IJOEM

Indonesian Journal of Elearning and Multimedia
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Website Design for Pineapple-Based MSMEs in Purbalingga Using the Extreme Programming Method (Case Study: Rumah Olahan Nanas Pinne)

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Article Information:
Received June 17, 2025
Revised June 23, 2025
Accepted July 14, 2025

Keywords:
Blackbox Testing; Extreme Programming; MSMEs; Processed Pineapple; Website

Abstract

Background: Rumah Olahan Nanas Pinne is one of the MSMEs in Purbalingga Regency that is engaged in the processing of pineapple-based products. In running its business, this MSME faces obstacles in promoting its products digitally and recording sales reports manually, which hinders operational efficiency.
Aims: This study aims to develop a website that can be used as a digital promotional medium and to view sales reports in a more structured manner.
Methods: The website system was developed using the Extreme Programming method, which is known for its flexibility and iterative nature, allowing for changes during the development process. System testing was conducted using the blackbox testing method to test the functionality of the system.
Result: The website was successfully developed and its functionality runs according to the design with a blackbox testing success rate of 100%.
Conclusion: The developed website has been successful in helping to promote products digitally to expand market reach. In addition, this system also helps in viewing sales reports easily and accurately.

A. Introduction

The rapid development of the internet and information technology has had a significant impact on various aspects of human life, particularly in business development, including Micro, Small, and Medium Enterprises (MSMEs) (Sutrisno et al., 2023). The use of technology has encouraged MSME actors to move beyond conventional marketing methods and utilize digital technology-based marketing (Setyawati et al., 2023). Through digital media such as website and social media like WhatsApp, TikTok, Instagram, Facebook, businesses can reach consumers more broadly, in real-time, and efficiently (Akbar et al., 2023; Wahyudi et al., 2024). By implementing digital media, MSMEs can enhance their competitiveness and reduce promotional and marketing costs (Hartono et al., 2022).

MSMEs make a significant contribution to the Indonesian economy. According to data from the Indonesian Chamber of Commerce and Industry in 2023, the number of MSMEs in Indonesia reached 66 million, representing a 1.52% growth from the previous year (UMKM Indonesia, 2023). MSMEs employ approximately 97% of the workforce in Indonesia and account for 70% of the country's gross domestic product (Widita et al., 2024). One of the regions that has become a center for SME development is Central Java Province, particularly Purbalingga Regency, which has around 96,000 SME operators across various sectors, including the culinary sector (Puspitowati & Widayati, 2021). In Siwarak Village, Karangreja District, there are over 1,500 pineapple farmers who have been selling fresh pineapples at low prices (Mandamdari & Widjojoko, 2022). To increase the value of their products, some entrepreneurs have begun

How to Cite : Anggraeni, L., & Gustalika, M. A. (2025). Website Design for Pineapple-Based MSMEs in Purbalingga Using the Extreme Programming Method (Case Study: Rumah Olahan Nanas Pinne). *IJOEM Indonesian Journal of E-Learning and Multimedia*, *4*(3), 166–180. https://doi.org/10.58723/ijoem.v4i3.452
ISSN : 2830-2885
Published by : Asosiasi Profesi Multimedia Indonesia

processing pineapples into various products such as jam, syrup, *dodol*, and other pineapple-based products (Fadillah & Indika, 2024).

In the era of digital transformation, digital literacy has become a crucial aspect that all MSME players and consumers must possess. Digital literacy encompasses the ability to use devices and applications, as well as an understanding of how to effectively and safely utilize technology to support economic activities (Paweloszek et al., 2023). Low digital literacy can be a significant obstacle to technology adoption, affecting both business players seeking to market their products and buyers looking to utilize digital services. Therefore, training on the benefits of using technology in managing SMEs is necessary to increase sales and expand marketing. Additionally, buyers can feel more confident and secure when transacting online (Lestari et al., 2024). This is important so that digital technology is not only accessed but also optimized to enhance competitiveness, economic inclusion, and the sustainability of businesses in society.

Rumah Olahan Nanas Pinne is one of the SMEs that focuses on pineapple processing and has been established since 2018. However, based on interviews with the business owner, it appears that product marketing is still carried out conventionally with suboptimal use of social media. The absence of a dedicated administrator and the owner's busy schedule pose challenges to regularly updating content, resulting in low customer interaction. Additionally, the manual process of recording sales also hinders the creation of accurate reports. To address these issues, a viable solution is the development of an integrated website that serves as both a promotional tool and a digital sales tracking system, thereby enhancing operational efficiency and effectiveness.

Previous research has shown that many businesses face challenges in managing and stocking goods manually. Dony Store is one such business that has encountered problems such as stock shortages during ordering and errors in order recording. To address this, an online goods ordering information system was developed. The results showed a functionality rate of 95% and a usability rate of 96%, indicating that the solution effectively improves the efficiency and accuracy of the ordering system (Priandika & Riswanda, 2023). Another study highlighted issues with manual record-keeping, ordering, and inventory tracking, as well as frequent long queues in the beverage business. As a solution, a website-based e-commerce system was developed using the extreme programming method, which also includes attendance management and payroll calculation features based on employee attendance. Blackbox testing results showed that 95.30% of users stated that the system was easier to use and more organized compared to the previous method (Imanda & Estrika, 2023).

Another study addressed the issue of conventional marketing not reaching a wide audience, resulting in suboptimal revenue. To address this issue, a website application was developed using the waterfall method. Blackbox testing results showed that the website functioned well for easy online ordering (Wijoyo et al., 2023). Further research focused on stores that did not yet have an online sales management system, seeking to efficiently input product data. Using the Rapid Application Development (RAD) method, a website was developed that provides customer service features, product information, and an online transaction system (Atmaja et al., 2023).

