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Design of a Multi-Platform Motorcycle Workshop E-Commerce and Reservation System with Payment Gateway Integration

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Abstract

The advancement of digital technology has significantly transformed business processes in the automotive service sector, particularly among small and medium-sized motorcycle workshops. Nevertheless, many workshops still depend on conventional procedures for service reservations, spare part sales, and transaction management. This condition often leads to inefficient service delivery, delays in operational processes, and an increased possibility of errors in data recording. Therefore, this study focuses on designing and implementing a multi-platform e-commerce and service reservation system for motorcycle workshops, supported by payment gateway integration to improve transaction efficiency and service accessibility. The system was developed using the Waterfall model, with Flutter applied for the mobile application, Laravel for the web-based administrator platform, and MySQL as the database management system. Communication between system components is handled through a RESTful API, while data access and authentication are secured using JSON Web Token (JWT).

Keywords: *E-Commerce; Multi-Platform; Payment Gateway; Reservation.*

1. Introduction

Digital transformation has changed the way businesses manage services, transactions, and customer interactions. For small and medium-sized enterprises (SMEs), the adoption of information technology is increasingly important to improve operational efficiency, data accuracy, and service competitiveness [1]. This condition is supported by the increasing number of internet users in Indonesia, which reached more than 221 million people in 2024, indicating that digital services have become an important part of business activities and customer needs [2].

Motorcycle workshops are one of the SME sectors that still face challenges in digital transformation. In many workshops, service reservations, spare part sales, inventory recording, and transaction management are still carried out manually. This conventional process can lead to inaccurate stock records, transaction errors, unorganized service schedules, and delays in customer service [3]. In addition, customers often have to visit the workshop directly to obtain spare part information or make service reservations, which makes the service process less flexible and inefficient [4], [5].

The implementation of an e-commerce and online reservation system can be used as a solution to overcome these problems. Through this system, customers can access spare part catalogs, place orders, make service reservations, and monitor transaction status more easily. For workshop administrators, the system can support product management, reservation control, transaction recording, and sales reporting in a more structured manner. Previous studies have shown that web-based workshop management systems and spare part sales systems can improve service management, transaction processing, and operational data control [6], [7].

In addition to sales and reservation management, payment gateway integration is also needed to support digital transactions. Payment gateway technology allows online payments to be processed more efficiently, securely, and automatically through various payment methods [8]. The use of payment gateways in e-commerce applications has been proven to simplify payment processes, reduce manual verification errors, and improve transaction efficiency [9]. Furthermore, a multi-platform application model can increase service accessibility because customers can use mobile applications, while administrators can manage operational data through a web-based system [10].

Based on these problems, this study aims to design and implement a multi-platform motorcycle workshop e-commerce and reservation system integrated with a payment gateway. The proposed system is developed to help customers purchase spare parts, make service

reservations, complete digital payments, and track transaction status more easily. Meanwhile, workshop administrators can manage products, reservations, transactions, inventory data, and sales reports in a more effective and organized manner. The main contribution of this study is the integration of spare part e-commerce, online service reservation, and digital payment features into a single multi-platform system designed to support the digitalization of motorcycle workshop SME operations.

2. Theoretical Review

2.1 E-Commerce System

E-commerce is a digital system that supports buying and selling activities through an online platform. In the context of motorcycle workshop services, e-commerce can be used to display spare part catalogs, provide product information, process customer orders, and record sales transactions more systematically. A web-based spare part sales system can help workshop owners manage product data, expand customer access, and improve transaction efficiency [11]. Therefore, e-commerce becomes an important component in this study because it supports the transformation of conventional spare part sales into a more structured digital transaction process.

2.2 Online Service Reservation

An online service reservation system allows customers to schedule services without having to visit the workshop directly. In motorcycle workshop operations, this feature can be used to select service types, determine service schedules, and submit service requests through a digital platform. Previous research on web-based workshop registration systems shows that online reservation services can simplify customer access and help administrators manage service schedules more efficiently [12]. Thus, online reservation is needed to reduce manual scheduling problems and improve service management.

