

Implementation of the Website-Based Prototyping Method for Marketing Management Information Systems for MSME Products in Pangkep Regency

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Abstract

This research is motivated by the importance of website-based marketing digitalization to improve the competitiveness of MSMEs in Pangkep Regency, which still face limitations in integrated marketing systems, unstructured product catalog management, and suboptimal online transaction processes. This study aims to develop a website-based marketing management information system for MSME products in Pangkep Regency using the prototyping method and to evaluate its feasibility in terms of functionality, interface design, and ease of use. The research applied an iterative prototyping method, including requirements gathering, initial prototype development, user evaluation, and repeated refinement based on feedback from MSME actors and prospective users. The system was implemented using PHP and MySQL with security measures such as input validation, CSRF tokens, and data sanitization. System testing was conducted through alpha testing for functionality and beta testing using a Likert-scale questionnaire. The results indicate that the developed system successfully meets user needs with functional features and achieves an average score of 4.4 or an index of 89.03%, which falls into the "Excellent" category, showing that the system is highly suitable for use by MSMEs in Pangkep Regency.

Keywords: *UMKM, Prototyping, Information System, Website-Based Marketing, E-Commerce.*

1. Introduction

Advances in information and communication technology have encouraged various sectors, including Micro, Small, and Medium Enterprises (MSMEs), to adapt to increase efficiency and competitiveness[1]. In Pangkep Regency, the government has provided MSME product galleries as a promotional tool since 2019, but the use of digital technology by business actors is still relatively low[2]. Most MSMEs still rely on conventional marketing methods and social media, which are limited in terms of reach, consistency, and effectiveness measurement. In fact, the number of MSMEs in Pangkep continues to increase and will reach 57,659 units in 2023, so a more structured and integrated marketing system is needed. Websites, as easily accessible information media, are considered capable of supporting promotions and transactions more broadly and sustainably[3]. Therefore, a website-based MSME product marketing information system with a Business-to-Consumer (B2C) model is needed that supports end-to-end transaction flows, from promotion to transaction completion[4]. To ensure suitability with user needs, this study applies an iterative prototyping method so that the developed system is relevant, easy to use, and in accordance with real conditions in the field

2. Theoretical Foundation

2.1. Prototyping Methods

Prototyping is a software development method that creates an initial sketch in the form of a simple model of the system to be built. This method helps developers and users work together during the system development process. Figure 1 shows the stages of the prototyping method, illustrating the smooth prototyping process [5].



Fig 1. Prototyping Model

The explanation of the stages of the prototyping method is as follows:

1. **Communication**
In this stage, developers meet with stakeholders to identify known software requirements and determine areas that require further clarification in the next iteration[6].
2. **Quick Plan**
Prototype creation is carried out quickly, followed by the initial modeling process in the form of a simple design[6].
3. **Quick Design Modeling**
The planning is modeled using several object-oriented diagrams with the help of UML tools. Use Case Diagrams are used to define system functions, class diagrams to show the class structure within the system, and Activity Diagrams to illustrate the process flow[6].
4. **Prototype Construction**
The initial design serves as the basis for building the prototype, with the primary focus being on displaying the parts of the software that are directly visible to end users, such as the interface design[6].
5. **Deployment, Delivery & Feedback**
The prototype is submitted to stakeholders for testing and evaluation. Feedback from stakeholders will be used to refine the system specifications. This process is repeated (iteration) until the prototype meets the expected needs[6].

2.2. Information Systems

An information system is a system consisting of several components, such as software, hardware, and human resources, that are useful in supporting the achievement of goals[7]. An information system can also be understood as a unit formed from relationships between networks that interact to achieve a common goal. The primary purpose of an information system is to produce useful information for users through data processing[8].

2.3. Website

A website is a collection of digital pages that present various information. This information can be in the form of text, images, video, or audio, all connected via the internet. To access a website, users can use a browser such as Google Chrome[9].

