CENTIVE
Conference on Electrical Engineering, Informatics,
Industrial Technology, and Creative Media
ISBN: 978-602-5004-0-0

Usability-Driven E-Commerce for EcoFashion: The Cimemo.id Redesign Case

Sukhaenah Tri Utami[1], Tenia Wahyuningrum[2*], Khoem Sambath[3]
[1,2] Study Program of Informatics, Telkom University
[3] Department of Computer Science, National Polytechnic Institute of Cambodia
[1,2]Jalan DI Panjaitan 128, Banyumas, 53147, Indonesia
[3]Phum Prey Popel, SK. Somrong Krom, Phnom Penh, 12409, Cambodia
*teniaw@telkomuniversity.ac.id

Abstract — Eco-friendly products are a solution to the widespread textile industry waste pollution in Indonesia. To support the eco-fashion trend, Cimemo.id, an ecoprint boutique established in 2018 in Purwokerto, faces challenges in attracting buyers and introducing ecoprint products more widely. Furthermore, Cimemo.id requires a platform that can address these challenges. The existing mobile application has drawbacks, including a lack of flexibility due to the need to install it on the user's mobile phone. Therefore, alternatives are needed to improve the user experience. This study aims to enhance the user interface and experience by redesigning the Cimemo.id e-commerce website using the User-Centered Design method. The design process involved five UCD stages and usability testing with 70 respondents, determined using the Slovin formula. Evaluation was conducted using the System Usability Scale to measure effectiveness, efficiency, and user satisfaction. The results showed an effectiveness rate of 98.36% (very effective), an efficiency of 0.184 goals/second (very fast), and a SUS score of 87.64 (A-Very Good). Its effectiveness exceeded user performance testing in previous research by 15%, and its efficiency increased by 11%. The front-end website implementation was tested using black box testing, with a 'pass' result for all components. This research yielded an effective interface design, ready for further development with the addition of a back-end system to achieve full functionality.

Keywords – e-commerce, front-end, system usability scale, user interface, user centered design

I. INTRODUCTION

Major contributors to the global environmental pollution problem include food waste, household waste, and industrial products. Thousands of manufacturing industries have produced hazardous waste that is disposed of carelessly without proper management [1], [2]. This situation encourages the trend of environmentally friendly products, one of which is the ecoprint technique that supports the eco-fashion movement [3], [4], [5]. Ecoprint is a technique of printing motifs on fabrics with natural materials such as leaves, flowers, and twigs, without synthetic chemicals, making it environmentally friendly. This technique produces unique motifs because they are influenced by the geographical character of the plants. This makes ecoprint a solution to the pollution of the textile industry [6], [7], [8]. In the development of technology, the textile and fashion industries are marketed through online channels with various platforms. Technology opens up opportunities for businesses to reach a wider range of consumers through e-commerce [9], [10], [11]. E-commerce has become a bridge between consumers and sellers, promising ease of shopping, offering a wide variety of products and competitive prices, so that shopping can now be done online via websites [10], [11], [12], [13].

One of the ecoprint-based fashion companies that utilizes e-commerce technology is Cimemo.id. Cimemo.id is a boutique that produces and sells ecoprint fashion products located in Purwokerto, Central Java, Indonesia. Cimemo.id offers various products such as dresses, shirts, pants, bags, and ecoprint fabrics. Cimemo.id also provides ecoprint courses to educate and promote this eco-friendly technique. Based on an interview with the owner, Cimemo.id conducts transactions through physical stores in several locations and social media such as Instagram, Facebook, and WhatsApp. However, the use of platforms such as Shopee has not been optimized due to difficulties in describing the uniqueness of ecoprint motifs. Customers also often have difficulty getting product information. In addition, many people still have the misconception that ecoprint is batik.

To solve these problems, Cimemo.id needs an e-commerce website designed with an effective user interface (UI) and user experience (UX) as known as

usability. In previous trials, Cimemo.id had created a mobile-based platform, but the efficiency level was 81.81%, so it required further improvements [14]. Customers expect a flexible platform that can be installed on a smartphone without requiring too much memory space. Therefore, website technology is necessary to offer options for users who wish to access the shopping platform without installing an application. The website aims to attract more customers, introduce ecoprint products widely, and increase customer satisfaction. Attractive UI, good UX and usable prototype will support the ease of user interaction with the system [15], [16], [17], [18]

In previous research, the design process employed design thinking; however, this method offers a broader framework for innovation and problem-solving in response to new challenges. Currently, the development of Cimemo.id focuses on emphasizing user needs and continuous iteration, which is why we have chosen the human-centered approach. This study redesigned the application using a web-based User-Centered Design (UCD) method, which prioritizes user needs at every design stage. This method includes five stages: planning, context of use specification, user requirement specification, solution design, and evaluation [18].

II. RESEARCH METHOD

Previous research emphasizes the importance of applying effective UI/UX design methodologies to create user-friendly and efficient systems. For example, research by [14], [19] focused on developing a UI/UX system for scaffolding management using a Design Thinking approach. The previous research showed that an iterative design process, including stages such as Empathize, Define, Ideate, Prototype, and Test. This research highlights the importance of a user-centered approach to improving operational efficiency, which is relevant to the development of ecoprint's e-commerce platform. By adopting similar principles, ecoprint can create a seamless user experience for customers interested in sustainable products, ensuring high usability and satisfaction.