2.3 Payment Gateway Integration

A payment gateway is a digital payment service that connects an application with various online payment methods. In an e-commerce system, payment gateway integration supports faster, more practical, and more secure transaction processing. The use of payment gateway technology in web-based applications can reduce manual verification problems and improve the efficiency of online transactions [13].

2.4 Multi-Platform Application

A multi-platform application is a system model that can be accessed through more than one platform, such as a mobile application for customers and a web-based system for administrators. This model is suitable for motorcycle workshop systems because customers need practical access through mobile devices, while administrators require a web interface to manage products, reservations, transactions, and reports. Previous research shows that multi-platform applications can support product promotion, ordering, and order tracking more effectively [14]. Therefore, the multi-platform approach is relevant to integrate customer services and workshop management in one system.

3. Research Methods

This study used the Waterfall method to develop a multi-platform motorcycle workshop e-commerce and reservation system integrated with a payment gateway. The Waterfall model was selected because it provides structured and sequential stages, making it suitable for system development with clearly defined requirements [15]. The research object was a motorcycle workshop SME that still used manual processes for service reservations, spare part sales, stock recording, transactions, and payment management.

3.1 Methods of Collecting Data

Data were collected through observation, interviews, and literature study. These methods were used to identify the current business process, user needs, and system requirements. A proper data collection process is important to ensure that the system design is relevant to the actual problems found in the research object [16].

1. Observation

Observation was conducted directly at the motorcycle workshop to examine the existing service reservation process, spare part sales, inventory recording, transaction flow, and payment mechanism. The observation showed that the manual process caused several problems, such as unorganized service schedules, inaccurate stock records, and delays in transaction processing [17].

2. Interview

Interviews were carried out with the workshop owner, administrator, and customers to obtain information about operational problems and required system features. The interview results were used to determine the main features of the system, including online service booking, spare part ordering, digital payment, transaction tracking, and sales reporting [17].

3. Literature Study

Literature study was conducted by reviewing journals, books, articles, and previous studies related to e-commerce, online reservation, payment gateway, inventory management, multi-platform applications, and software development. This stage was used to strengthen

the theoretical foundation and support the system design.

3.2 Data Source

The data sources in this study consisted of primary data and secondary data. Both were used to support requirement analysis and system development

1. Primary Data

Primary data were obtained directly from observation and interviews at the motorcycle workshop. These data included information about service reservation flow, spare part sales, inventory recording, payment procedures, transaction activities, and user needs. Primary data were used as the main basis for defining the system requirements.

2. Secondary Data

Secondary data were obtained from scientific journals, books, articles, official documents, and previous studies related to information systems, e-commerce, reservation systems, payment gateway, inventory management, and software development. These data were used to support the theoretical foundation and compare the proposed system with previous research [18].

4. Design of Proposed System Procedures

The proposed system procedure describes the main workflow of the motorcycle workshop e-commerce and reservation system. The design uses UML to show the interaction between Customer, Administrator, and system processes [19]. Customers can order spare parts, make service reservations, complete digital payments, and track transaction status through the mobile application. Administrators manage products, reservations, payments, inventory, and reports through the web-based system. This procedure is designed to replace manual workshop operations with a more structured and integrated digital process.