Another study highlights the challenges faced by SMEs in marketing their products due to the lack of integrated promotional and sales platforms. Potential buyers also struggle to find the products they need. The system was developed using the Extreme Programming method, resulting in an e-commerce website that facilitates sellers in promoting their products and assists buyers in finding the desired items. Testing results indicate that the system effectively addresses these issues (Sumigar et al., 2022).

Previous studies have contributed greatly to the development of digital business ordering and management information systems. The systems developed in previous studies generally include product promotion, ordering, and product management, but most do not provide real-time sales reporting and inventory monitoring features. Additionally, there have been few studies specifically addressing the case of SMEs in the agricultural processing sector, such as pineapple production, particularly in rural areas with limited technological resources and administrative staff. Based on this, this study developed a website using the Extreme Programming method, which not only serves as a platform for product promotion and ordering but is also equipped with inventory monitoring features, information on sold products, and sales reports accessible to business owners. With this system, it is hoped that it can assist SMEs, particularly the Rumah Olahan Nanas Pinne, in managing their business operations effectively, efficiently, and structurally.

Therefore, this study aims to develop a website for pineapple processing MSMEs in Purbalingga, namely Rumah Olahan Nanas Pinne. This system is designed not only to integrate product promotion, online ordering, product stock viewing, and sales report viewing functions, but also to serve as an educational

platform or resource for MSME players. Through this website, business players are expected to improve their digital skills and independence in managing their businesses online, so that business operations become more effective, efficient, and competitive in the era of digital marketing.

B. Research Methods

This research is a type of applied research with a software engineering approach that aims to develop a website-based information system at UMKM Rumah Olahan Nanas Pinne. The system development method used is Extreme Programming which has several stages, namely planning, design, coding, and testing (Pramudya et al., 2025). This method was chosen because it supports an iterative process and allows direct involvement from the client in each stage of system development. This makes it easier for the development team to complete features if there are changes or input from users during the development process (Shrivastava et al., 2021). For example, any input or suggestions from MSME partners can be directly implemented in the next iteration without waiting for all development processes to be completed.

The object of this research is a website for UMKM Rumah Olahan Nanas Pinne that can be used to view product information, buy and sell online, and view sales reports. The research subjects include business owners as system admins and customers as website users. The sampling technique used is purposive sampling, where the subject is chosen intentionally because of its relevance to the needs of the system. The research was conducted in Siwarak Village, Karangreja District, Purbalingga Regency, with the main data collection process carried out on June 10, 2024 through direct interviews with the business owner. Overall, the research process took place during the 2024/2025 academic year.

The research begins with the problem identification stage which includes conventional problems and manual recording of sales. Furthermore, a literature study was conducted on several relevant sources to support the theoretical basis and system design. After that, data collection was carried out through interviews, which were then compiled into user stories as a reference in feature development.

In this research, the Extreme Programming method is used to support feature development based on its four stages, namely:

1. Planning
   This planning stage is carried out by collecting user requirements specifications, identifying problems, and analyzing and documenting user stories. Users explain the problems that exist in the previous system and provide an overview of the system to be developed. The results of the interview are then analyzed and documented in the form of user stories as the basis for developing the features of the designed system.
2. Design
   At this stage, the system design is carried out according to user needs, which includes system design modelling and interface design based on predetermined specifications (Pramudya et al., 2025). System modelling is made to describe the relationship between data and the workflow of the system. To clarify the design process, UML or Unifield Modelling Language is made which consists of a use case diagram, activity diagram, sequence diagram, and class diagram (Prabandanizwaransa et al., 2023).
3. Coding
   The coding stage involves implementing the previous system design into a programming language. This process begins by creating a database based on the results of the class diagram created during the design stage. Next is to implement the results of the user interface design that has been made at the ui design stage into the program in order to produce the appropriate system display. In developing this system, HTML, CSS, and PHP programming languages are used, with MySQL database support for structured database management.
4. Testing
   The testing stage is carried out to evaluate whether the system developed can function effectively and meet user needs. Testing is done using the black box testing method, which is focused on testing the functionality of the system (Megawati et al., 2023). Test scenarios are created based on the main features available in the system, by specifying the inputs provided, the expected outputs, and comparing them with the actual results when the system is running.

The final stage of the research is the analysis of the results comparing the situation before and after the system, especially in terms of marketing and viewing sales reports. The research flow can be described as follows:

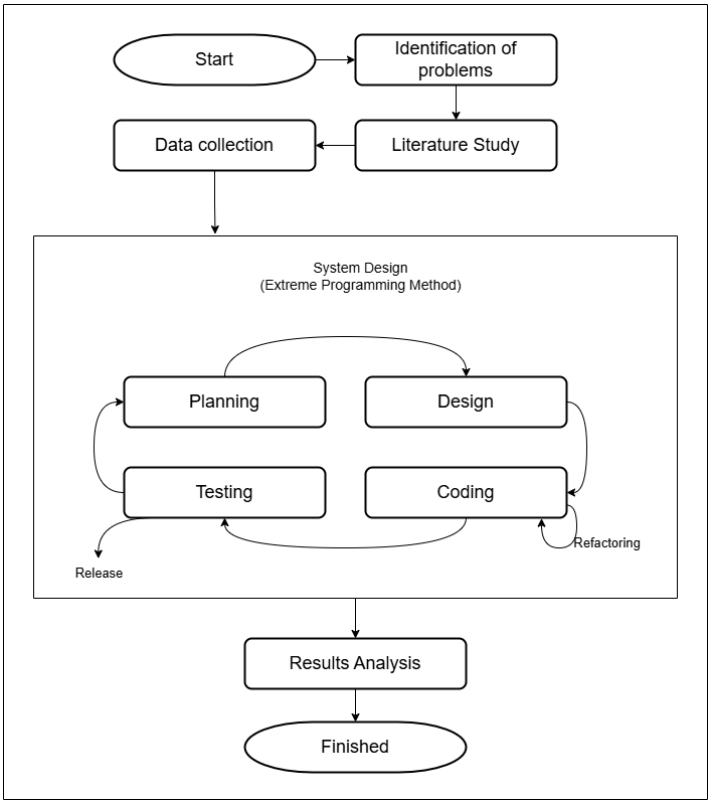

Figure 1. The Research Flowchart

The complete research flow can be seen in Figure 1, where the stages of the research process are explained, starting from the problem identification stage to the analysis of results, by displaying the software development cycle using the extreme programming method.