In a similar vein, research by Sinlae et al. [20] applied Human-Centered Design (HCD) principles in the development of a telemedicine platform, WebMed, which received positive feedback from users, although some design aspects, such as the layout of the home page and the design of menu icons, needed improvement. The research emphasized the need for continuous iteration and user testing, which is crucial for a platform like Ecoprint. By applying the User-Centered Design (UCD) methodology, this research aims to ensure that the ecoprint platform continues to evolve based on user feedback, thereby improving the overall usability and relevance of the design for customers in the e-commerce sector.

In addition, Kartiko et al. [21] explored the Lean UX approach in designing a student knowledge management system. Their findings showed that user testing and feedback are crucial to creating a system that fits the users' needs. Although this study uses Lean UX, the UCD approach in this study will prioritize deeper engagement with ecoprint's target audience to design a platform that increases user satisfaction through intuitive navigation, efficient purchase flow, and clear product presentation.

Together, these studies provided valuable insights for this research, which applied User-Centered Design methodology to develop a UI/UX strategy for ecoprint's e-commerce platform. By focusing on continuous iteration, real-time user feedback and design optimization, the research aims to create a seamless and intuitive experience that meets the needs of environmentally conscious customers while driving business success.

III. RESEARCH METHOD

In this chapter, we will explain the stages in developing UI/UX design for ecoprint e-commerce website using UCD method. This method involves users in every stage, with the aim of creating an optimal user experience according to their needs and desires [22], [23], [24], [25], [26], [27]. Figure 1 shows the UCD method for redesign the Cimemo.id website.

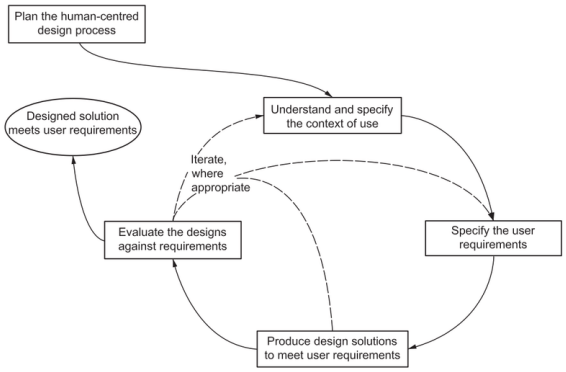


Figure 1. User Centered Design

A. Plan the Human-Centered Design

The first stage was to plan and establish the commitment of all parties involved in this research. This step included discussions and information gathering through literature studies, with the aim of ensuring that the entire system design process was based on a user-centered approach. This stage also involved developing a research plan to understand the context and user needs [28].

B. Specify the Context of Use

At this stage, the main focus is to understand the context of use of the application, including who will use the ecoprint website and how it is used in everyday life by users. The process began by determining potential users who had certain criteria for the design to meet their needs. Next, interviews were conducted with potential users to dig deeper into their needs and expectations of the ecoprint app. These interviews used a flexible question guide, tailored to the topic at hand to gain deeper insights.

The information obtained from the interviews was then used to create user personas that describe the characteristics, needs, and problems experienced by users. In addition, User Journey Maps were also created to map the steps taken by users in achieving their goals while using the website, helping in identifying needs and areas for improvement. All this information collected is combined into a single point of view that brings together all of the user's needs and wants, so as to provide a clear direction in product development.

C. Specify User and Organizational Requirements

After understanding the user profile, the next step is to determine the specific needs of the user and the organization. The information structure is organized using the Information Architecture concept to make it easier for users to access information. This structure will be visualized in the form of sitemaps to describe the relationship between pages and elements on the website.

In addition, the next step is to develop User Flow, which describes the sequence of steps taken by users to complete certain tasks on the website. This is very important to make it easier for users to purchase ecoprint products with efficient and effective steps. Wireframes are also compiled to provide a rough idea of the user interface layout that will be implemented in the website, including components such as buttons, headers, footers, and main content.

D. Produce Design Solutions

At this stage, based on the user needs analysis and wireframes that have been compiled, the user interface (UI) and user experience (UX) designs are developed. The design process was carried out by designing UI components and user interactions that fit the user's needs. These designs were adjusted to a design system that included brand guidelines, color palettes, typography, and other design elements. The customized design was then developed into a Hi-Fidelity design that described the ecoprint website interface in more detail.

E. Evaluate Design Against User Requirements

After the design is complete, the evaluation stage is carried out to measure whether the design that has been developed meets the needs and expectations of users.

Testing is done by involving users who have different characteristics and personas. This evaluation uses the Usability Testing method, which focuses on three main aspects: effectiveness, efficiency, and user satisfaction. This testing is done using tools such as Maze to assess the effectiveness and efficiency of the website in completing the given task [29], [30]. In addition, satisfaction testing is done using the System Usability Scale (SUS) to measure the extent to which users are satisfied with the developed design [31]

If the test results show any deficiencies or areas that need improvement, the design will be improved and retested. This process will continue until users are satisfied with the experience provided by the ecoprint website.

F. Development

After the design evaluation is complete and iterations have been made, the next stage is the front-end implementation of the website. At this stage, the approved interface design will be implemented into HTML, CSS, and JavaScript code according to predetermined specifications. This implementation will create a functional and responsive e-commerce website, allowing users to purchase ecoprint products easily.

After the front-end implementation is complete, the next stage is system testing using Blackbox Testing. This test is done by focusing on the input and output of the system without paying attention to the code structure behind it. Testing is done on several browsers to ensure compatibility and system performance on various platforms.