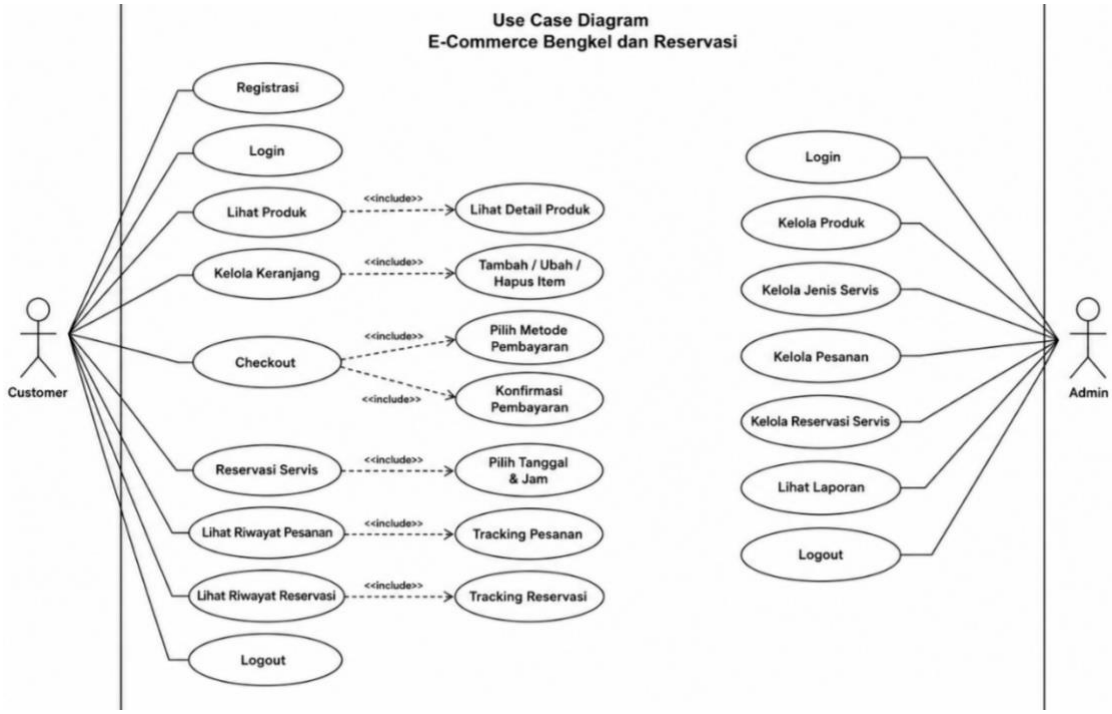

Fig. 1: Proposed Use Case Diagram

5. Implementation and Testing

5.1 Web Interface Implementation

The web interface was developed for administrators to manage workshop operations through a browser-based system. This platform provides several main features, including dashboard monitoring, service order management, product management, category management, service type management, customer data, order processing, inventory control, and sales reports. Through the web system, administrators can monitor transactions, update order status, manage service reservations, and review sales performance in a more structured and efficient manner.

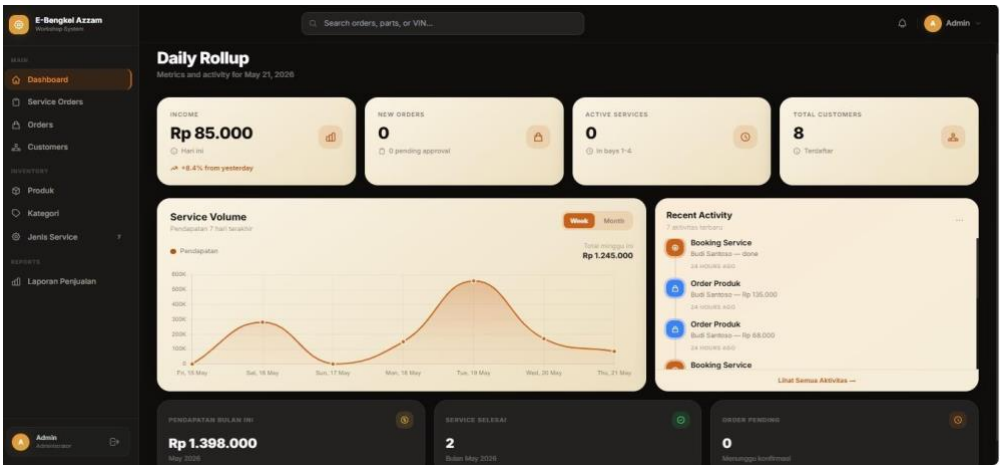

Fig. 2: Admin Dashboard Page

The admin dashboard page displays a summary of workshop operations, including income, new orders, active services, total customers, service volume, recent activities, and monthly revenue. This page helps administrators monitor transactions and service activities more quickly through an organized web-based interface.

