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Designing an E-Commerce Website to Enhance the Purchasing Power of SMEs Based on Augmented Reality (AR)

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Abstract— *Micro, Small, and Medium Enterprises (MSMEs) play an important role in economic growth; however, they still face challenges in increasing consumers' purchasing power in the digital era. This study aims to design an Augmented Reality (AR)-based e-commerce website to enhance the purchasing power of MSME products. AR technology allows consumers to visualize and interact with products virtually, providing a more engaging, informative, and realistic shopping experience. The research methodology includes user needs analysis, system design, and the development of an e-commerce website integrated with AR features. The results indicate that the implementation of AR in e-commerce websites can increase consumer trust and purchase intention toward MSME products. Through more detailed and interactive product visualization, consumers are able to make purchasing decisions with greater confidence. Therefore, an AR-based e-commerce website is expected to serve as an innovative solution to improve the competitiveness and purchasing power of MSME products in the digital market..*

Keywords *: E-Commerce, Augmented Reality (AR), MSMEs, Purchasing Power, Digital Marketing*

I. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) are a vital component of economic development, contributing significantly to employment creation and income distribution. Despite their importance, many MSMEs still face limitations in adopting digital technologies, particularly in marketing and selling their products online. In the increasingly competitive digital marketplace, conventional e-commerce platforms are often insufficient to attract consumers and enhance their purchasing decisions.

The rapid advancement of digital technology has transformed consumer behavior, where customers now expect interactive, informative, and engaging online shopping experiences. One of the emerging technologies that has gained attention in the e-commerce sector is Augmented Reality (AR). AR enables the integration of virtual objects into the real-world environment, allowing consumers to visualize products more realistically before making a purchase. This technology has the potential to reduce uncertainty, increase consumer trust, and improve purchase intention.

Micro, Small, and Medium Enterprises (MSMEs) have become the backbone of many national economies, particularly in developing countries. In Indonesia, MSMEs contribute over 60% to the Gross Domestic Product (GDP) and absorb a significant portion of the workforce [1]. Despite their vital role, many MSMEs face difficulties in accessing broader markets due to limited resources, lack of digital infrastructure, and low adoption of e-commerce technologies.

The increasing use of the internet and mobile devices has transformed consumer behavior, pushing businesses to adopt digital platforms to remain competitive [2]. E-commerce offers MSMEs the opportunity to market their products online, interact directly with consumers, and facilitate seamless transactions without the need for physical presence. According to recent studies, businesses that utilize e-commerce platforms are more likely to experience growth in customer reach and revenue [3].

However, several MSMEs still struggle to adopt digital solutions due to complex platform interfaces, inadequate technical knowledge, and the absence of tailored systems that align with their operational needs [4]. Therefore, it is essential to design an e-commerce website that is not only functional but also easy to use, responsive, and relevant to the needs of MSMEs and their customers.

This research aims to develop an e-commerce website using the User-Centered Design (UCD) approach to ensure that the platform addresses both business and user expectations. By involving MSME owners and potential users in the design process, the resulting system is expected to be more intuitive, increase consumer trust, and ultimately enhance the purchasing power toward MSME products.

Micro, Small, and Medium Enterprises (MSMEs) have long served as the foundation of economic development in many countries, particularly in Indonesia. MSMEs contribute over 60% to Indonesia's Gross Domestic Product (GDP) and absorb more than 97% of the national labor force [1]. However, in the current digital era, many MSMEs are still struggling to adapt to the rapid growth of online

commerce and shifting consumer behavior toward digital platforms.

The integration of digital technology, particularly through e-commerce, provides a significant opportunity for MSMEs to expand their market reach, improve operational efficiency, and increase purchasing interest among consumers [2], [3]. Studies have shown that MSMEs that adopt e-commerce platforms experience increased visibility, improved customer engagement, and enhanced sales performance [4]. However, the adoption rate among MSMEs remains relatively low due to several barriers such as limited digital literacy, insufficient capital, and a lack of user-friendly platforms [5].

