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Application Planning Website Saribuah Fruit Sales with Stock Prediction Features and Digital Payment Integration

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ABSTRACT

The development of information and communication technology has encouraged Micro, Small, and Medium Enterprises (MSMEs) to adapt to electronic trading systems (e-commerce). SariBuah, as a fresh fruit provider, requires a web-based sales platform capable of displaying product catalogs, facilitating ordering, predicting stock, and securely processing digital payments. This study aims to design and develop the SariBuah website application by implementing a hybrid Prophet and XGBoost prediction model to estimate stock availability based on historical sales data, as well as integrating the Midtrans payment gateway to support various payment methods. The system was developed using the System Development Life Cycle (SDLC) Waterfall model, with Next.js as the frontend framework, Tailwind CSS for user interface styling, Express.js as the backend server, Firebase for database management and authentication, and the Midtrans API for digital payment integration. The implementation results show that the stock prediction system can help optimize inventory management, minimize the risk of overstock or stock shortages, and improve sales planning accuracy. The Midtrans digital payment integration provides convenient transactions through bank transfers, digital wallets, credit cards, and QRIS. Functional and usability testing indicate that the application operates well, is easy to use, and provides consumers with a comfortable online shopping experience. This solution is expected to enhance the competitiveness of fruit MSMEs within the modern digital trade ecosystem. This website can be accessed via the following link: https://web-buah-next.vercel.app/ .

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1. INTRODUCTION

The rapid development of digital technologies has transformed how Micro, Small, and Medium Enterprises (MSMEs) conduct business, interact with customers, and manage their internal operations. Digital transformation allows smaller businesses to adopt e-commerce, data analytics, cloud services, and digital payment systems to improve market access and operational performance. Nevertheless, MSMEs commonly experience limitations related to technological capabilities, financial resources, digital knowledge, and the ability to integrate new technologies into existing business processes (Crupi et al., 2020). The sustainability of e-commerce adoption among MSMEs is also influenced by organizational readiness, technology infrastructure, external support, and the capability to continuously use digital platforms rather than merely adopting them temporarily (Amornkitvikai et al., 2022).

E-commerce technology provides MSMEs with opportunities to broaden their customer reach, present products digitally, simplify order processing, and support more responsive services. However, developing an online sales channel alone does not necessarily resolve operational problems, particularly for businesses that sell perishable products. Fresh fruit businesses must manage products with relatively short shelf lives while responding to demand that may vary across periods. Inaccurate demand estimation can lead to excessive inventory, product deterioration, unnecessary storage costs, or insufficient stock that prevents businesses from fulfilling customer orders. Research on perishable-product inventory management therefore emphasizes the importance of reliable demand forecasting in supporting inventory decisions and reducing the operational consequences of uncertain demand (Elorza et al., 2025).

Time-series forecasting and machine-learning methods provide potential tools for addressing these inventory challenges. Prophet is a forecasting procedure based on a decomposable time-series model that represents trend, seasonality, and holiday-related effects. Its design supports configurable forecasting and facilitates interpretation and adjustment by analysts, making it applicable to business time-series data with recurring patterns and trend changes (Taylor & Letham, 2018). Meanwhile, Extreme Gradient Boosting, commonly known as XGBoost, is a scalable tree-boosting method designed to model complex relationships efficiently through regularized ensemble learning (Chen & Guestrin, 2016). Prophet and XGBoost consequently offer different but potentially complementary capabilities: Prophet represents temporal structure, whereas XGBoost can model nonlinear relationships and residual patterns that may remain after the initial time-series estimation.

The combination of Prophet and XGBoost has been investigated in demand forecasting for perishable retail products. In this type of hybrid approach, Prophet is used to estimate the principal temporal components, while XGBoost processes additional patterns or prediction residuals that are not adequately represented by the first model. Elorza et al. (2025), for example, evaluated Prophet, XGBoost, and a hybrid Prophet–XGBoost approach for predicting customer demand for perishable products in retail inventory management. Their study demonstrates the relevance of combining time-series and machine-learning methods when demand is influenced by changing historical conditions. However, the suitability and performance of any hybrid model still depend on the amount, quality, periodicity, and representativeness of the historical data used during training and evaluation.