Data collection techniques were carried out through interviews, using a semi-structured questionnaire based on the information needs of the system, such as the ordering process, promotional constraints, and sales management. The research instruments used were direct observation of business processes, a semi-structured interview questionnaire, and documentation during the system development process. Analysis of the results in this study was carried out descriptively based on the results of system testing using a black box. This test aims to evaluate the functionality of each feature on the website developed (Megawati et al., 2023).The test results show that all features can run according to the scenario that has been designed, so the system is declared functionally successful. This research is limited to developing a system that functions as a digital marketing medium and viewing sales reports.

C. Results and Discussion

The research results and discussion presented include the process of designing a website for MSMEs using the Extreme Programming method and the results of system testing using blackbox testing to ensure that all features function as intended. The research results and discussion are described as follows.

1. Results

a. System Planning Results

Table 1. User Story

No	User Story
US-01	As an admin and customer, I want the system to be able to log in and register accounts so that I can access features according to my role as an admin or customer.
US-02	As an administrator, I would like the system to be able to view sales reports so that I can analyze and evaluate sales results in the store easily, quickly, and accurately without having to open multiple books.

No	User Story
US-03	As a customer, I want the system to be able to view product lists and product details, so that I can see the complete product with descriptions, images, and prices, thereby improving the customer experience and reducing the need for manual questions and answers.
US-04	As a customer, I want to be able to order products online, which allows for more efficient transactions from a distance, without having to go to the store or wait for manual confirmation from the store owner to make a purchase.

Table 1 is a user story that describes the main needs of system users, both as admins and customers. This user story will later become a reference in designing the features of the system being developed.

b. System Design Results

1) Use Case Diagram

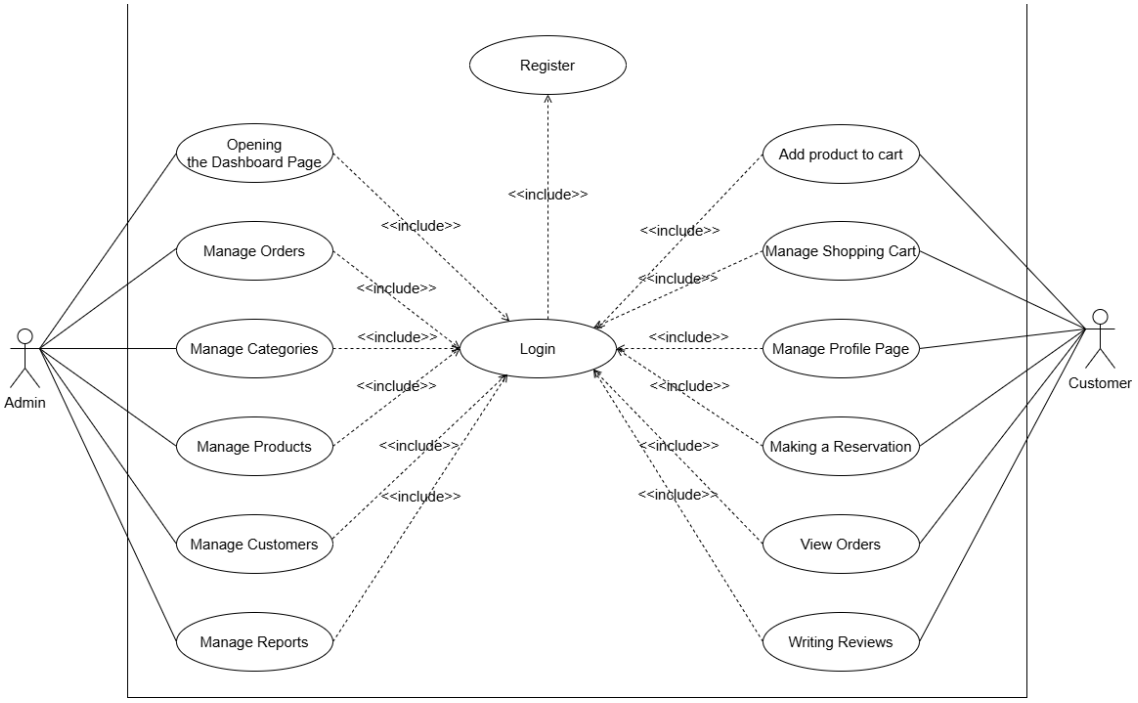

Figure 2. Use Case Diagram

Figure 2 shows the use case diagram for administrators and customers on the Rumah Olahan Nanas Pinne website. Administrators have access to perform various tasks, including logging in, opening the dashboard page, managing category pages, products, customers, and orders, as well as viewing sales reports. Meanwhile, customers can log in, open the homepage, add products to their cart, place orders, leave reviews, and manage their accounts.