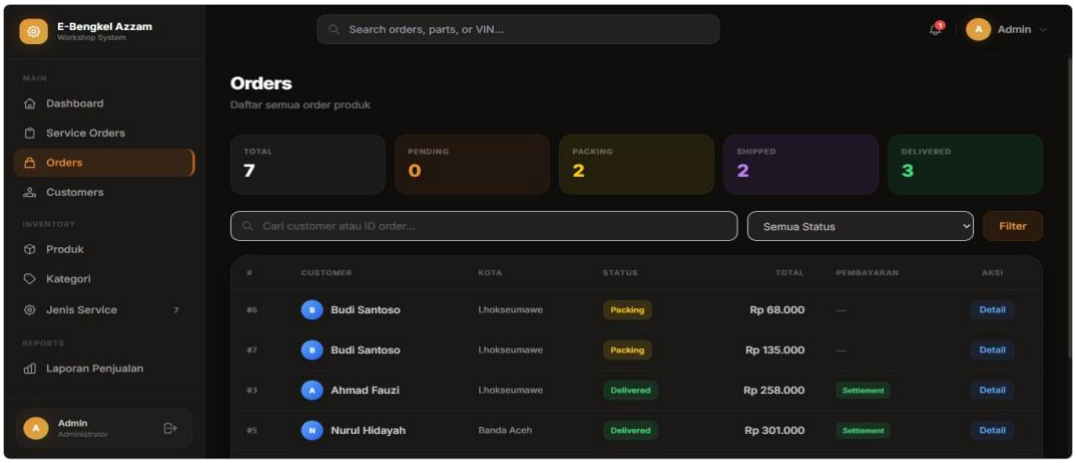

Fig. 3: Orders Management Page

The orders management page is used by administrators to monitor and manage product orders. This interface displays order summaries, such as total orders, pending orders, packing status, shipped orders, and delivered orders. It also provides search and filter features to help administrators find transaction data more easily and update order status in a structured manner.

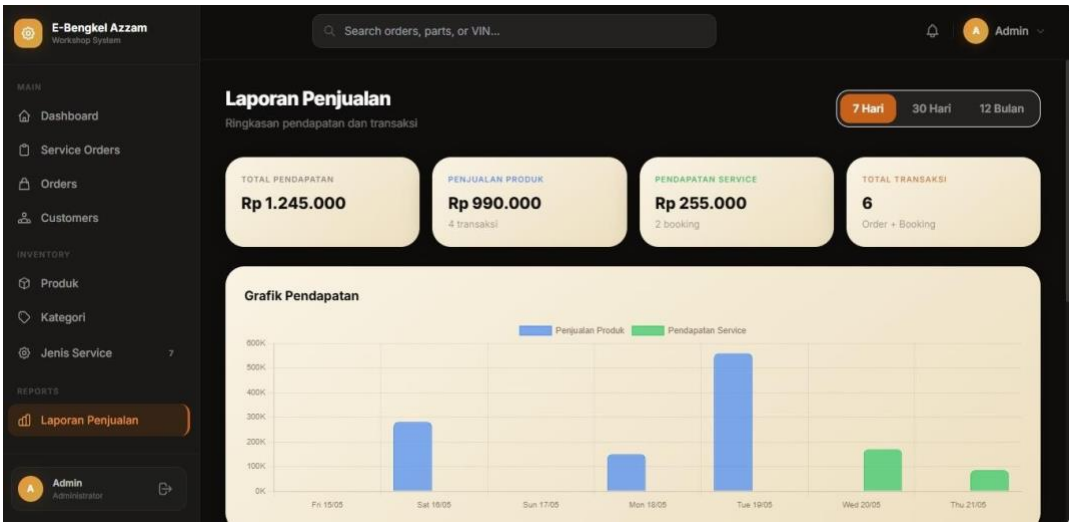

Fig. 4: Sales Report Page

The sales report page provides administrators with a summary of workshop revenue and transaction activities. This interface displays total income, product sales, service revenue, number of transactions, and a revenue chart based on the selected time period. By using this page, administrators can review sales performance, compare income sources, and monitor workshop financial activity more efficiently.

