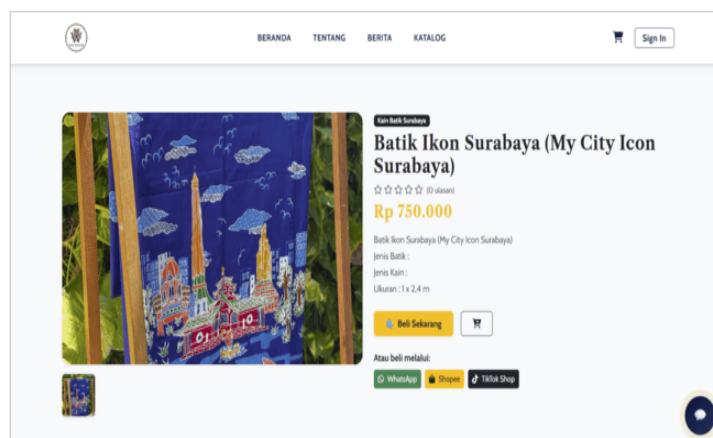


Figure 8 Product Detail Page

- 4) Cart and Checkout Page: Shopping summary, and total shopping bill.



Figure 9 Cart and Checkout Page

- 5) Admin dashboard page: Navigation of product management, orders, and sales reports.

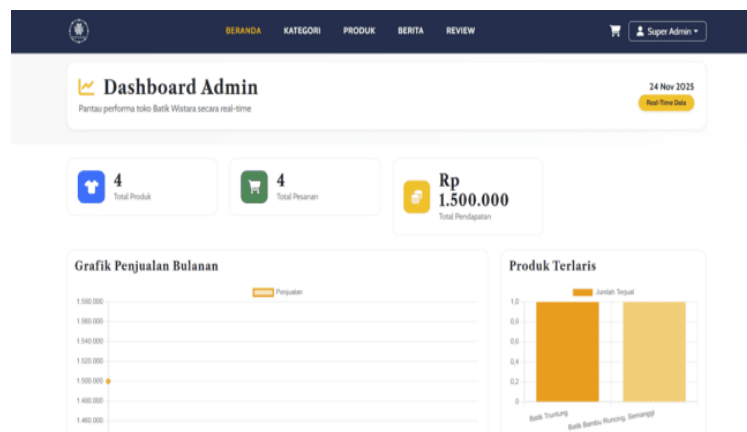


Figure 10 Admin dashboard page

3. RESULTS AND DISCUSSION

The implementation phase resulted in a website-based e-commerce system specifically developed to support the business activities of Batik Wistara, a micro, small, and medium enterprise (MSME) that produces and markets traditional Surabaya batik products. The system was developed based on identified user requirements and the actual business processes implemented by Batik Wistara. Its main objective is to facilitate product management, online transactions, payment processing, and sales reporting while providing customers with a convenient and accessible purchasing experience.

The system database was implemented based on the previously developed Entity Relationship Diagram (ERD). The migration feature provided by the Laravel framework was used to create the database structure, tables, attributes, and relationships between tables. MySQL was selected as the database management system because of its compatibility with Laravel and its ability to manage structured transaction data efficiently. The implemented database supports several important types of data, including user information, product details, shopping carts, orders, payments, transaction histories, and sales reports.

The website interface was implemented according to the previously prepared user interface design. The interface was designed to provide clear navigation, consistent page layouts, readable information, and straightforward transaction procedures. The implemented interfaces include the registration and login pages, product catalog, product detail page, shopping cart, checkout page, transaction history, and administrative dashboard. Examples of the implemented interfaces are presented in Figures 6–10.

The program code was implemented using the Laravel framework to connect the user interface, business logic, and database. The implementation includes data processing, database interaction, user authentication, product management, shopping cart operations, checkout procedures, payment processing, transaction recording, and sales report generation. The system was also integrated with the Midtrans payment gateway to support online payment transactions. Through this integration, payment responses can be received and transaction statuses can be automatically recorded in the system database.

After the implementation process was completed, the system was evaluated through functional and user satisfaction testing. Functional testing was conducted using the black-box testing method, which evaluates system functionality based on the relationship between input and output without examining the internal program structure or source code. The testing process focused on determining whether each system feature operated according to the specified functional requirements. The results of the functional testing are presented in Table 4.

Table 4. Functional Testing Results

No.	Tested Feature	Description	Status
1	Registration and Login	Users can successfully create an account and log in to the system.	Passed
2	Product Catalog and Details	Product information is displayed according to the data stored in the database.	Passed
3	Shopping Cart	Products can be added, updated, and removed from the shopping cart.	Passed
4	Checkout and Payment Process	Midtrans provides the appropriate response, and transaction data are successfully recorded.	Passed
5	Transaction History	Transaction information is displayed according to the authenticated user.	Passed
6	Product Management	Administrators can create, view, update, and delete product data.	Passed
7	Sales Reports	The system can display monthly sales reports in graphical form.	Passed

As shown in Table 4, all tested features successfully passed the functional testing process. The registration and login functions allowed users to create accounts and access the system successfully. Product information was accurately retrieved from the database and displayed on the product catalog and detail pages. Shopping cart operations, including adding, updating, and removing products, also functioned correctly.