2) Activity Diagram

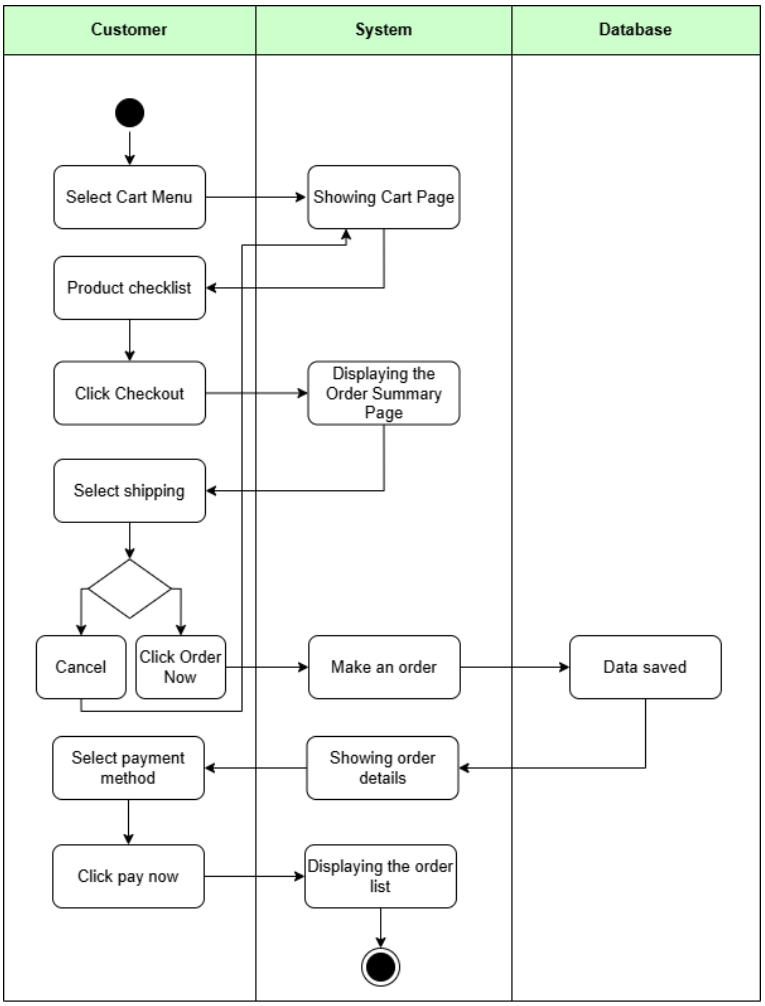

Figure 3. Activity Diagram for Orders

Figure 3 is an activity diagram that illustrates the customer's ordering process. The process begins on the shopping cart page, where customers can select the products, they wish to order and then click the checkout button. Next, customers will be directed to the order summary page to select a shipping method. On this page, customers can choose to cancel and return to the shopping cart page or select “Place Order Now” to continue. If they choose “Place Order Now,” the order data will be saved to the database, and customers will be redirected to the order details page to select a payment method. After that, the customer's order list will be displayed.

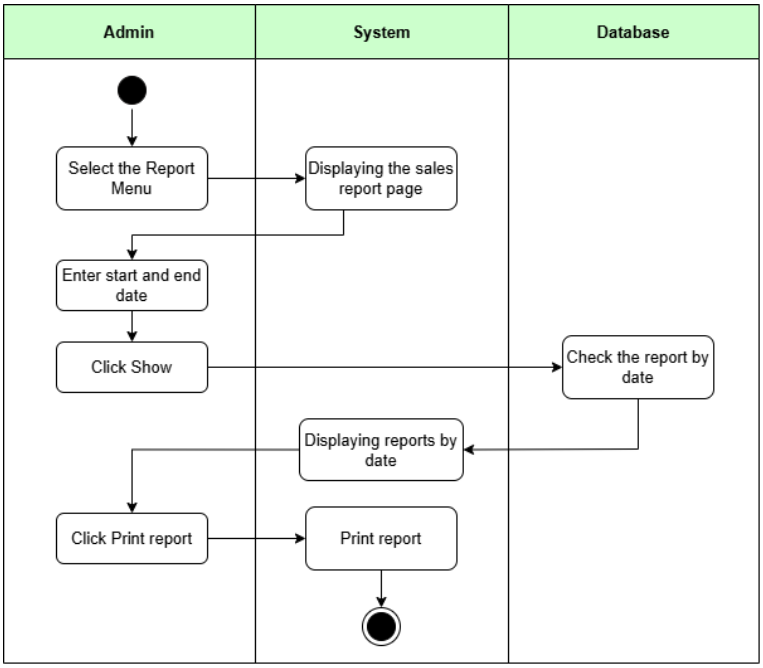

Figure 4. Sales Report Activity Diagram

Figure 4 is an activity diagram that illustrates the activities on the report page, where administrators can print reports based on the date range entered. Administrators can enter the start date and end date as filters for the report data. After that, the system will process and display the report data according to the dates entered, and administrators can select the print menu to print the report.