5.2 Mobile Interface Implementation

The mobile interface was developed for customers to access workshop services through the application. The main features displayed in the mobile system include the dashboard, profile management, address management, spare part catalog, service catalog, service booking, checkout, digital payment, and transaction history. These interfaces were designed to make it easier for customers to order spare parts, book workshop services, complete payments, and monitor transaction status through one integrated application.

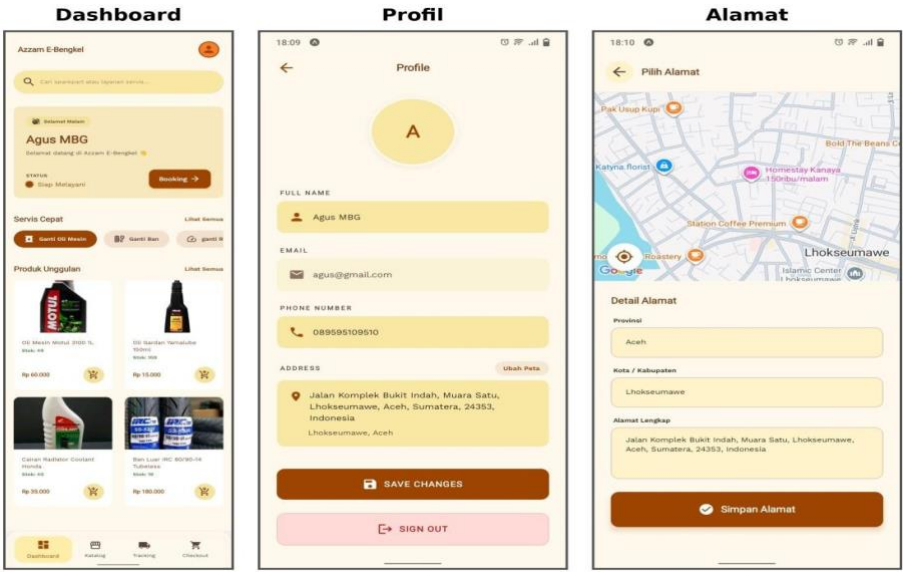

Fig. 5: Dashboard, Profile, and Address Page

Fig. 5 displays the dashboard, profile, and address pages of the customer application. The dashboard functions as the main page that presents customer information, available services, and recommended spare parts. The profile page is used to view and edit personal data, including name, email, phone number, and address. Meanwhile, the address page allows customers to save detailed location information required for delivery and service-related needs. These pages help users prepare and manage their account information before carrying out transactions.