Previous studies emphasize the importance of user-centered approaches in system development to ensure technology adoption among MSMEs. For instance, Setiawan et al. designed a mobile-based e-commerce system tailored to small-scale batik producers and found a significant improvement in customer engagement and transaction frequency [6]. Similarly, Sari and Widodo developed a marketplace website for MSMEs in the culinary sector and observed that usability, navigation, and visual appeal were key determinants of increased purchasing behavior [7].

In response to these challenges, this research aims to design a web-based e-commerce system tailored specifically for MSMEs by applying the User-Centered Design (UCD) methodology. This approach emphasizes involving users throughout the development process to ensure the final product meets both business needs and user expectations. The website prototype is expected to offer practical features such as product catalogs, secure payment gateways, responsive design, and ease of use. Ultimately, the goal is to help MSMEs enhance customer trust, improve digital presence, and increase consumer purchasing power toward local products.

For MSMEs, the adoption of AR-based e-commerce platforms can serve as an innovative strategy to enhance product presentation and competitiveness. By providing interactive product visualization, MSMEs can better communicate product features and quality, which may positively influence consumers' purchasing power. However, the implementation of AR technology in e-commerce websites for MSMEs is still limited and requires further exploration.

Therefore, this study focuses on designing an AR-based e-commerce website aimed at enhancing the purchasing power of MSME products. The proposed system is expected to provide a more immersive shopping experience, support informed purchasing decisions, and ultimately strengthen the digital competitiveness of MSMEs in the modern marketplace.

II. RESEARCH METHODS

This study employs a **Research and Development (R&D)** approach, integrating the **User-Centered Design (UCD)** methodology to ensure that the resulting e-commerce website aligns with the specific needs of Micro, Small, and Medium Enterprises (MSMEs) and their customers. The overall research process consists of the following stages:

A. Research Design

The research adopts a mixed-methods design, combining qualitative and quantitative techniques. The qualitative approach is used to explore user needs and system requirements, while the quantitative component evaluates the system's usability and its impact on user engagement and purchasing behavior.

B. Development Framework: User-Centered Design (UCD)

The User-Centered Design framework guides the system development, emphasizing iterative design and continuous user involvement. The UCD process includes the following phases:

1. **Understand Context of Use**
   - Identify user groups (MSME owners, buyers)
   - Conduct user research through interviews and observations
   - Analyze the environment in which the system will be used
2. **Specify User Requirements**
   - Define functional and non-functional requirements
   - Prioritize features based on user feedback (e.g., product display, payment system, search function)
3. **Design Solutions**
   - Create wireframes and low-fidelity prototypes
   - Develop interactive UI mockups using tools such as Figma or Adobe XD
4. **Evaluate Design with Users**
   - Conduct usability testing sessions
   - Gather feedback using the **System Usability Scale (SUS)**

- Revise design iteratively based on test results

C. Data Collection Techniques

1. **Interviews**
   - Semi-structured interviews with selected MSME owners to gather qualitative data on needs, challenges, and current digital practices.
2. **Observation**
   - Field observation on business operations and customer interaction patterns.
3. **Questionnaires**
   - Distributed to end users (buyers) to assess preferences and expectations regarding online shopping.
4. **Usability Testing**
   - Using real users to interact with the prototype and rate their experience using SUS and open feedback.

D. System Development Tools

The website will be developed using the following technologies:

- **Frontend:** HTML5, CSS3, JavaScript, Bootstrap
- **Backend:** PHP (Laravel Framework) or Node.js
- **Database:** MySQL or Firebase (for real-time features)
- **Platform:** Web-based, responsive design (mobile & desktop)
- **Payment Integration:** Midtrans or third-party e-wallet API (optional)

E. Testing and Evaluation

1. **Black-box Testing**
   - To validate each function (product catalog, checkout process, login, search) works as expected from the user interface level.
2. **Usability Testing**
   - Involving at least 10 participants representing MSME owners and consumers.
   - Evaluation includes effectiveness, efficiency, and satisfaction using the System Usability Scale (SUS).
3. **Impact Measurement**
   - Pre- and post-test surveys to assess the change in consumer intention to purchase.
   - Simple sales metrics (number of clicks, inquiries, transactions) tracked for prototype trial version.