In addition to inventory forecasting, online commerce requires an efficient payment mechanism. A payment gateway connects an e-commerce application with supported

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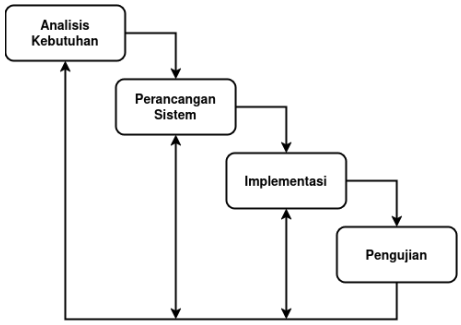
payment channels, allowing payment information and transaction status to be processed electronically. Midtrans provides web- and application-based payment integration through options such as Snap and Core API and supports payments through bank transfers, cards, direct debit, electronic money, and other available channels. Its documentation also explains that transaction statuses can be returned to the connected application, enabling order records to be updated through an automated payment workflow rather than relying entirely on manual confirmation (Midtrans, n.d.).

Several previous studies and system-development projects have focused separately on e-commerce adoption, payment-gateway integration, or demand forecasting. However, forecasting research generally concentrates on predictive performance without implementing the model as part of a complete transaction platform. Conversely, e-commerce application studies frequently emphasize product catalogs, shopping carts, authentication, and payment processing but do not include data-driven inventory forecasting. This separation creates a practical research gap, particularly for fresh fruit MSMEs that require both customer-facing transaction facilities and decision support for managing perishable inventory. The gap is therefore not merely the absence of a forecasting algorithm or payment service, but the limited integration of these components into one operational web-based environment.

To address this gap, this study aims to design and develop the SariBuah web-based e-commerce application by integrating weekly stock forecasting based on a hybrid Prophet–XGBoost model with the Midtrans digital payment gateway. The application is developed through the Waterfall model of the System Development Life Cycle and employs Next.js for the frontend, Express.js for backend transaction services, Firebase for authentication and database management, FastAPI for forecasting services, and Midtrans for payment processing. The proposed system includes product-catalog management, customer registration and authentication, shopping-cart processing, order monitoring, digital payment, and an administrative stock-prediction feature. The main contribution of this study is the implementation of forecasting analytics and digital transaction processing within a unified e-commerce platform specifically intended to support the operational needs of a fresh fruit MSME. The system is evaluated through Black Box Testing and User Acceptance Testing to assess functional conformity and user acceptance.

2. METHODS

This study This research uses software engineering methods with approach System Development Life Cycle (SDLC) model Waterfall, which consists of the following stages: needs analysis, system design, implementation, and testing.



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Needs Analysis

The requirements analysis stage is carried out to identify user needs and the functions that must be available, which are divided into two main categories, namely functional and non-functional requirements.

System Planning

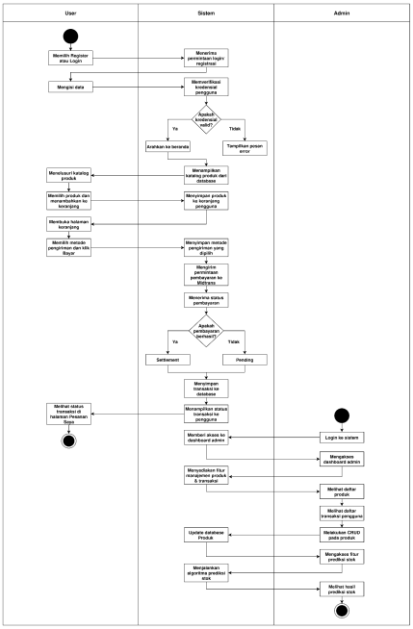
System design is carried out to describe the implementation according to functional and user requirements. non-functional, including compilationuse case diagram, activity diagram, page navigation structure, database, and user interface.

Use Case Diagram

Describes the interaction between users and administrators with the system. Users can register, log in, view the catalog, add products to their cart, make payments, and monitor orders. Admins can manage products (CRUD), monitor transactions, and use the stock forecast feature.

Activity Diagram

Displays the process flow in threeswimlane: user, admin, and system. This diagram visualizes the process from login to transactions and stock predictions.



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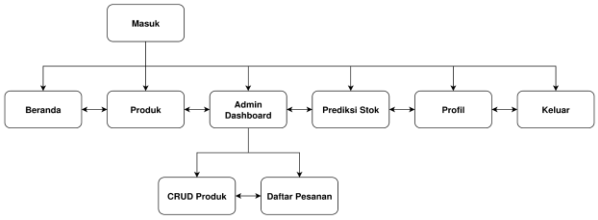
Navigation Structure

The system uses a combination of hierarchical and linear navigation. Users are guided from login to the homepage, then to the catalog, product details, cart, payment, and order history. Admins are guided todashboard product management, transactions, and prediction features.



Database Design

The database uses Cloud Firestore, with a structure consisting ofusers (user account),products (product information),carts (shopping cart), andtransactions (transaction and payment data).