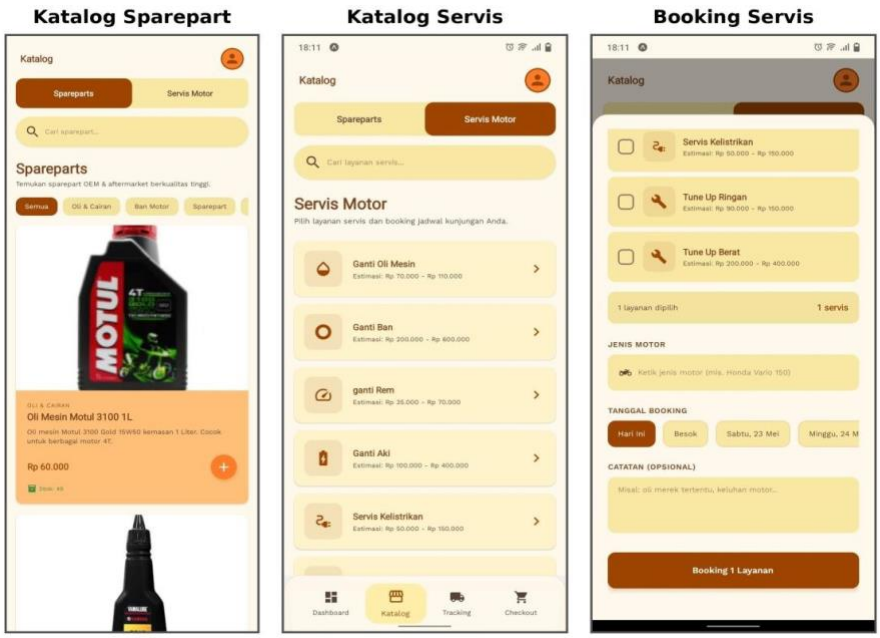

Fig. 6: Sparepart Catalog, Service Catalog, and Service Booking Page

Fig. 6 shows the spare part catalog, service catalog, and booking service pages. The spare part catalog provides product information, prices, and stock availability so customers can choose the needed items more easily. The service catalog presents the list of available workshop services. After selecting a service, customers can continue to the booking page by entering vehicle details, choosing a reservation date, adding notes or complaints, and submitting the booking request. This feature changes the service reservation process from manual communication into a more structured digital process.

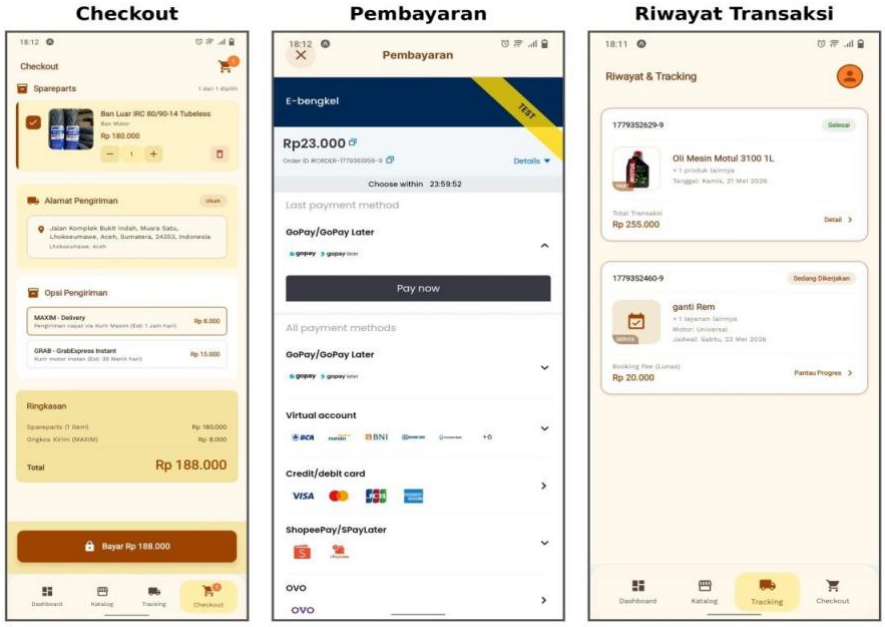

Fig. 7: Checkout, Payment, and Transaction History Page

Fig. 7 presents the checkout, payment, and transaction history pages in the customer mobile application. The checkout page displays order details, delivery address, shipping options, and total payment before the transaction is confirmed. The payment page is integrated with a digital payment gateway, enabling customers to complete payments through the available payment methods. Meanwhile, the transaction history page provides records of product orders and service bookings, including their status and progress. Through these features, customers can complete transactions and monitor their activities more clearly and transparently.

5.3 System Testing

System testing was conducted to ensure that each feature in the motorcycle workshop e-commerce and reservation system operated according to its intended function. The testing process used the Black Box Testing method, which focuses on evaluating system output based on the given input without examining the internal program code [20]. The tested features included login, product ordering, service reservation, digital payment, transaction tracking, inventory management, and sales reports. The results of this testing were used to identify functional errors and ensure that the system was ready to support workshop operations.