IV. RESULT

The User-Centered Design (UCD) method is applied in this research to ensure that the designed solution is centered on the user's needs. With this approach, the resulting interface is expected to be visually appealing and easy to use, thus improving the user experience. The stages in the application of UCD are outlined as follows:

A. Plan the Human-Centered Design

The first step in implementing UCD is to plan the involvement of relevant parties. Identification was made of stakeholders, such as CIMEMO.ID managers and potential users. Initial discussions were used to determine the roles and responsibilities of each party, as well as formulate the scope of the design. In addition, interviews with stakeholders and potential users were designed to explore in-depth needs and expectations.

B. Specify the Context of Use

The next process is to understand the context in which the application will be developed. The main focus of this stage is to identify who will use the application and extract relevant information from them. Determining the criteria for potential users is done through discussions with Cimemo.id so that the resulting design is in line with the target market and user needs. Table I shows the user criteria of Cimemo.id.

TABLE I. USER CRITERIA

Demography	1) Age 20 - 55 years 2) Male or Female
Geography	Indonesia
Psychography	Interested in fashion products
Behavior	1) Often use online applications to view and compare fashion products, but purchases can be made online or offline. 2) Prefer to do product research first before buying. 3) Active on social media to look for product recommendations and reviews.

The interview process was conducted to explore the needs, barriers and expectations of potential users. Eight respondents who met the criteria in Table I were

interviewed, with priority given to those who were familiar with and had purchased ecoprint products. The interview results were summarized in the Empathy Map (Figure 2), covering four main dimensions: Think, Feel, Say and Do.

In the "Think" dimension, users see ecoprint as an eco-friendly innovation, but it is still not well known. In "Feel", they are interested in unique products but are concerned that the quality of online shopping may not meet their expectations. The "Say" dimension reflects the desire for quality, unique, and eco-friendly products. While "Do" shows a preference for offline shopping, they are willing to try online platforms if the products are trusted. The main barrier is a bad experience when shopping online before.