3) Sequence Diagram

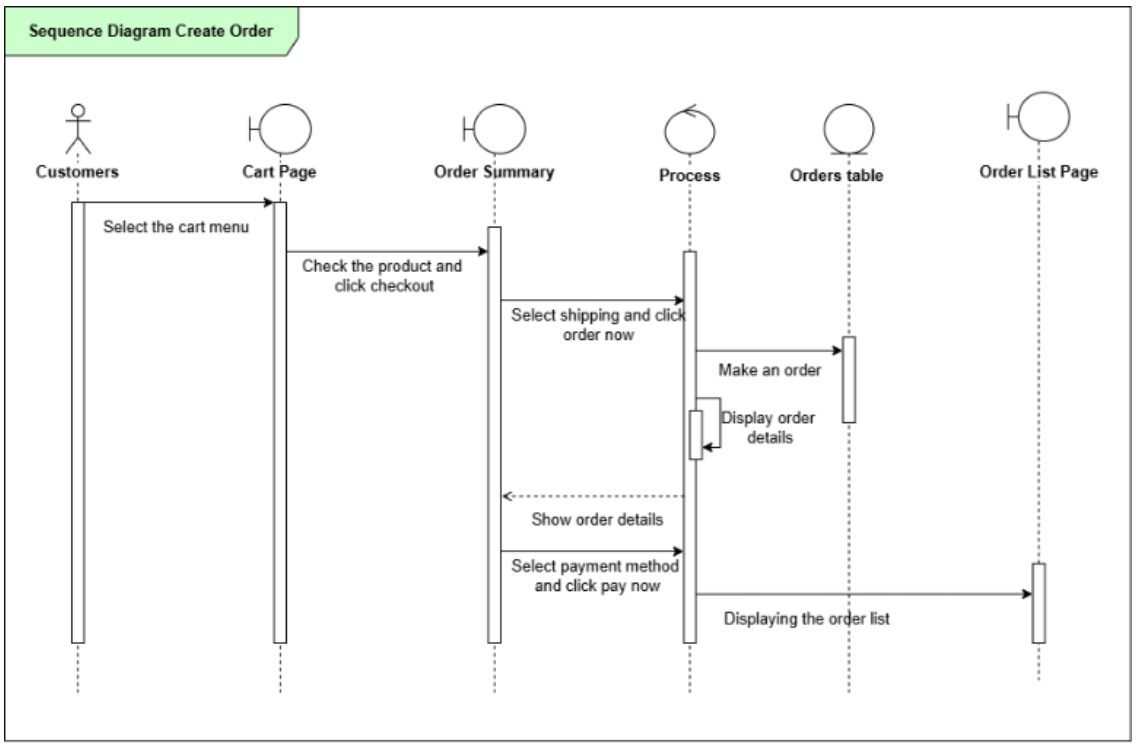

Figure 5. Sequence Diagram Create Order

Figure 5 is a sequence diagram for the ordering process. The process begins when the customer selects a product on the shopping cart page and clicks the checkout button. The system then directs the customer to the order summary page, where they can select a shipping method. The customer can either cancel the order

or proceed with it. If the order is continued, the system saves the order data to the database and directs the customer to the order details page to select a payment method. After that, the system displays the customer's order list.

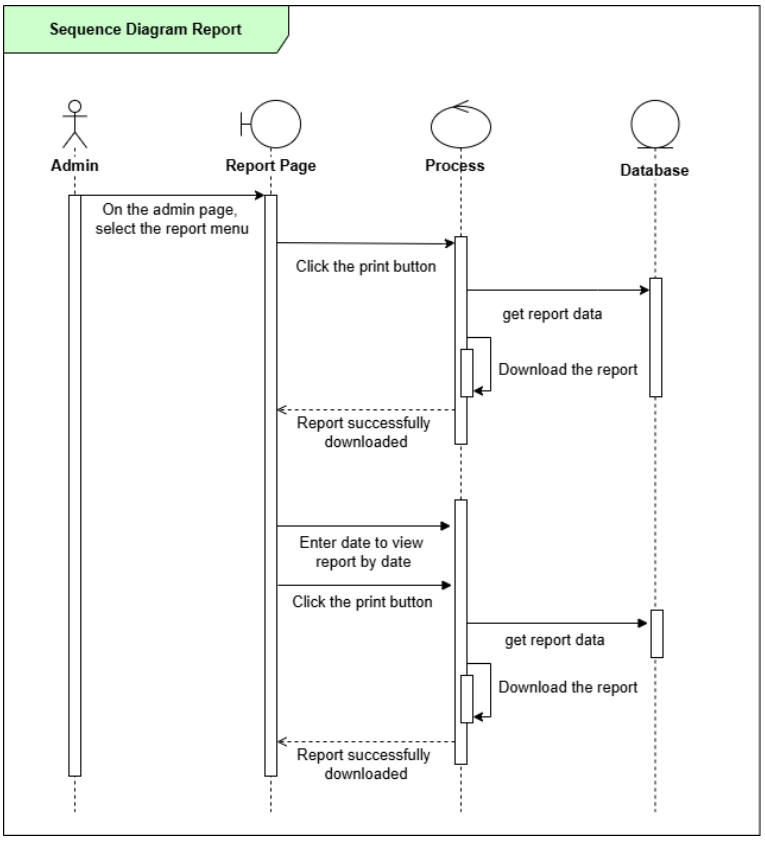

Figure 6. Sales Report Sequence Diagram

Figure 6 is a sequence diagram for the report page. The process begins when the administrator enters the start date and end date as filters for the report data. The system then processes the request and retrieves the report data from the database based on the entered dates. Additionally, the administrator can print the report by selecting the Print menu.