2.4. MSMEs

Micro, Small, and Medium Enterprises (MSMEs) are a form of productive economic enterprise. They also serve as a safe haven for low-income communities to adapt to the dynamically changing business world. MSMEs are required to adapt to the times. This allows them to maintain existing markets, maintain customer loyalty, and expand their business reach[10][11].

2.5. Blackbox Testing

Blackbox testing is used to ensure that all system functions function as expected, without requiring knowledge of the internal structure of the program code. This testing is conducted by providing various inputs to the system and observing the resulting output. After this stage is completed and the system's functionality is deemed appropriate, testing continues internally through alpha testing. Alpha testing aims to evaluate the overall quality and stability of the system, while also identifying bugs or errors that may arise before the system is tested.

Beta testing is then conducted, involving users such as MSMEs and consumers, to determine the extent to which the system is accepted and meets needs[12].

3. Research Method

Data collection in this study was carried out through several methods, namely field observation by conducting direct observation of the promotion and sales process of MSME products in Pangkep Regency to define the system needs and workflows that will be digitized, interviews with the Pangkep Regency MSME Cooperative Office, namely Mr. Muhammad Arsyad Hasan, S.E., M.M. as Head of the Cooperative Empowerment and Development Division, as well as MSME actors to gather information about user needs, manual system constraints, and expectations for website-based systems, as well as prototype trials involving MSMEs as users to evaluate ease of use, system functionality, and level of satisfaction with the prototype developed.

3.1. Design

The image is a Use Case Diagram of a Website-Based MSME Marketing Information System that illustrates the interaction between users and the system. There are three main actors, namely the Cooperative Admin, MSME Actors, and Consumers. The Cooperative Admin has access rights to manage MSME data, manage MSME accounts, and view sales reports. MSME Actors can edit profiles, manage product data, view their own product catalogs, manage orders, and view sales history and recaps. Consumers can register, view product lists, checkout, confirm payments, and view order history. All user activities are connected to the Login process as the main requirement to access the system, which is indicated by the «include» relationship. This diagram shows that each function in the system is integrated with each other and supports the MSME marketing process and digital transactions.

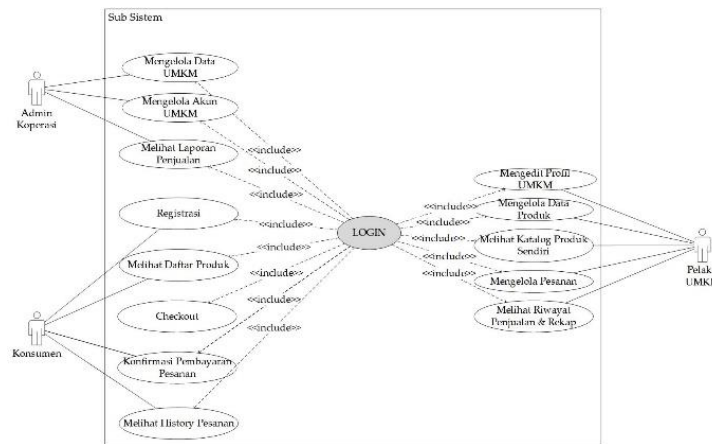


Fig 2. Use Case Diagram

4. Research Result

This website-based marketing management information system for MSMEs in Pangkep Regency was developed using a prototyping method, enabling iterative analysis and design based on user feedback. The system aims to facilitate MSME digitalization through product catalogs, store management, online transactions, and structured order management. The application is built using PHP Native, MySQL, Bootstrap, and security validation techniques such as input sanitation, CSRF tokens, and prepared statements.

1. Home Page & MSME Product Portfolio

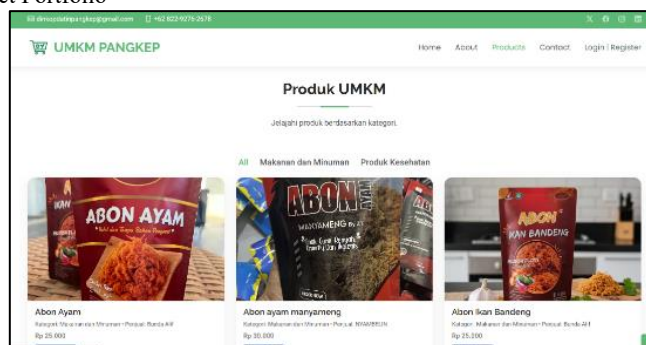


Fig 3. Home Page & MSME Product Portfolio

The image shows a page displaying a list of MSME products by category. Visitors can browse products by name, price, and image.