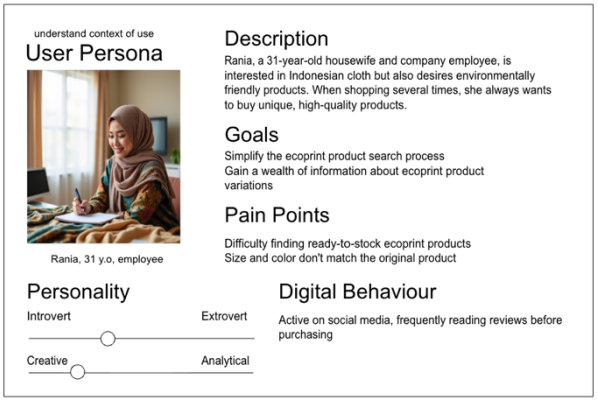


Figure 3. User Persona

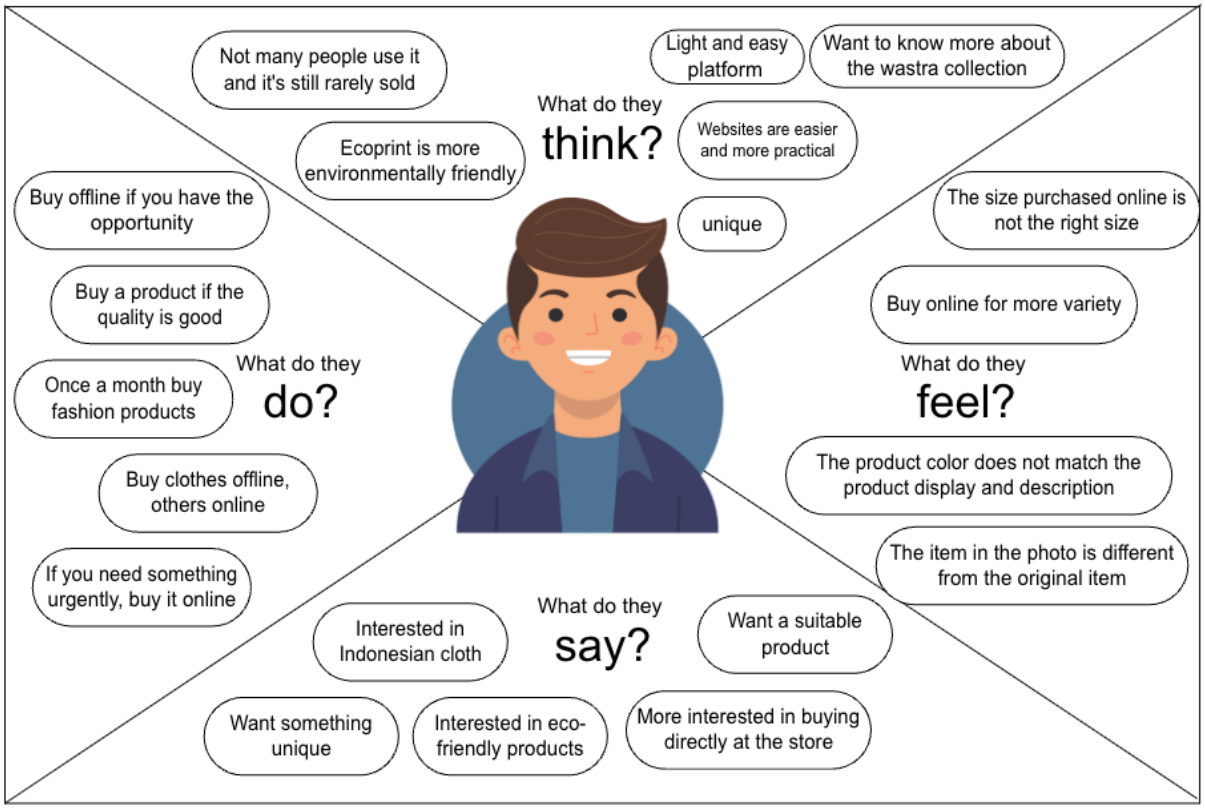


Figure 2. Empathy Maps

The User Persona (Figure 3) was created on behalf of Rania, a housewife and employee who is interested in Indonesian cloth but has limited time for offline shopping. She needs a platform with complete information, product variety, and guaranteed quality. The User Journey Map (Figure 4) maps the user journey, from search to purchase, with a focus on trust and information transparency.

The Point of View (POV) concludes that users need a platform that offers quality products, education about ecoprint, and a convenient shopping experience. Education and trust are important elements to improve the experience at Cimemo.id.

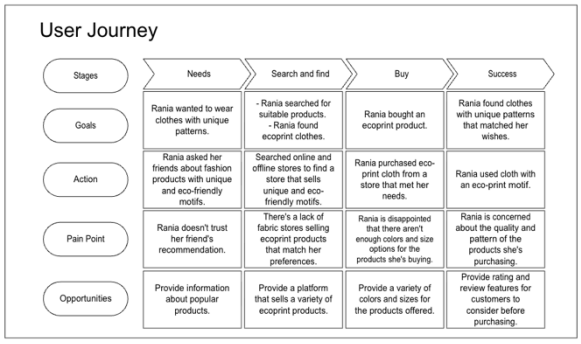


Figure 4. User Journey Maps

C. Specify User and Organizational Requirement

This stage determines the needs of users and organizations based on the results of previous research, involving Cimemo.id. The needs are summarized in the

aspects of How Might We Questions, Information Architecture, Wireflow, and Wireframe.

How Might We

From the Point of View (POV) formulated, the following are the "How Might We" questions to determine the features needed:

a) How to make it easier for people to find contemporary batik with unique motifs?
b) How to design a user-friendly shopping and course application?
c) How to encourage people to buy ecoprint products online?

User Flow

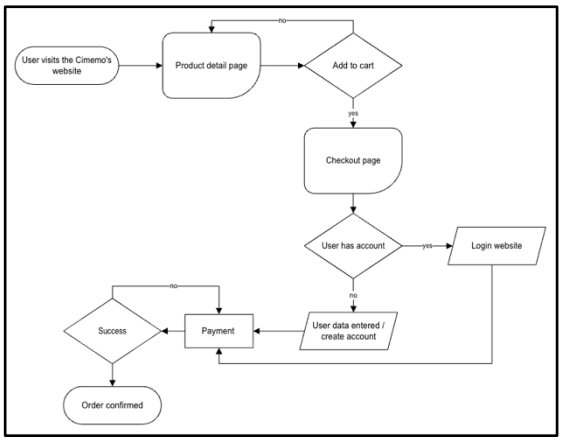


Figure 5. User Flow of Checkout Process

The user flow of the Cimemo.id website is designed to facilitate user interaction. The flow starts from the home page with a choice of product categories or ecoprint courses (Figure 5).

Wireframe of Cimemo.id website

Wireframes are designed to show the layout of interface elements systematically without focusing on color and typography. Figure 6 show the effective visual framework for Cimemo.id website.

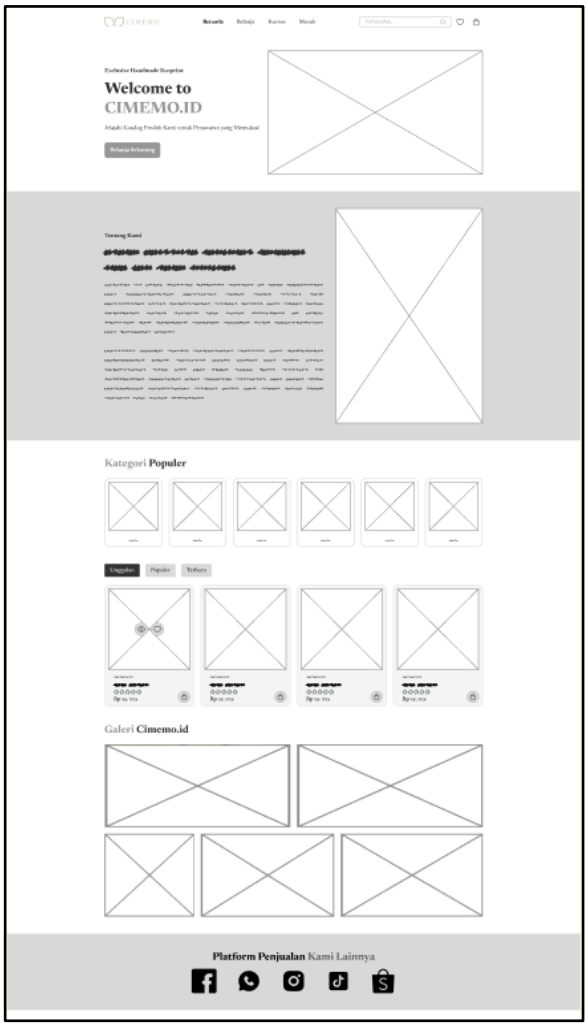


Figure 6. Wireframe of Website Design

D. Produce Design Solutions

This stage develops a design solution based on user needs and predetermined specifications, including tone of voice, design system, and high-fidelity prototype.