4) Class Diagram

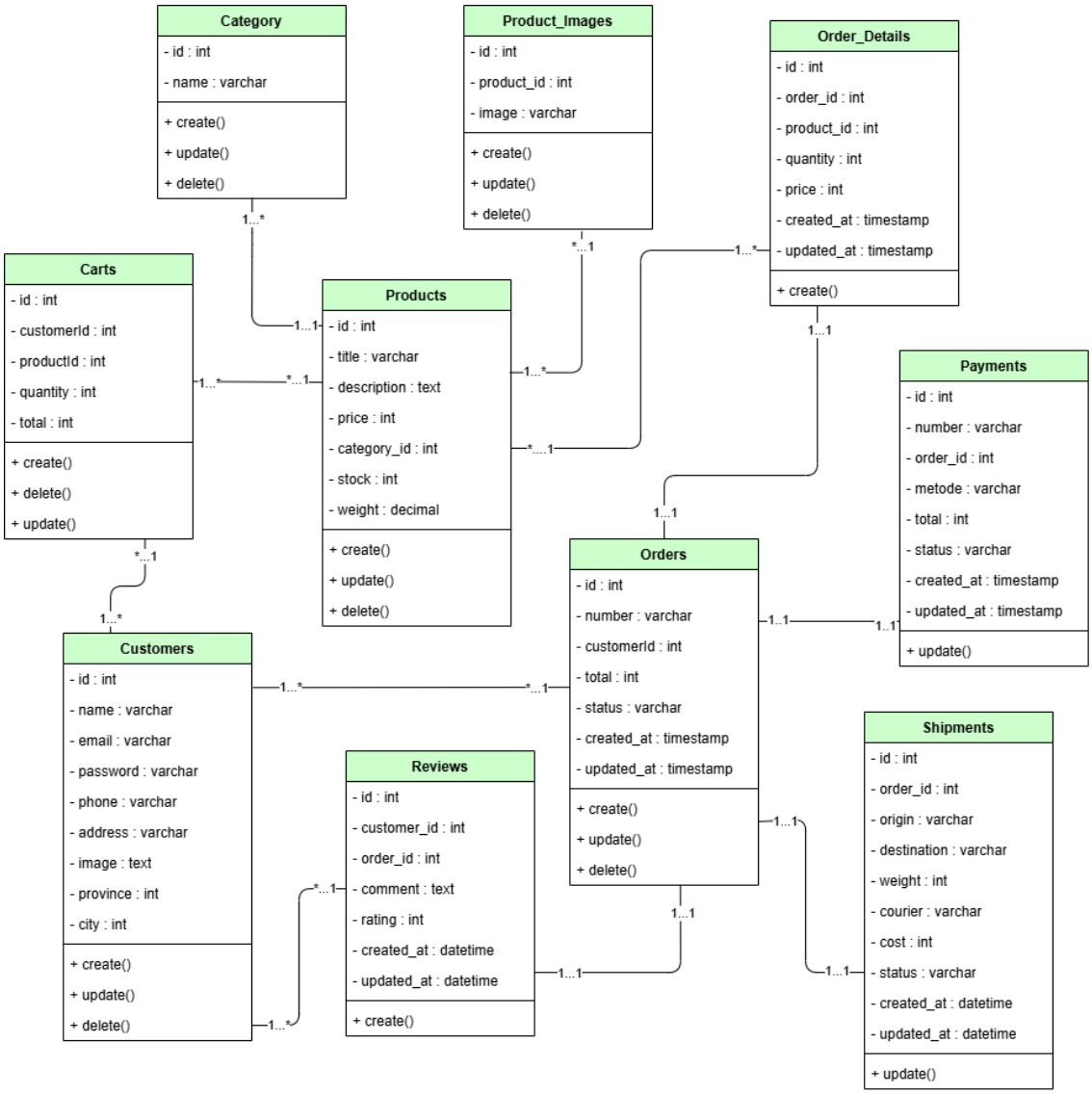

Figure 7. Class Diagram

Figure 7 is a class diagram of the Pinne Pineapple Processing House website system. This diagram includes the main classes, namely category, product, product image, carts, customers, order, order_details, payments, shipments, and reviews. Each class has attributes and methods for data management, including add, edit, and delete operations. The relationships between classes in the diagram illustrate the interconnections and interactions between functions in the system as a whole.

c. System Implementation Results

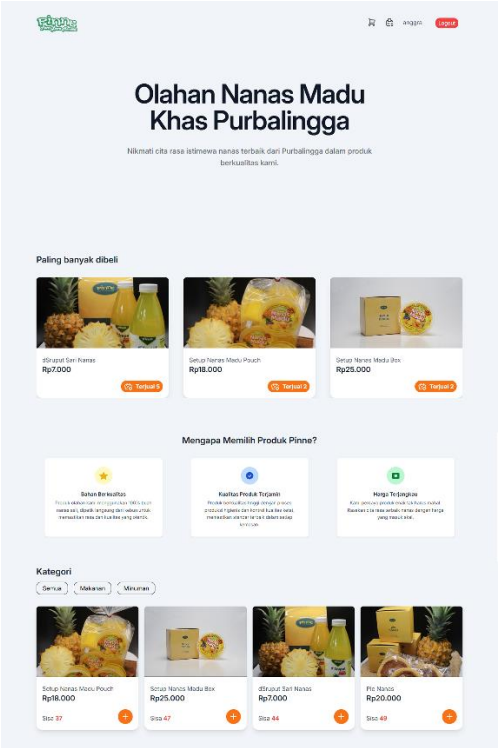

Figure 8. Homepage

Figure 8 shows the homepage, which is the main page for customers. This page contains various content, including product information, reasons for choosing Pinne products, product categories, customer reviews, store addresses, and contact information. Additionally, the navbar features menus that provide access to the shopping cart, order list, customer profile, and a logout button, making it easy for customers to utilize the available services.