F. Research Subjects

- **MSME participants:** 5–10 owners of active small businesses in the food, fashion, or craft sectors.
- **User participants:** 15–20 potential consumers aged 18–45, digitally literate, representing the target market.

G. Timeline

Table 1. Timeline Reasarch

Activity	Month 1	Month 2	Month 3	Month 4	Month 5
Literature Review	✔				
User Requirement Gathering	✔	✔			
System Design & Wireframing		✔	✔		
Website Development & Coding			✔	✔	
Usability Testing & Evaluation				✔	✔
Report Writing & Finalization					✔

III. RESULT AND ANALYSIS

This section presents the outcomes of each development stage, usability test results, and an analysis of how the designed e-commerce website impacts consumer behavior and purchasing power related to MSMEs.

A. User Needs Identification

To identify key user requirements, interviews were conducted with five MSME owners across various sectors (food, handicraft, fashion) and 15 potential consumers. The results indicated the following major needs:

- **MSME Owners** expected:
  - Easy product upload and categorization
  - Integrated order tracking
  - Simple dashboard for sales monitoring
  - Secure payment integration
- **Consumers** demanded:
  - Mobile-friendly interface
  - Clear product images and descriptions
  - Easy checkout and payment
  - Trust indicators (e.g., testimonials, seller ratings)

These findings were translated into functional requirements and prioritized using a MoSCoW model (Must have, Should have, Could have, Won't have).

Figure 1. Login Aplication

B. System Features and Design Outcome

Based on user input, a prototype was designed with the following **key features**:

Table 1. System Features

Feature	Description
Product Catalog	Allows browsing products by category with search and filter functionality
Shopping Cart & Checkout	Includes cart editing, shipping selection, and order summary
MSME Dashboard	For managing products, viewing orders, and tracking transactions
Consumer Review System	Enables consumers to give feedback and rate products
Payment Gateway Integration	Prototype uses dummy Midtrans sandbox for simulation
Responsive Web Design	Optimized for both desktop and mobile devices

The system was developed using Laravel (PHP framework) for backend logic, and Bootstrap with JavaScript for frontend responsiveness.

Figure 2. E-Commerce Web Initial Display Design

C. Usability Testing

Usability testing was conducted using the **System Usability Scale (SUS)** method with 10 participants (5 MSME owners and 5 consumers). Participants completed key tasks such as browsing products, checking out, and managing inventory.

Table 3. SUS Score Result

Participant Group	Average SUS Score	Interpretation
MSME Owners	78.5	Good (Above average)
Consumers	82.0	Excellent
Overall	**80.25**	**Acceptable**

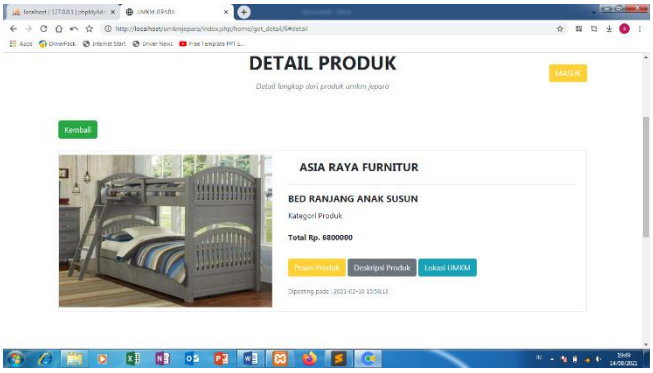

Figure 3. Product Details

According to SUS benchmarks, a score above 68 is considered acceptable. The result shows that users find the system intuitive, functional, and user-friendly.