Design System

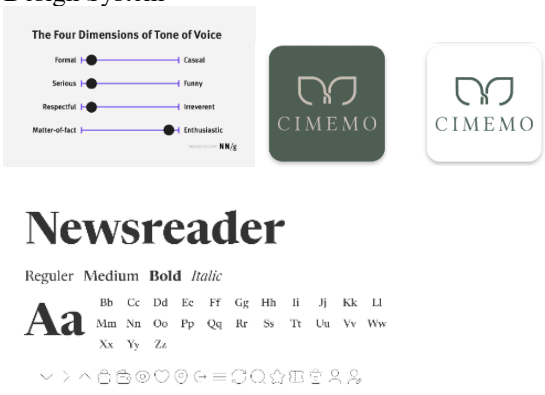


Figure 7. Design System

Cimemo.id's tone of voice is designed to be formal yet approachable, reflecting the professionalism of the brand. The brand guideline refers to the name "C'Mey Modiste," with a leaf-shaped logo that reflects ecoprint

creativity and sustainability. The green color is used as the main identity, reinforcing the natural and organic impression (Figure 7). The typography uses the Newsreader font in various variants to create a clear hierarchy of information. The color system combines dark green as the primary color with warm accents for visual harmony, as well as alert colors for interaction feedback.

High-Fidelity Prototype

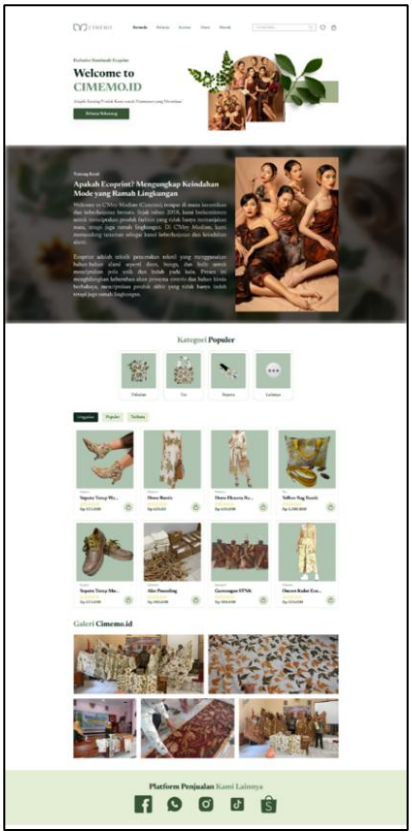
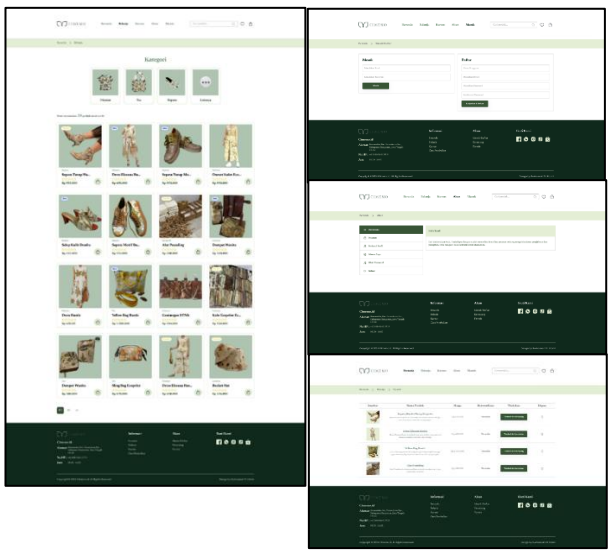


Figure 8. High Fidelity of Home UI



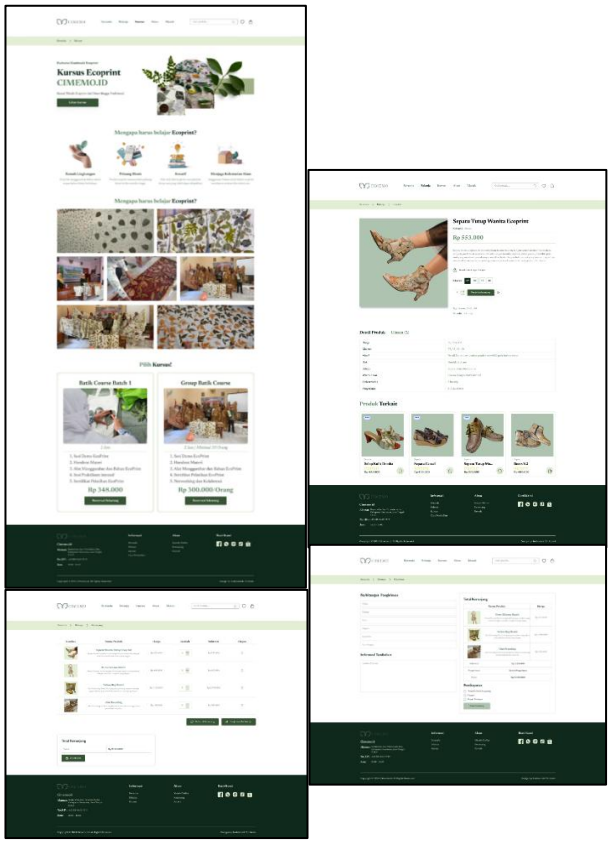


Figure 9. Other High Fidelity Design

Cimemo.id's high-fidelity design offers an elegant and intuitive interface with full features to support the user experience (Figure 8-9). The header displays the logo on the left side, the main navigation menu in the center (Home, Shopping, Course, Account), and the search and cart icons on the top right. The home page is designed with a hero section featuring featured ecoprint products, a grid of product categories, and information on ecoprint techniques. The shopping system includes a grid-shaped product catalog with filters, an informative shopping cart, and a favorites page for saving products. The courses section provides comprehensive information on ecoprint learning programs, schedules, and registration forms. The account page presents a dashboard for managing profiles, purchase history, and other features, while authentication is made simple yet secure. The interactive prototype ensures that the user flow, from exploration to purchase, is smooth and easy to understand.