User Interface

Interface Designed using Figma with a wireframe approach, the design focuses on simplicity and ease of navigation. The main page includes the homepage, catalog, product details, cart, and order history. Admins have access to a product management dashboard and stock forecasting feature.

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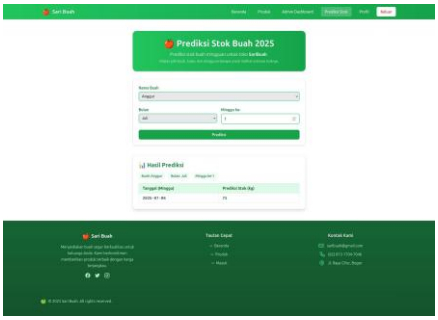
3. DISCUSSION

Database Implementation with Firebase

Firebase is used as backend for authentication, data storage via Firestore, and shopping cart management. Configuration includes project creation, feature activation, and more.Authentication and Firestore, as well as integration with applicationsNext.js uses SDKs and environment variables to keep API keys secure. Firestore access rules are structured based on roles: users can only access their own data, while admins have full control over product and transaction data. Authentication and cart are done through the React Context API (AuthContext and CartContext) to be globally accessible within the application.

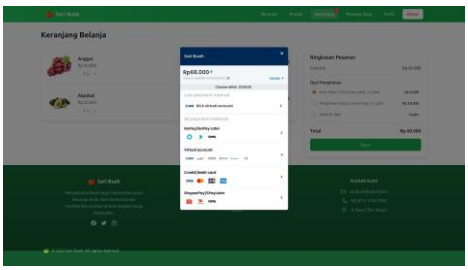
Implementation of Weekly Fruit Stock Prediction Model

Model prediction The stock model uses Prophet as the main model and XGBoost to handle residuals. Weekly sales data for 2024 is processed into time series per fruit type, then trained and evaluated using RMSE, MAE, and MAPE, with log-transformation andfallback The median is used to maintain accuracy. Evaluation results are stored in CSV format, and the trained model is saved as a .pkl file. The model is integrated into the FastAPI API via a custom endpoint, packaged in Docker, and deployed on Hugging Face Spaces. Predictions are displayed in a visual format.real-time Of dashboard admin, complete with validation, authentication, and handlingerror to support decision making.



Midtrans Payment Implementation

Midtrans integration is done by storing the ServerKey in the backend (Express.js) andClient Key in the frontend (Next.js). Processcheckout Snap Tokens are generated through a dedicated endpoint, while payment notifications are received for verification, order status updates, and automatic stock reduction in Firestore. The system is deployed in Vercel, and testing is using Midtrans.Simulator successfully displays the “Payment Successful” status on the order page.



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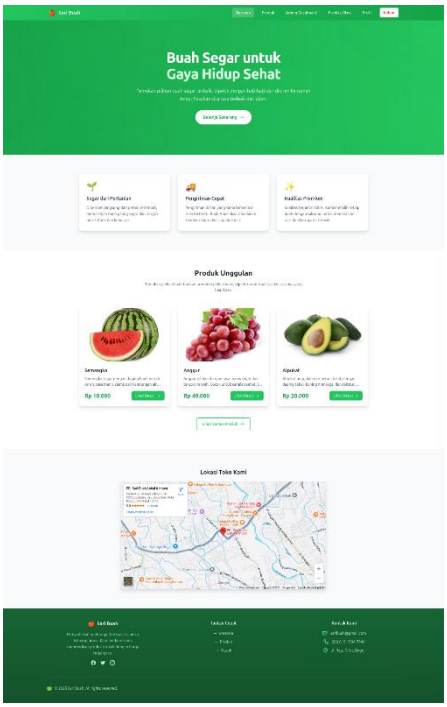
Website Creation Implementation

The website is developed with Next.js, including the homepage,

Product management, authentication, product details, cart, orders, user profiles, admin dashboard, and stock forecasts. Key features include a hero section, product filters, login/registration validation, subtotal and shipping cost calculations, and payment integration with Midtrans. Admins can manage products, monitor transactions, and access stock forecasts.real-time via API. The system is connected to Firebase and Midtrans, then deployed to Vercel.



System Testing

Testing done to make sureall feature worksproperly and according to user needs. The methods used includeBlack Box Testing to verify functionality, as well asUser Acceptance Testing (UAT) to assess user satisfaction and acceptance level of the system.

Black Box Testing

This test verifies system functionality based on input and output without examining the internal structure. Features tested include registration, login, shopping cart, payment, and stock forecasting for both users and admins.

User Acceptance Testing (UAT)

UAT aims to evaluate the suitability of the system to user needs and expectations, by assessing functionality and usability from the end user's perspective.