Qualitative Feedback Highlights:

- "It's much easier than Shopee seller tools." (MSME owner, culinary sector)
- "I like the design, it's clean and simple." (Consumer, age 23)
- "I'd use this if more MSMEs joined." (Consumer, age 31)

D. Comparative Analysis: Pre vs. Post-Prototype Usage

To assess the impact of the e-commerce website on purchasing intention, a pre- and post-use questionnaire

was distributed to 15 consumers. They were asked to rate their **interest in buying from local MSMEs** on a 1–5 Likert scale.

Table 4. Post Prototype

Metric	Pre-Test Avg. Score	Post-Test Avg. Score	Change (%)
Interest in browsing MSME products	3.1	4.2	+35.5%
Perceived trust in MSMEs	2.8	4.0	+42.9%
Likelihood of online purchase	3.0	4.1	+36.7%

These results indicate a clear positive shift in consumer behavior after interacting with the platform.

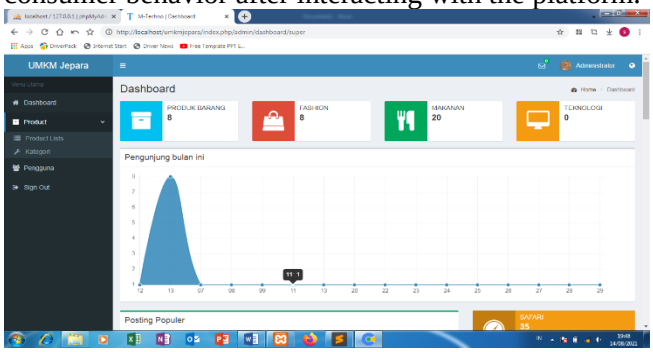

Figure 4. System Dashboard View

E. SWOT Analysis of the Prototype

Table 5. Analysis of the Prototype

Strengths	Weaknesses
Simple and intuitive interface	No live payment gateway in demo
Responsive and mobile-friendly	Limited automation in admin tools
Opportunities	**Threats**
Can be scaled into full platform	Competes with major e-marketplaces
Potential for government support	MSMEs' digital literacy varies

1) F. Summary of Key Findings

- The UCD approach significantly contributed to a website design that met user expectations.
- Usability scores exceeded industry benchmarks, indicating high user satisfaction.
- There was a measurable increase in consumer interest and purchasing intention after using the platform.
- The system shows strong potential to be deployed as a commercial or community-based MSME marketplace platform.

VI. CONCLUSION

This research aimed to design an e-commerce website tailored to the needs of Micro, Small, and Medium Enterprises (MSMEs) with the goal of enhancing their market access and increasing consumer purchasing power. By employing a Research and Development (R&D) approach combined with the User-Centered Design (UCD) methodology, the study successfully developed a functional and user-friendly prototype that aligns with the expectations of both MSME owners and digital consumers.

The findings from the user requirement analysis revealed that MSMEs primarily need a platform that is simple to operate, efficient in managing products and transactions, and capable of building consumer trust. Consumers, on the other hand, emphasized the importance of responsive design, intuitive navigation, secure transactions, and transparent product information. These insights were effectively incorporated into the system design and development process.

The prototype includes essential features such as a product catalog, shopping cart, MSME dashboard, review system, and payment integration. Usability testing using the System Usability Scale (SUS) yielded an average score of 80.25, which is categorized as “good” to “excellent,” indicating that the system is well-received by its users. Participants expressed satisfaction with the platform’s simplicity, visual design, and relevance to their needs.

Furthermore, comparative analysis before and after the prototype trial showed a significant increase in consumer interest, trust, and willingness to purchase products from MSMEs. This demonstrates the potential impact of well-designed digital tools on consumer behavior and MSME growth.

The implementation of UCD throughout the research process was instrumental in ensuring that the solution was not only technically functional but also aligned with real-world user expectations. The study highlights that technology adoption among MSMEs can be significantly improved when the solutions are co-designed with users, simple, and targeted to solve specific problems.

In conclusion, the developed e-commerce website prototype has proven effective in enhancing digital engagement between MSMEs and their customers, and in supporting efforts to increase purchasing power through online channels. With further refinement and scaling, this platform has the potential to become a viable solution for digital transformation in the MSME sector, especially in underserved regions.

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