The checkout and payment features successfully communicated with the Midtrans payment gateway, and the resulting transaction information was recorded in the system database. The transaction history feature displayed information according to the relevant user account, thereby preventing users from accessing transactions belonging to other customers. From the administrative perspective, product data could be created, viewed, updated, and deleted successfully. The system was also able to generate monthly sales report charts to assist Batik Wistara in monitoring its sales performance. These results demonstrate that the implemented e-commerce system satisfies the specified functional requirements.

In addition to functional testing, user satisfaction was evaluated by involving 20 respondents representing the target users of the Batik Wistara website. The respondents assessed the system in terms of interface design, ease of use, access speed, clarity of the transaction process, and overall satisfaction. The questionnaire results were then analyzed to determine users' perceptions of the usability and overall quality of the system. The user satisfaction results are presented in Table 5.

Table 5. User Satisfaction Results

Evaluation Indicator	Average Respondent Score
User Interface Design	4.65 / 5
Ease of Use	4.60 / 5
Access Speed	4.25 / 5
Transaction Flow Clarity	4.55 / 5
Overall User Satisfaction	4.65 / 5
Final Average Score	4.54 / 5
Final SUS Score	90.8

The questionnaire results indicate that the developed system achieved an overall average score of 4.54 out of 5, placing it in the very good category. The highest scores were obtained for user interface design and overall user satisfaction, both of which received an average score of 4.65. These findings indicate that respondents considered the website interface visually appealing and were highly satisfied with their overall experience when using the system.

The ease-of-use indicator received an average score of 4.60, demonstrating that users could understand and operate the website without significant difficulty. The clarity of the transaction flow obtained an average score of 4.55, indicating that the procedures for selecting products, adding them to the shopping cart, completing the checkout process, and making payments were clearly presented. Meanwhile, access speed received the lowest average score of 4.25. Although this score remains within the positive category, it indicates that system performance and page-loading speed could be further optimized.

The final System Usability Scale (SUS) score was 90.8, which falls within the excellent usability category. This result suggests that the Batik Wistara e-commerce website is highly usable, easy to understand, and acceptable to its intended users. The combination of successful functional testing and high user satisfaction demonstrates that the system can effectively support Batik Wistara's online sales activities. Overall, the developed system successfully integrates product management, customer transactions, digital payments, transaction history, and sales reporting into a single website-based platform. The implementation of the system can help Batik Wistara expand its market reach, improve the efficiency of sales administration, and provide customers with a more convenient purchasing process. Nevertheless, further development may focus on improving access speed, strengthening system security, optimizing the website for mobile devices, and evaluating the system with a larger and more diverse group of respondents.

4. CONCLUSION

A website-based e-commerce system developed to support the digitalization of Batik Wistara's business operations—an MSME in the creative industry is the result of this research. Based on the stages of needs analysis, system design, implementation, and testing, the system successfully fulfills key functional requirements, including user registration, product catalog management, product ordering, Midtrans payment integration, order management, and the generation of sales reports by administrators. The implementation of the Model-View-Controller (MVC) architecture using the Laravel framework enhanced logical system separation, development flexibility, and long-term maintenance efficiency. Functional testing results indicated that all system features operated as expected without significant issues, demonstrating accurate and reliable responses to user input. Furthermore, usability evaluation using the System Usability Scale (SUS) yielded a category A score of 90.8, reflecting a highly user-friendly interface that supports efficient online transaction processing. Overall, the implementation of this system directly contributed to expanded market reach, improved business professionalism, and increased operational efficiency.