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UAT Testing Results

Majority Respondents gave Agree and Strongly Agree ratings to various aspects of the application, indicating that key features such as registration, login, transactions, and interface display have functioned as expected by users.

No.	Function	Testing Scenario	Expected Results	Test Results	Status
1	Account Registration	Fill in all fields: Full Name, Email, Password, Confirm Password, Telephone Number, and Address	Account successfully created and redirected to the homepage	Account successfully created and redirected to the homepage	Passed
2	Account Registration	Leave all registration fields empty	Display message: 'Please fill out this field.'	Display message: 'Please fill out this field.'	Passed
3	Login	Enter a valid email and password	Successfully logged in and redirected to the homepage	Successfully logged in and redirected to the homepage	Passed
4	Login	Enter an invalid email and password	Display message: 'Failed to sign in. Please check your credentials.'	Display message: 'Failed to sign in. Please check your credentials.'	Passed
5	Add Product to Cart	Click 'Add to Cart' on a product	Product is added to the shopping cart	Product is added to the shopping cart	Passed
6	Manage Cart	Delete products, change quantities, select shipping options	Cart updated successfully	Cart updated successfully	Passed
7	Payment Process	Click 'Pay' to continue checkout	Midtrans Snap payment window appears	Midtrans Snap payment window appears	Passed
8	Payment Simulation	Select BCA Virtual Account payment	Payment simulation processed successfully	Payment simulation processed successfully	Passed
9	View Order Status	Open 'My Orders' page	Order ID, order details, and transaction status are displayed	Order ID, order details, and transaction status are displayed	Passed
10	Add Product (Admin)	Complete add-product form and save	Product saved and displayed on product page	Product saved and displayed on product page	Passed
11	Edit Product (Admin)	Modify product information	Updated product information displayed	Updated product	Passed

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				information displayed	
12	Delete Product (Admin)	Delete selected product	Product removed from system and product page	Product removed from system and product page	Passed
13	View Transaction List (Admin)	Open transaction list	Transaction table displayed correctly	Transaction table displayed correctly	Passed
14	Weekly Stock Prediction (Admin)	Select fruit, month, week, then click 'Prediction'	Estimated weekly stock displayed	Estimated weekly stock displayed	Passed

No.	Question	Response Count					Percentage				
		1	2	3	4	5	1	2	3	4	5
1	Registration is easy to complete	0	0	1	2	32	0	0	2,86	5,71	91,43
2	Login process is fast and reliable	0	1	0	2	32	0	2,86	0	5,71	91,43
3	Website interface is attractive and easy to use	0	0	2	9	24	0	0	5,71	25,71	68,57
4	Product information is complete and clear	0	0	2	9	24	0	0	5,71	25,71	68,57
5	Product search feature functions properly	0	1	0	8	26	0	2,86	0	22,86	74,29
6	Ordering process is easy and smooth	0	1	0	6	28	0	2,86	0	17,14	80
7	I can easily choose shipping/payment methods	0	0	2	8	25	0	0	5,71	22,86	71,43

With a total score of 2434 out of 2625, the test result percentage reached 92.76%, falling into the strongly agree category. These results indicate that the SariBuah app is deemed suitable and accepted by users as a fruit shopping platform.online.

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No	Score Weight	Calculation	Results
1	Strongly Disagree	1 x 0	0
2	Don't agree	2 x 3	6
3	Neutral	3 x 27	81
4	Agree	4 x 128	512
5	Strongly agree	5 x 367	1835
Shoes			2434

4. CONCLUSION

This research successfully designed and developed a fruit sales web application called SariBuah, which provides a product catalog, pricing information, and online ordering facilities. This system is equipped with a weekly stock prediction feature using a combination of the Prophet and XGBoost algorithms, which has proven effective in processing historical sales data to support more optimal inventory management. Integration with the Midtrans payment service also provides convenience and security in the transaction process. Based on the results of functional testing and user evaluations, the application was deemed easy to use, has good performance, and is able to provide a shopping experience.online which is practical and efficient for consumers.

5. REFERENCES

Aditya Santika, A., et al. (2023). Application of Likert scale in classifying BRILink agent customer satisfaction levels using random forest. [Journal name not provided], 11(3).

Aqila, F. D., Normansyah, R., Latuconsina, R., & Novianty, A. (2025). Creating an interactive student portfolio in the form of a scientific work book [Online]. Telkom University.

Arianti, T., et al. (2022). Designing a library information system using UML (Unified Modeling Language) diagrams. Journal of Applied Computer Science and Information (JIKTI), 1(1), 19–25.