6. Conclusion

Based on the results of the research and system implementation that have been carried out, several conclusions can be drawn:

1. The multi-platform motorcycle workshop e-commerce and reservation system has been successfully designed and implemented to support workshop operational activities. The system is able to accommodate spare part sales, service reservations, transaction management, and payment processes in a more structured and integrated manner.
2. The mobile application provides customers with easier access to workshop services, including viewing spare part catalogs, placing product orders, booking services, completing digital payments, and monitoring transaction or reservation status. This feature helps reduce the limitations of the previous manual service process.
3. The web-based administrator system helps administrators manage product data, service orders, reservations, payments, inventory, and sales reports more efficiently. Through this system, workshop data can be recorded more accurately, transaction monitoring becomes easier, and manual recording errors can be minimized.
4. The integration of the payment gateway supports a faster and more practical digital payment process. Overall, the developed system can improve service efficiency, support better data management, and contribute to the digitalization of motorcycle workshop SME operations.

References

[1] G. Vial, “Understanding Digital Transformation: A Review and a Research Agenda,” The Journal of Strategic Information Systems, vol. 28, no. 2, pp. 118–144, 2019, doi: 10.1016/j.jsis.2019.01.003.
[2] APJII, “APJII Jumlah Pengguna Internet Indonesia Tembus 221 Juta Orang,” Asosiasi Penyelenggara Jasa Internet Indonesia, 2024. [Online]. Available: APJII official news page.
[3] V. A. Indriani, A. Sidik, and N. Nurmaesah, “Sistem Informasi Inventory Berbasis Web Studi Kasus di Bengkel Chinot,” Jurnal Topik Global, vol. 1, no. 1, pp. 1–5, 2022, doi: 10.38101/jtopikglobal.v1i1.523.
[4] S. W. C. Ngangi, C. A. J. Soewoeh, E. Alfonsius, D. Lapihu, and I. G. N. A. Putra, “Sistem Informasi Penjualan Sparepart Motor Berbasis Website (Studi Kasus Pada Bengkel Motorindo),” Journal of Information Technology, Software Engineering and Computer Science (ITSECS), vol. 1, no. 2, pp. 75–83, 2023, doi: 10.58602/itsecs.v1i2.33.
[5] S. Nurmiati and G. A. Hafidz, “Perancangan Sistem Pendaftaran Bengkel untuk Pelayanan Home Service Berbasis Website,” Jurnal Sistem Informasi Bisnis (JUNSIBI), vol. 2, no. 2, pp. 59–81, 2021, doi: 10.55122/junsibi.v2i2.307.
[6] M. Audrilia and A. Budiman, “Perancangan Sistem Informasi Manajemen Bengkel Berbasis Web (Studi Kasus: Bengkel Anugrah),” Jurnal