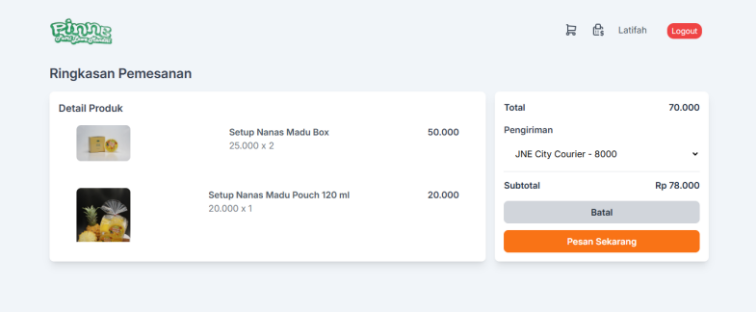

Figure 9. Order Summary Page

Figure 9 shows the order summary page, which contains the products that have been selected and will be ordered by the customer, as well as the total amount to be paid. On this page, customers can also select their preferred shipping method. In addition, there is a cancel button to return to the shopping cart page and an order now button to continue and complete the ordering process.

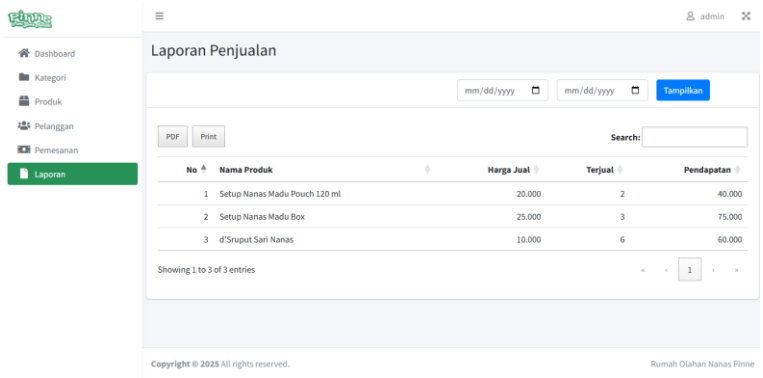

Figure 10. Sales Report Page

Figure 10 is the report page, where administrators can access information about products sold. There is a filter feature based on date, namely the start date and end date, to facilitate reviewing reports for the desired date period. Additionally, there are print and PDF buttons that enable administrators to print reports in PDF format, as well as a search feature to facilitate data retrieval.

d. System Testing Results

To ensure that all features on the website function as designed, black box testing was conducted. The test results are shown in the following table:

Table 2. Blackbox Testing

Role	Menu Tested	Test Scenario	Expected Results	Testing Results
Admins	Login	Input email and password, then click the "Login" button	Successful login and enter the dashboard page	Success
	Reports Page	Choose the "Print" Button	Successfully downloaded the report in PDF	Success
		Use the date, month, and year filter features	Display the report according to the date inputted	Success
Customers	Carts Page	Change product quantity	Successfully increase or decrease the number of products in the cart	Success
		Select the delete button	Delete products that have been added	Success
		Select the "Checkout" button	Display the booking summary page	Success
	Order Summary Page	Select a delivery type and click "Order Now"	Successfully order and display the order details page and payment method	Success
		Select the "Cancel" button	Back to cart page	Success
	Order Detail Page	Choose a payment method and click "Pay Now"	Displays the order list page	Success

Based on the results shown in Table 2 regarding blackbox testing, all test scenarios were successfully executed and achieved a success rate of 100%. These results indicate that the Rumah Olahan Nanas Pinne website is functioning optimally and in accordance with the expected design.

2. Discussion

In the process of developing the website of the Rumah Olahan Nanas Pinne MSME, several challenges were found which are important concerns in developing a website-based information system for MSME players. The main challenges faced are the limitations of customer devices and the unstable quality of internet networks in certain areas. This can result in slow access times, especially when customers access pages with high-resolution images or when placing online orders. In addition, some customers are not yet familiar with digital systems, particularly in terms of using websites via browsers. Therefore, education is

needed not only for customers to help them transition to digital systems, but also for MSME players so that they can manage and utilize this technology independently and effectively.

The developed website features a user-friendly interface. This system has two interfaces: one for customers and one for administrators. In the admin section, there is a dashboard feature that presents a summary of important data, such as the number of customers, this month's revenue, and total revenue. Additionally, users can view a list of past orders and manage their personal accounts, including updating user information. These features are designed to provide an easy, convenient, and secure online shopping experience. The results of system testing using blackbox testing show that all features can run according to their functions in accordance with the design and test scenarios. In other words, this system is designed to function properly and meet user needs.

Meanwhile, on the customer side, the website provides a main page that displays general information about the store and a list of products. Customers can also view product details including descriptions, prices, and images, then add products to the shopping cart and proceed to the ordering process. In addition, there are features to view a list of past orders and manage personal accounts, such as updating user information. These features are designed to provide an easy, convenient, and secure online shopping experience. The results of system testing using blackbox testing show that all features can run according to their functions in accordance with the design and test scenarios. In other words, this system is declared to function properly and in accordance with user needs.

Compared to previous studies, the system developed in this study has several advantages. Previous studies have generally focused on digital order management and inventory management, but have not integrated sales reporting features. Some systems only cover online transactions and product information provision, without providing sales data analysis or real-time inventory monitoring support. This study aims to address these shortcomings by developing a system that not only includes product promotion and ordering functions but is also equipped with real-time inventory monitoring and periodic sales reports that can be accessed directly by business owners.

In terms of results, the developed system demonstrated success in black-box testing with a 100% pass rate across all tested scenarios. This indicates a high level of functional stability compared to other studies, which typically show effectiveness between 90% and 96%. This comparison suggests that the system in this study not only addresses the shortcomings of previous systems but also achieves optimal functional testing levels.

Additionally, this study delves deeper into the local context, specifically focusing on small and medium-sized enterprises (SMEs) in the agricultural processing sector in rural areas that face limitations in digital infrastructure and human resources. This aspect has not been extensively discussed in previous studies, thereby highlighting a more contextual and practical contribution to the development of information systems tailored to the real needs of SMEs in the region.