REFERENCES

- [1] D. Angraini, Y. Riady, P. Putimasurai, A. Pratama, A. Sadria, and Rosmiati, "Digital Transformation in Improving the Competitiveness of Indonesian Micro, Small, and Medium Enterprises (MSMEs): A Systematic Review," *J. Pendidik. Ekon. dan Kewirausahaan*, vol. 7, no. 2, pp. 132–142, 2024, doi: 10.24014/ekl.v7i2.33958.
- [2] A. T. Artanto, N. Haryono, and E. Sholihatin, "Digitalization of Micro , Small and Medium Enterprises in Building Business Resilience in the New Normal Era," vol. 3, no. 2, pp. 163–180, 2022, doi: 10.20473/jgar.v3i2.41772.
- [3] V. Jain, B. Malviya, and S. Arya, "An Overview of Electronic Commerce (e-Commerce)," *J. Contemp. Issues Bus. Gov.*, 2021, doi: 10.47750/cibg.2021.27.03.090.
- [4] O. G. Smeshko, I. V. Uporova, and D. V. Kruglov, "Impact of digital transformation on small business development," in *AIP Conference Proceedings*, AIP Publishing LLC, 2022, p. 40004. doi: 10.1063/5.0079260.
- [5] R. N. Permadi, R. Amarullah, M. Agustini, and P. Sari, "Challenges and Obstacles for MSMEs in Digitalization: Case Studies in Jayapura Regency, Muaro Jambi Regency, Kulon Progo Regency, & Surabaya City in 2024," vol. 10, no. 2, 2025, doi: 10.14710/jiip.v10i2.27916.
- [6] D. D. Prasetyo, "E-Commerce for the Development of MSME Product Sales in Subah Village with Product Recommendations Using the Apriori Algorithm," *J. Pengemb. Rekayasa dan Teknol.*, vol. 5, no. 2, pp. 108–114, 2021.
- [7] H. Sabila, B. Praptono, and I. Y. Arini, "Designing a Financial Reporting Application Using the Agile Development Scrum Method," *JOISIE (Journal Inf. Syst. Informatics Eng.*, vol. 5, Dec. 2021, doi: 10.35145/joisie.v5i2.1406.
- [8] A. Demirag, E. N. D. Öztürk, and C. Ünal, "Analysis and Comparision of Waterfall Model and Agile Approach in Software Projects," *AJIT-e Acad. J. Inf. Technol.*, vol. 14, no. 54, pp. 183–203, 2023, doi: 10.5824/ajite.2023.03.002.x.
- [9] A. Arifandi, R. N. Z. Simamora, G. A. Janitra, M. A. Yaqin, and M. M. Huda, "Survey of Software Testing Techniques Using the Systematic Literature Review Method," *ILKOMNIKA*, vol. 4, no. 3, pp. 297–315, 2022, doi: 10.28926/ilkomnika.v4i3.436.
- [10] M. Sholeh, I. Gisfas, Cahiman, and M. A. Fauzi, "Black Box Testing on ukmbantul.com Page with Boundary Value Analysis and Equivalence Partitioning Methods," *J. Phys. Conf. Ser.*, vol. 1823, no. 1, p. 12029, 2021, doi: 10.1088/1742-6596/1823/1/012029.
- [11] W. Ningsih and H. Nurfauziah, "Comparison of the Waterfall Model and the Prototype

- Method For Application Development in Information Systems," *J. Ilm. METADATA*, vol. 5, no. 1, pp. 83–95, Jan. 2023, doi: 10.47652/metadata.v5i1.311.
- [12] C. Prasetiawan, A. ST, and E. Yandani, "Design and Construction of a Web-Based Geographic Information System for Telecommunication Tower Fees at the Bungo Communications and Information Service," *JOISIE (Journal Inf. Syst. Informatics Eng. Vol 7 No 2*, Dec. 2023, doi: 10.35145/joisie.v7i2.3374.
- [13] N. F. Hadi and N. Afandi, "Literature Review is A Part of Research," *Sulawesi Tenggara Educ. J.*, vol. 1, no. 3 SE-Articles, Dec. 2021, doi: 10.54297/seduj.v1i3.203.
- [14] N. Putrianto, Y. Widyastuti, and T. Oktiarso, "Perencanaan Dan Analisis Kebutuhan Pengguna Dalam Pengembangan Sistem Informasi Hubungan Pelanggan," *Kurawal - J. Teknol. Inf. dan Ind.*, vol. 7, no. 1 SE-Articles, Mar. 2024, doi: 10.33479/kurawal.v7i1.1064.
- [15] R. Sianturi, A. Sinaga, Y. Pratama, H. Simatupang, J. Panjaitan, and S. Sihotang, "Design OF Functional And Non-Functional Tests OF Siappara Applications In Humbang Hasundutan District," *J-Icon J. Komput. dan Inform.*, vol. 9, no. 2, Sep. 2021, doi: 10.35508/jicon.v9i2.4706.
- [16] B. P. Raharjo and F. David, "Implementation of model view controller architecture and Zend framework in the development of Category Online application at PT XYZ," *J. Indones. Manaj. Inform. Dan Komun.*, vol. 5, no. 2, pp. 1403–1412, 2024.
- [17] S. W. Ramdany, S. A. Kaidar, B. Aguchino, C. Amelia, A. Putri, and R. Anggie, "Implementation of UML Class Diagrams in Designing Web-Based Library Information Systems," *J. Ind. Eng. Syst.*, vol. 5, no. 1, pp. 30–41, 2024.
- [18] S. M. Pulungan, R. Febrianti, T. Lestari, N. Gurning, and N. Fitriana, "Entity-Relationship Diagram Technical Analysis in Database Design," *J. Ekon. Manaj. dan Bisnis*, vol. 1, no. 2 SE-Articles, pp. 143–147, Feb. 2023, doi: 10.47233/jemb.v1i2.533.
- [19] Y. S. Purbo, F. S. Utomo, and Y. Purwati, "Analysis and Design of Tourism Application Interface Using User Centered Design (UCD) Method," *J. Teknol. Terpadu*, vol. 9, no. 2, pp. 123–132, Dec. 2023, doi: 10.54914/jtt.v9i2.977.