E. Evaluate Design Against User Requirement

Design evaluation is conducted to ensure that the designed solution meets user needs, encompassing effectiveness, efficiency, and satisfaction. Measurement of effectiveness and efficiency is carried out using the Maze tool. At the same time, satisfaction is tested through the System Usability Scale (SUS) with respondents according to user criteria in Table II.

TABLE II. USABILITY TESING

No	Usability Testing	Acceptance	Range Score
1	Effectiveness	98.36%	Very effective
2	Time Based Efficiency	0.184 goal/sec	Very Fast
3	Overall Relative Efficiency	92.4%	-
4	System Usability Scale (SUS)	87.6	A (Excellent)

Respondents were selected using a random sampling method from Cimemo.id customers. Using the Slovin formula, with a population of 85 and a margin of error (*e*) of 0.05, the resulting sample value was 70. Effectiveness was measured based on the average percentage of success of 70 respondents in completing the main scenario tasks, such as product search, purchase, course enrollment, and account management. As a result, the average success rate reached 96%, indicating a very high level of effectiveness according to usability standards (Table III).

TABLE III. USABILITY METRIC MEASUREMENTS RESULT

No	Task	Effectiveness	Time Based Efficiency	Overall Relative Efficiency
1	View Products by Category	92.8%	0.05 *goals/sec*	56.08 %
2	Put Goods into Cart	100%	0,1 *goals/sec*	100%
3	Checkout items	100%	0.06 *goals/sec*	100%
4	Login/ Register	95.7%	0.15 *goals/sec*	92.3%
5	Choose a course package	100%	0.13 *goals/sec*	100%
6	View favorite products	100%	0.32 *goals/sec*	100%
7	View account details	100%	0.39 *goals/sec*	100%
TOTAL		98.3%	0.184 *goals/sec*	92.392%

Efficiency is measured by the average time it takes respondents to complete the task scenario. The measurement results show an average time speed of 0.184 goals/second, with an Overall Relative Efficiency of 92.39%, which is categorized as very fast in task completion based on time behaviour indicators.

Overall, the redesign has improved performance, with effectiveness increasing from 83.92 to 98.3% (approximately 15%) and efficiency rising from 81.81% to 92.39% (approximately 12%). Time-based efficiency has also increased, from 0.039 goals/sec to 0.184 goals/sec (78%) [14]. For more details, Table IV provides a comparison of the results before and after the redesign.

TABLE IV. COMPARISON RESULT BEFORE AND AFTER REDESIGN

	Effectiveness	Time Based Efficiency	Overall Relative Efficiency
Before	83.92%	0.039 goals/sec	81.81%
After	98.30%	0.184 goals/sec	92.39%

Based on the usability evaluation using the SUS questionnaire, the Cimemo.id website obtained an average score of 87.64, which includes grade A with a rating of "Excellent," indicating a very good level of user acceptance.

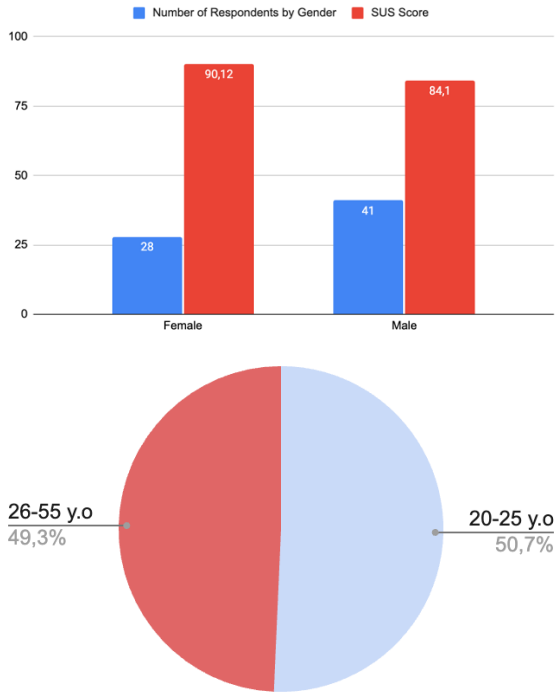


Figure 10. SUS Analysis

Respondents' criticisms and suggestions include some fonts that are too small, features that can be further explored, as well as praise for the attractive design and complete features. SUS analysis by gender showed an average score of 90.12 for females, higher than males (84.1), while analysis by age showed a score of 89.14 for 20–25 year-olds, higher than 86.59 for 26–35 year-olds (Figure 10). These results confirm a design that is user-friendly, efficient, and meets the needs of the target users, without requiring further iteration.