2.1. Implications

Based on the results of development and testing, the Rumah Olahan Nanas Pinne website has been proven to support the digitalization of MSMEs through a system that facilitates promotion, product management, and online marketing. For business owners, this website provides benefits in managing products, ordering, and viewing sales reports through the admin dashboard feature. Meanwhile, from the customer side, features such as the main page that displays products, the shopping cart, and the order history provide convenience in making transactions.

This system can be an example of the application of simple but functional technology for other MSMEs that want to utilize digital technology in developing their business. The application of the Extreme Programming method has also proven effective in producing a system that meets user needs. Therefore, this success is expected to encourage related agencies and local governments to more actively support the digitalization of MSMEs through training, technical assistance, and the provision of adequate infrastructure. In addition, this website can also serve as a platform or educational resource for MSME players to improve their digital literacy, enabling them to become more independent and skilled in managing their businesses online.

Although testing results using the blackbox method showed a 100% success rate for all functional scenarios tested, this method has limitations because it only evaluates the system from the output side and does not cover the internal logic of the program. Additionally, this testing has not yet involved end-users extensively through user acceptance testing (UAT), which should provide deeper insights into the system's usability,

interface clarity, and ease of use in real-world contexts. However, within the scope of this research, black-box testing is considered sufficient to ensure the system functions as intended. For further development, it is recommended that additional testing, such as whitebox testing and UAT be conducted to obtain a more comprehensive evaluation, both from the internal technical aspects and the user experience.

2.2. Research Contribution

This research contributes to the development of information systems for MSMEs by creating a website for Rumah Olahan Nanas Pinne in Purbalingga. By applying the Extreme Programming method, this research developed a system that assists in online product marketing, online ordering, and provides automatic and accurate sales reporting. The website is designed to replace the previously manual sales and accounting processes, thereby improving operational efficiency, expanding market reach, and minimizing errors in sales data recording. Additionally, the developed website is expected to enhance the digital skills and independence of SME operators in managing their businesses online, as well as serve as a reference for other SME operators seeking to transition to digital systems to support more modern business management in the digital transformation era.

2.3. Limitations

To facilitate the implementation of research and maintain the focus of development, clear boundaries need to be established. This research is limited to the development of a website-based information system focused on product marketing activities and sales report recording at the Rumah Olahan Nanas Pinne MSME. This system is built using MySQL as a database management system to efficiently and structurally manage data. In its implementation, the website development was carried out using the PHP programming language, with an Extreme Programming approach that emphasizes collaboration, flexibility, and continuous iteration to produce software that meets user needs. Additionally, system testing was conducted using blackbox testing methods, which focus on testing core functions without examining the internal code structure, ensuring that all features operate properly according to the specified requirements.

2.4. Suggestions

For better website development in the future, several suggestions can be implemented to enhance service quality and user experience. First, it is recommended to add an automatic notification feature that provides customers with real-time information regarding order status, payments, and deliveries. This feature will enhance user interaction with the system, making it more responsive and informative. Second, it is advisable to add an option for direct address entry during the ordering process, without the need to first set the address through the profile menu. This aims to enhance user convenience and flexibility in transactions.

Furthermore, the website should also provide an option to select the type of delivery service. With this feature, users can choose the delivery method that best suits their needs and budget, thereby providing flexibility in determining the service to use. Finally, improvements to the user interface are essential, particularly in terms of a more modern, easy-to-understand, and visually appealing design. These changes are expected to enhance the professional image and provide a better and more enjoyable user experience.

Future website development should also consider adding features that support education for MSME players. These educational features can take the form of interactive learning modules or help centers that contain step-by-step explanations for using the system, managing products, recording sales, and online marketing strategies. With these features, it is hoped that MSME players can enhance their digital understanding and skills, thereby becoming more independent and confident in managing their businesses online.

D. Conclusion

This study concludes that the implementation of the MSME website for Rumah Olahan Nanas Pinne successfully overcame the challenges faced, including the development of an effective sales and promotion information system, integration of digital sales transactions, and accurate sales report management. Using the Extreme Programming method, this website was well-designed and implemented in accordance with the desired functions. Blackbox testing results indicate that the provided features function effectively, achieving a 100% success rate.

The design of this website is considered a strategic step to increase sales for the Pinne Pineapple Processing House SME. It is hoped that its existence will simplify the promotion process and expand the digital reach of consumers, thereby optimizing sales results. This research not only contributes to the development of technological systems but also provides insights into the importance of education and training in the digital

transformation of SMEs, which can help enhance the capacity of SME operators to manage their businesses more independently and effectively.

E. Acknowledgment

The author expresses gratitude to God Almighty for His grace and assistance in completing this final project. Thanks are also extended to my parents and beloved younger sibling for their prayers, support, and unwavering encouragement. Thank you to Mr. Muhamad Azrino Gustalika, S.Kom., M.Tr.T., as the academic advisor for his guidance and direction, and to Mrs. Tri Wahyuningsih as the business partner of Rumah Olahan Nanas Pinne for her collaboration. Not to forget, thank you to family and friends for their support, and to oneself for persevering until the end.

F. Author Contribution Statement

This research is the result of a structured cooperation between two authors with a clear and complementary division of tasks. LA is responsible for formulating the background and research problems, compiling relevant theoretical foundations, designing and developing the website system for UMKM Rumah Olahan Nanas Pinne, to testing the system using the blackbox method and analyzing the test results to assess the effectiveness and feasibility of the system. Meanwhile, MAG plays a role in providing overall academic guidance, providing input on the selection and application of methodologies, and evaluating the results of development and report writing in accordance with scientific principles and research ethics. This collaboration ensures that the entire research process is conducted systematically and yields high-quality outputs.

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