2. Product Detail Page



Fig 4. Product Detail Page

The image is a page that displays complete product information, including description, price, stock, and a button to contact the seller via WhatsApp.

3. Login Page

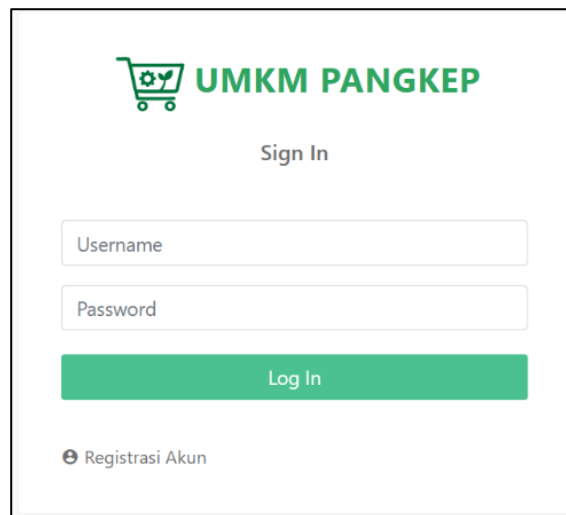


Fig 5. Login Page

The image shows the main entry page for users to access the Pangkep MSME system features. This page is designed to be simple, intuitive, and easy to understand to ensure users don't encounter any difficulties during the authentication process.

4. Product Catalog Page

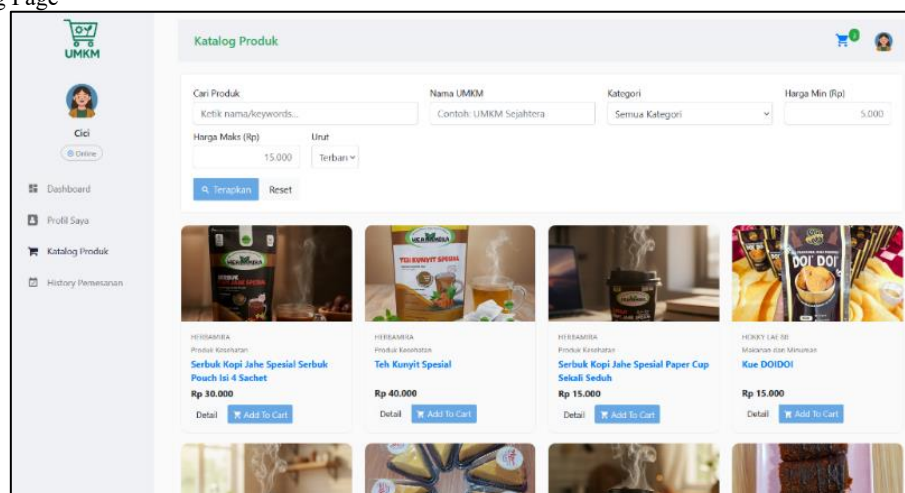


Fig 6. Product Catalog Page

The image shows a page displaying all products sold by various MSMEs registered in the system. Buyers can view all products without being restricted to a specific MSME category.