F. Development

After applying the UCD method with satisfactory evaluation results without requiring iteration, the next stage is development, which is the front-end implementation using Hypertext Markup Language (HTML), Cascading Style Sheet (CSS), and JavaScript with the help of Visual Studio Code. The completed code was uploaded to a hosting service with the Uniform Resource Locator (URL) address: https://cimemo-id.netlify.app, so that the interface

design that has been designed can be realized. This implementation process produces a website display according to the prototype design.

To ensure the functionality runs according to user needs, testing is carried out using the black box testing method. This test focuses on evaluating features and interfaces without paying attention to the internal structure of the code. The test results showed that all features successfully passed a series of tests with a status of "pass." Before achieving this result, testing was carried out up to three times to ensure all components were working optimally. This success proves that the Cimemo.id website is ready to use with quality functionality that meets the specifications and needs of users, providing an effective and satisfying experience.

V. CONCLUSSION

The research on UI/UX design of Cimemo.id e-commerce website using User-Centered Design (UCD) method successfully went through the stages of Plan the Human-Centered Design, Specify the Context of User, Specify User and Organizational Requirements, Produce Design Solutions, to Evaluate Design, involving 70 respondents to produce an effective and attractive interface according to user needs. The usability testing results showed an effectiveness rate of 98.36% (very effective), efficiency of 0.184 goals/second (very fast), and user satisfaction with an SUS score of 87.64 (grade A/Excellent). These results are much better than the previous design and are considered to have met user expectations. The front-end implementation was successfully tested through the black box testing method, with all components functioning as expected. Further research can measure the long-term impact of UCD implementation on customer satisfaction, customer retention, and conversion rates by conducting post-implementation evaluations within a specified time frame (6-12 months).

REFERENCES

[1] G. Puspitasari Larasati and E. Kristiani Purwendah, "Implementation of the Polluter Pay Principle Towards Pollution from Hazardous and Toxic Materials (B3) Waste," *Jurnal Locus Delicti*, vol. 3, no. 2, pp. 165–181, 2022.

[2] N. P. W. Romianingsih, "Waste to energy in Indonesia: opportunities and challenges," *Journal of Sustainability, Society, and Eco-Welfare*, vol. 1, no. 1, pp. 60–69, 2023, doi: 10.61511/jssew.v1i1.2023.180.

[3] I. Ayu, A. Mahadewi, N. Luh, and A. Pradnyani, "Exploring Sustainable Fashion: Crafting Drawstring Bags with Eco-Printed Fabrics," *Journal of Aesthetics, Design, and Art Management*, vol. 4, no. 2, 2024, doi: 10.58982/jadam.v4i2.801.

[4] Kristanti, N. L. Ramadhani, and P. Pandansari, "Utilization of Eco-print Techniques as an Environmentally Friendly Fashion Business Opportunity," *Jurnal Teknologi Busana dan Boga*, vol. 12, no. 2, pp. 139–142, 2024, [Online]. Available: https://journal.unnes.ac.id/journals/teknobuga/index

[5] U. Laili, R. Rohmawati, S. N. Hasina, Y. Septianingrum, and E. P. Rahayu, "Eco Printing as an Environmentally Friendly Effort in Malaysia," *Amalee: Indonesian Journal of Community Research and Engagement*, vol. 5, no. 1, pp. 493–501, 2024, doi: 10.37680/amalee.v5i1.3986.

[6] E. E. Kristanti, "Eco-Printing As Alternative Opportunity of School-Based-Msme Environmentally Friendly," *Paraplu Journal*, vol. 1, no. 1, pp. 36–42, 2024.

[7] S. Wulandari and E. Mahmudah, "Eco-print Hijab through STEAM Project-Based Learning in Research Class," *Paedagogia*, vol. 27, no. 3, p. 379, 2024, doi: 10.20961/paedagogia.v27i3.88314.

[8] R. Y. Mulyanti and P. R. Marlianingrum, "Eco Print Making Training as an Environmentally Friendly Product at Pipaya Foundation Bogor," *Jurnal Pengabdian Masyarakat Bestari (JPMB)*, vol. 4, no. 3, pp. 189–200, 2025.

[9] P. Costa and H. Rodrigues, "The ever-changing business of e-commerce-net benefits while designing a new platform for small companies," *Review of Managerial Science*, vol. 18, no. 9, pp. 2507–2545, 2024, doi: 10.1007/s11846-023-00681-6.

[10] A. A. Fashola and F. Kusuma, "E-Commerce Development for the Digital Economy in Indonesia," *Activa Yuris: Jurnal Hukum*, vol. 4, no. 2, pp. 1–6, 2024, doi: 10.25273/ay.v4i2.20842.

[11] M. T. Morepje, M. Z. Sithole, N. S. Msweli, and A. I. Agholor, "The Influence of E-Commerce Platforms on Sustainable Agriculture Practices among Smallholder Farmers in Sub-Saharan Africa," *Sustainability (Switzerland)*, vol. 16, no. 15, 2024, doi: 10.3390/su16156496.

[12] Anita Swantari, Michael Khrisna Aditya, and Purwanti Dyah Pramanik, "Consumer Behavior of Generation Z Students: The Influence of Using Lazada E-Commerce, Promotions and Social Media (Case Study of Trisakti Institute of Tourism Students)," *International Journal Management and Economic*, vol. 4, no. 1, pp. 01–07, 2025, doi: 10.56127/ijme.v4i1.1777.

[13] I. Ullah *et al.*, "Revolutionizing E-Commerce with Consumer-Driven Energy-Efficient WSNs: A Multi-Characteristics Approach," *IEEE Transactions on Consumer Electronics*, vol. 70, no. 4, pp. 6871–6882, 2024, doi: 10.1109/TCE.2024.3411606.