Ba'abud, M. R. (2025). Prediction of online game voucher sales using the XGBoost method based on Prophet residuals [Thesis, Universitas Pembangunan Nasional "Veteran" Jawa Timur].

Badan Pengembangan dan Pembinaan Bahasa. (2024). Buah. Dalam Kamus Besar Bahasa Indonesia Daring [Online].

Chamida, M. A., Susanto, A., & Latubessy, A. (2021). Analisa user acceptance testing pada sistem informasi pengelolaan rumah susun di Dinas Perumahan Rakyat dan Kawasan Permukiman Kabupaten Jepara. Indonesian Journal of Technology, Informatics and Science (IJTIS), 3(1), 36–41.

DOI: https://doi.org/10.63956/jitar.v2i1.71
e-ISSN: 3089-8013; p-ISSN:3089-8021

Fathoni, A., Afirianto, T., & Akbar, M. A. (2025). Comparative analysis of performance between Prisma and KnexJS on TypeScript-based API applications. [Publication details not provided].

IBM. (2025). What is Hugging Face? IBM Think [Online].

Jange, B., et al. (2021). BCA Bank stock price prediction using Prophet. Journal of Trends Economics and Accounting Research, 2(1), 1–5.

Kharisma Wardana, G., et al. (2021). E-commerce development with Midtrans payment gateway API integration. [Publication details not provided].

Mukhlis, I. R. (2023). Web learning programming: Basic introduction reference for learning web programming stages for beginners. [Publisher not provided].

Permono, A. L., Ruswanti, D., & Carolina, A. (2024). The application of MERN stack on Schedule Plus App as a web-based scheduling management system. Go Infotech: Jurnal Ilmiah STMIK AUB, 30(2), 276–286.

Pratama, S. Y., & Zaky, U. (2024). Analysis of mobile web-based emergency application development with Next.js technology approach. MALCOM: Indonesian Journal of Machine Learning and Computer Science, 5(1), 207–215.

Rahman, S., Sembiring, A., Siregar, D., Khair, H., Prahmana, I. G., Puspadini, R., & Zen, M. (2023). Python: Basics and programming. [Publisher and publication details not provided].

Ridwan, M., & Fitri, I. (2021). Design and construction of a website-based marketplace using the systems development life cycle methodology with the Waterfall model. Journal of Information and Communication Technology, 5(2).

Riza, F. (2022). Analysis and prediction of sales data using machine learning with a data science approach. Data Sciences Indonesia, 1(2), 62–68.

Setiyani, L. (2021). System design: Use case diagram. In Proceedings of the National Seminar on Innovation and Technology Adoption 2021: Implementation of Cybersecurity in Organizational Operations (Vol. 1, No. 1, pp. 246–260). STMIK Rosma.

Sofyan, M., et al. (2024). Measurement of SQL and NoSQL database performance on e-commerce applications. [Publication details not provided].

Solihat, M., & Sandika, D. (2022). E-commerce in Industry 4.0. [Journal and publication details not provided].

Suharni, Ratnasari, L., Lestari, M., & Haikal, F. (2024). Designing an e-commerce website for sweet passion fruit products using navigation structure and UML. Information Engineering Journal. [Volume, issue, and page numbers not provided].

Suryanto, A. A., & Muqtadir, A. (2019). Application of the mean absolute error method in the linear regression algorithm for rice production prediction. SAINTEKBU, 11(1), 78–83.

Syuhada, E. G., Yusril, M., & Setyawan, H. (2023). Comparative analysis of the Prophet method and the exponential smoothing method in forecasting the number of unemployed people

DOI: https://doi.org/10.63956/jitar.v2i1.71
e-ISSN: 3089-8013; p-ISSN:3089-8021

in West Java: A systematic literature review. In Journal of Informatics Engineering Student Oriented Object. Tahta Media.

Wanto, A., & Windarto, A. P. (2017). Analysis of consumer price index prediction based on health groups using the backpropagation method. Sinkron: Jurnal dan Penelitian Teknik Informatika, 2(1), 37–43.

Yulianti, E. H., Soesanto, O., & Sukmawaty, Y. (2022). Application of the Extreme Gradient Boosting (XGBoost) method to credit card customer classification. JOMTA Journal of Mathematics: Theory and Applications, 4(1).

Bisnis, J. E., et al. (2023). The role of micro, small, and medium enterprises in the Indonesian economy. [Journal name not identified], 2(3).

Handayani, N. L. P., et al. (2022). The role of digital payment systems in revitalizing MSMEs. [Journal name not identified], 4(3).

DOI: https://doi.org/10.63956/jitar.v2i1.71
e-ISSN: 3089-8013; p-ISSN:3089-8021