5. Cart Page

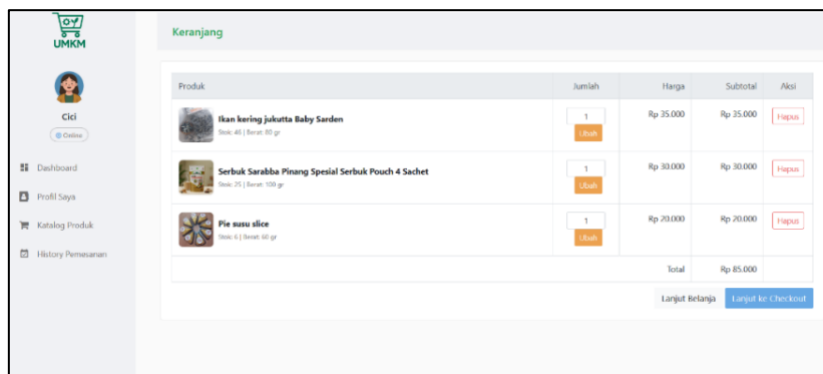


Fig 7. Cart Page

The image shows the cart page, which displays a list of products the user has selected before checkout. Each product row displays the product name, variable quantity, unit price, and subtotal per product. Users also have the option to remove products from the cart using the Delete button.

6. Checkout Page

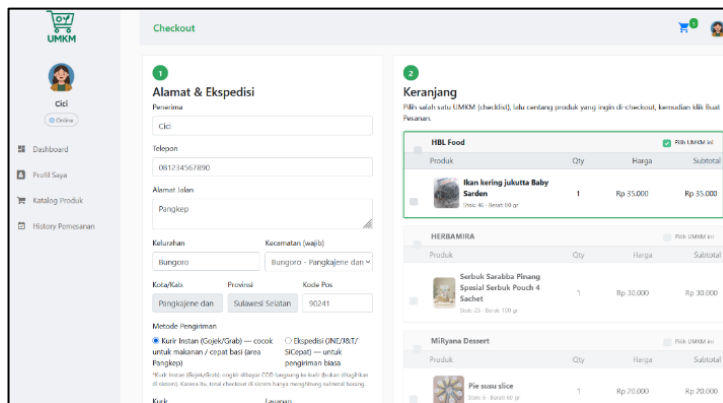


Fig 8. Checkout Page

The image is a page that functions to review order details before the buyer proceeds to the payment stage.

4.1. Blackbox (Alpha) Test Results

Based on the results of alpha testing using the blackbox testing method on the login, account registration, and product management features, it can be concluded that all main system functions operated in accordance with the defined functional requirements and design specifications. In normal test scenarios, the system was able to process valid input correctly, such as verifying user accounts and directing users to dashboards based on their access roles, storing registration data accurately, and successfully adding and displaying product data as expected. In error test scenarios, the system also demonstrated effective input validation by rejecting invalid data and displaying clear error messages for various conditions, including empty fields, incorrect data formats, duplicate data, as well as errors in numeric inputs and file uploads. Therefore, the system is considered to function properly, remain stable, and meet basic functional requirements, making it suitable to proceed to the beta testing stage.

4.2. Blackbox (Beta) Test Results

Based on the results of beta testing involving 31 respondents consisting of a cooperative administrator, MSME actors, and consumers, an overall index of 89.03% was obtained, which falls into the Very Good category. These results indicate that the web-based MSME Product Marketing Management Information System has met user needs in terms of interface design, ease of use, support for marketing activities, clarity of product information, and system stability during use. All assessment items (P1–P6) achieved a very good category, indicating a high level of user acceptance and satisfaction with the system. In addition, user feedback gathered during the prototype iteration stage contributed to improvements in features and enhancements in system functionality, making it more user-friendly, stable, and less prone to errors. Therefore, the system is considered suitable for real-world implementation, although further development and minor improvements can still be carried out to enhance the overall user experience in the future.

5. Conclusion

Based on the results of system design, implementation, and testing conducted on the web-based MSME Product Marketing Management Information System in Pangkep Regency, several conclusions can be drawn as follows:

1. This study successfully designed and developed a web-based MSME Product Marketing Management Information System for Pangkep Regency that facilitates digital marketing, product management, and ordering processes, thereby expanding marketing reach and improving convenience for consumers.

2. The prototyping method was effectively applied through an iterative development process based on user feedback, resulting in a system that functions properly according to alpha testing and is considered highly feasible for use, achieving an average score of 4.45 or 89.03% (Very Good category).

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