MADANI: Ilmu Pengetahuan, Teknologi, dan Humaniora, vol. 3, no. 1, pp. 1–12, 2020, doi: 10.33753/madani.v3i1.78.
[7] D. Marsudi, A. Mufti, and M. Lestari, "Perancangan Sistem Aplikasi Penjualan Sparepart pada Toko Kim Jaya Motor," Jurnal Riset dan Aplikasi Mahasiswa Informatika, vol. 1, no. 3, pp. 376–383, 2020, doi: 10.30998/jrami.v1i03.382.
[8] B. Setiawan, B. Selviana, and A. S. Y. Irawan, "Mengoptimalkan Fungsi Payment Gateway Midtrans pada Website Coffee Shop Melalui Penggunaan Metode Prototype pada Proses Pengembangan," JRST (Jurnal Riset Sains dan Teknologi), vol. 7, no. 2, pp. 219–228, 2023, doi: 10.30595/jrst.v7i2.16964.
[9] D. A. Ramadhani, P. E. Nugraha, M. I. Syahrizal, and R. R. Sani, "Perancangan Aplikasi E-Commerce Top-Up Game Online Berbasis Website dengan Integrasi Payment Gateway," Jurnal Teknologi dan Informasi (JATI), vol. 15, no. 2, pp. 160–173, 2025, doi: 10.34010/jati.v15i2.17055.
[10] A. Hermanto and M. Marsela, "Model Aplikasi Layanan Pelanggan Multi Platform pada Usaha Percetakan Kartu Undangan," Jutisi: Jurnal Ilmiah Teknik Informatika dan Sistem Informasi, vol. 11, no. 2, pp. 459–470, 2022, doi: 10.35889/jutisi.v11i2.932.
[11] I. Maliki and A. Nudin, "Sistem Informasi E-Commerce untuk UMKM Sepeda Motor Berbasis Web," INFOTECH Journal, vol. 9, no. 2, pp. 406–417, 2023, doi: 10.31949/infotech.v9i2.6355.
[12] M. Y. Ardabili and M. Fachrie, "Pengembangan Sistem Pemesanan Jasa Fotografi dengan Integrasi Payment Gateway Berbasis Android," Jurnal Teknologi dan Sistem Informasi Bisnis, vol. 6, no. 1, pp. 54–64, 2024, doi: 10.47233/jteksis.v6i1.1095.
[13] Hasanuddin, H. Asgar, and B. Hartono, "Rancang Bangun REST API Aplikasi Weshare sebagai Upaya Mempermudah Pelayanan Donasi Kemanusiaan," JINTEKS: Jurnal Informatika Teknologi dan Sains, vol. 4, no. 1, pp. 8–14, 2022, doi: 10.51401/jinteks.v4i1.1474.
[14] O. M. A. Al-Atraqchi, "A Proposed Model for Building a Secure Restful API to Connect between Server Side and Mobile Application Using Laravel Framework with Flutter Toolkits," Cihan University-Erbil Scientific Journal, vol. 6, no. 2, pp. 28–35, 2022, doi: 10.24086/cuesj.v6n2y2022.pp28-35.
[15] D. Andrian, "Penerapan Metode Waterfall dalam Perancangan Sistem Informasi Pengawasan Proyek Berbasis Web," Jurnal Informatika dan Rekayasa Perangkat Lunak, vol. 2, no. 1, pp. 85–93, 2021, doi: 10.33365/jatika.v2i1.729.
[16] H. Taherdoost, "Data Collection Methods and Tools for Research; A Step-by-Step Guide to Choose Data Collection Technique for Academic and Business Research Projects," International Journal of Academic Research in Management, vol. 10, no. 1, pp. 10–38, 2021, doi: 10.2139/ssrn.4178676.
[17] S. Bhangu, F. Provost, and C. Caduff, "Introduction to Qualitative Research Methods – Part I," Perspectives in Clinical Research, vol. 14, no. 1, pp. 39–42, 2023, doi: 10.4103/picr.picr_253_22.
[18] N. Surawy-Stepney, F. Provost, S. Bhangu, and C. Caduff, "Introduction to Qualitative Research Methods: Part 2," Perspectives in Clinical Research, vol. 14, no. 2, pp. 95–99, 2023, doi: 10.4103/picr.picr_37_23.
[19] A. Alyami, S. F. Pileggi, O. Sohaib, and I. Hawryszkiewycz, "Seamless Transformation from Use Case to Sequence Diagrams," PeerJ Computer Science, vol. 9, p. e1444, 2023, doi: 10.7717/peerj-cs.1444.
[20] M. Sholeh, I. Gisfas, Cahiman, and M. A. Fauzi, "Black Box Testing on ukmbantul.com Page with Boundary Value Analysis and Equivalence Partitioning Methods," Journal of Physics: Conference Series, vol. 1823, no. 1, p. 012029, 2021, doi: 10.1088/1742-6596/1823/1/012029.