[14] S. T. Utami, "Designing User Interface and User Experience on Ecoprint E- Commerce Mobile Application using Design Thinking Method (Case Study : Cimemo . id)," in Conference on Electrical Engineering , Informatics , Industrial Technology , and Creative, pp. 1012–1023, 2024.

[15] T. I. Hasan, C. I. Silalahi, R. Y. Rumagit, and G. D. Pratama, "UI/UX Design Impact on E-Commerce Attracting Users," *Procedia Comput Sci*, vol. 245, no. C, pp. 1075–1082, 2024, doi: 10.1016/j.procs.2024.10.336.

[16] W. Swasty, R. T. Akista, S. Soedewi, A. Mustikawan, M. A. Mukmin, and M. A. Hafidzan, "From Empathize to Prototype: A Design Thinking Approach in Developing a Web-based Color Palette Generator," *PaperASIA*, vol. 41, no. 4b, pp. 62–74, 2025, doi: 10.59953/paperasia.v41i4b.596.

[17] L. Made *et al.*, "Koptihub : A UI / UX Design for Transparent Procurement using a User - Centered Design Approach," *Sistemasi: Jurnal Sistem Informasi*, vol. 14, no. 5, pp. 2113–2124, 2025.

[18] S. A. Ambami and A. Safitri, "Prototype Design of User Centered Design Based on UCD For Hand Services at PT Semen Indonesia Distributor," vol. 4, no. 2, pp. 190–214, 2025, doi: 10.26740/jdbim.v4i2.70211.

[19] B. Suratno and J. Shafira, "Development of User Interface/User Experience using Design Thinking Approach for GMS Service Company," *Journal of Information Systems and Informatics*, vol. 4, no. 2, pp. 469–494, 2022, doi: 10.51519/journalisi.v4i2.344.

[20] F. Sinlae, D. Alfauzi Hidayatullah, H. Rizqi Sanjaya, and L. Situmorang, "Application of Human-Centered Design Principles in WebMed Application UI/UX Development," *Siber Journal of Advanced Multidisciplinary (SJAM)*, vol. 2, no. 2, pp. 194–203, 2024.

[21] C. Kartiko, H. A. Arrasyid, and A. C. Wardhana, "Designing a mobile user experience student knowledge management system using Lean UX," *Journal of Engineering and Applied Technology*, vol. 2, no. 1, 2021, doi: 10.21831/jeatech.v2i1.39476.

[22] D. P. S. and P. R. Ioannis C. Drivas, "Improving Website Usability and Traffic Based on Users Perceptions and Suggestions—A User-Centered Digital Marketing Approach," in *Strategic Innovative Marketing*, Cyprus, Greece: Springer, 2017, pp. 255–265. doi: 10.1007/978-3-319-56288-9_72.

[23] D. B. Halim Khoo, A. F. Harun, and S. I. Suliman, "Requirements engineering for User-centered school food ordering system," *Indonesian Journal of Electrical Engineering and Computer Science*, vol. 17, no. 1, pp. 357–364, 2019, doi: 10.11591/ijeecs.v17.i1.pp357-364.

[24] J. J. Garrett, *The Elements of User Experience: User-Centered Design for the Web and Beyond*. 2010. [Online]. Available: http://books.google.com/books?hl=en&lr=&id=9QC6r5OzCpUC&pgis=1

[25] L. Barbieri, E. Marino, F. Bruno, M. Muzzupappa, and B. Colacino, "User-centered design of an augmented reality inspection tool for industry 4.0 operators," *International Journal on Interactive Design and Manufacturing*, vol. 19, no., pp. 3321–3333, 2024, doi: 10.1007/s12008-024-01931-x.

[26] L. A. Trujillo-Lopez, R. A. Raymundo-Guevara, and J. C. Morales-Arevalo, "User-Centered Design of a Computer Vision System for Monitoring PPE Compliance in Manufacturing," *Computers*, vol. 14, no. 8, p. 312, 2025, doi: 10.3390/computers14080312.

[27] S. Fleury and N. Chaniaud, "Multi-user centered design: acceptance, user experience, user research and user testing," *Theor Issues Ergon Sci*, vol. 25, no. 2, pp. 209–224, 2024, doi: 10.1080/1463922X.2023.2166623.

[28] Q. Fu, J. Lv, Z. Zhao, and D. Yue, "Research on optimization method of VR task scenario resources driven by user cognitive needs," *Information (Switzerland)*, vol. 11, no. 2, 2020, doi: 10.3390/info11020064.

[29] J. Jeng, "Usability Assessment of Academic Digital Libraries: Effectiveness, Efficiency, Satisfaction, and Learnability," *Libri*, vol. 55, no. 2–3, pp. 96–121, 2005, doi: 10.1515/LIBR.2005.96.

[30] B. Maqbool and S. Herold, "Potential effectiveness and efficiency issues in usability evaluation within digital health: A systematic literature review," *Journal of Systems and Software*, vol. 208, no. November 2023, p. 111881, 2024, doi: 10.1016/j.jss.2023.111881.

[31] T. Wahyuningrum, C. Kartiko, and A. C. Wardhana, "Exploring e-Commerce Usability by Heuristic Evaluation as a Complement of System Usability Scale," in *International Conference on Advancement in Data Science, E-learning and Information Systems (ICADEIS)*, 2020, pp. 1–5.