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REDESIGNING THE UI/UX WEBSITE FOR THE INDUSTRIAL ENGINEERING DEPARTMENT AT MULAWARMAN UNIVERSITY USING DESIGN THINKING METHOD

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Abstract

The industrial engineering department website of Mulawarman University faces challenges in disseminating academic information due to inadequate maintenance. This research utilizes the design thinking method to enhance the website's user interface and user experience (UI/UX) and evaluate its usability against the current version. The decision to use design thinking is grounded in its established effectiveness in improving website UI/UX. The study involves empathizing, defining, ideating, prototyping, and testing phases. User needs and concerns were identified through interviews, observations, and tools such as affinity diagrams, user personas, and user journey maps. Creative concepts were developed and organized using the priority matrix, sitemap, and user flow. Wireframes and mockups facilitated pre-construction design visualization. The redesigned UI/UX prototype resulted in a significantly improved user experience, as evidenced by the results of the user experience questionnaire and system usability scale. The initial UEQ scores indicated low usability, with attractiveness at 0.85, perspicuity at 1.01, efficiency at 0.71, dependability at 0.76, stimulation at 0.41, and novelty at -0.18. Following the redesign, scores notably increased, attractiveness at 2.06, perspicuity at 1.89, efficiency at 1.94, dependability at 1.79, stimulation at 2.05, and novelty at 1.64. SUS testing revealed an average rise to 76 from 63 points, indicating enhanced user satisfaction, acceptance, and descriptive ratings. The website's grade improved from C to B after the redesign. In conclusion, the UI/UX redesign successfully enhanced website usability and user experience.

Keywords: *Design Thinking, SUS, UEQ, UI/UX, Usability, Website*

PERANCANGAN ULANG *UI/UX WEBSITE* PROGRAM STUDI TEKNIK INDUSTRI UNIVERSITAS MULAWARMAN DENGAN METODE *DESIGN THINKING*

Abstrak

Penyebaran informasi akademik melalui *website* program studi teknik industri Universitas Mulawarman menghadapi kendala karena kurangnya pemeliharaan. Oleh karena itu, penelitian ini bertujuan untuk merancang ulang *UI/UX website* dengan menggunakan metode *design thinking* dan membandingkan tingkat *usability* antara *website* saat ini dan *prototype* hasil rancangan ulang. Metode *design thinking* dipilih karena keefektifannya dalam merancang ulang *UI/UX website*. Penelitian ini meliputi tahapan *empathize*, *define*, *ideate*, *prototype*, dan *test*. Observasi dan wawancara digunakan untuk mengidentifikasi kebutuhan dan masalah pengguna. Selanjutnya, *affinity diagram*, *user persona*, dan *user journey map* digunakan untuk memahami pengguna secara mendalam. Ide-ide kreatif dikembangkan dan diorganisir menggunakan *priority matrix*, *sitemap*, dan *user flow*. *Wireframe* dan *mockup* digunakan untuk memvisualisasikan desain sebelum dibangun menjadi *prototype*. Hasil pengujian menggunakan *user experience questionnaire* dan *system usability scale* menunjukkan peningkatan signifikan dalam pengalaman pengguna pada *prototype* rancangan ulang *UI/UX*. Sebelum perancangan ulang, hasil *UEQ* menyatakan *usability website* tersebut rendah dengan skor daya tarik 0.85, kejelasan 1.01, efisiensi 0.71, ketepatan 0.76, stimulasi 0.41, dan kebaruan -0.18. Setelah perancangan ulang, terjadi peningkatan signifikan dalam tingkat *usability* dengan skor daya tarik 2.06, kejelasan 1.89, efisiensi 1.94, ketepatan 1.79, stimulasi 2.05, dan kebaruan 1.64. Pengujian *SUS* menunjukkan peningkatan rata-rata menjadi 76 poin dari 63 poin setelah rancangan ulang *UI/UX*, menandakan peningkatan kepuasan pengguna. Peningkatan juga terlihat dalam kategori penerimaan pengguna dan penilaian *adjective* yang diberikan oleh pengguna. Sebelum perancangan ulang, *website* berada pada *grade C*, namun setelah perancangan ulang, *website* mendapatkan

penilaian *grade B*. Kesimpulannya, rancangan ulang *UI/UX* berhasil meningkatkan pengalaman pengguna dan *usability website*.

Kata kunci: *Design Thinking*, *SUS*, *UEQ*, *UI/UX*, *Usability*, *Website*

1. INTRODUCTION

A website is a collection of web pages accessible on the internet designed to provide information or services [1]. The website for the department of industrial engineering at Mulawarman University is a crucial platform for sharing academic information with students and faculty [2]. However, the website's upkeep is lacking, resulting in a lack of updates. Consequently, department staff rely on WhatsApp and written correspondence to distribute information, which presents issues like sluggish data transmission and the possibility of overlooking crucial messages. Furthermore, the staff encounter difficulties in responding to WhatsApp messages beyond regular business hours.

To address these concerns, the site requires a redesign of its user interface (UI) and user experience (UX). UI pertains to the website's visual appearance and interaction design, while UX emphasizes the overall user experience, including ease of use and information quality [3]. A user-centered approach that employs design thinking methodology has been chosen to ensure that the website meets user requirements and delivers a favorable experience. The design thinking process includes comprehending user needs, defining problems, generating ideas, creating prototypes, and testing solutions [4]. By implementing this method, our aim is to enhance the UI/UX of Mulawarman University's industrial engineering department website, thereby augmenting user satisfaction and academic information accessibility.

UI design varies depending on the functions and needs of the users and must adhere to specific guidelines to ensure ease of use. Incorporating usability assessments is integral in creating a system that conforms to Human-Centered Interface standards [5]. User interfaces can be classified into two primary types, Command Line Interface (CLI) and Graphical User Interface (GUI). The CLI is a system where users input text-based instructions or type commands to execute specific tasks [6].

UX design involves designing the interaction between the user and the product or service, with the goal of creating a positive user experience. User experience measurement tools, such as surveys and interviews, are utilized to gauge the quality of user experience, enabling ongoing improvements and development. Therefore, UX design is a crucial process for developing a successful and satisfying product or service for users [7].

In previous studies, UI/UX design was conducted on sales applications that fulfill business requirements [4], iPusnas applications [8], Siakadu applications [9], village head election applications [10], and Cleanstic applications [11].

In a study [4] examining sales applications tailored to meet business needs, the design thinking method was utilized with the goal of improving user-friendliness. The findings demonstrated an enhancement in user experience and application efficiency.

Research by [8], conducted on the iPusnas app with the goal of improving user interface design through the design thinking method and considering the needs and experiences of real users. Test results of the redesigned iPusnas app prototype demonstrate that users can easily navigate through the product flow.

Research by [9] examined the Siakadu application's ability to assist users in running and obtaining academic information through the utilization of the design thinking method. The interface design created was subjected to usability testing using the Maze platform.

The study conducted by [10] focused on e-voting for village head elections, specifically aimed at assisting immigrant individuals in exercising their right to vote. design thinking methodology was applied in this research to test the usability and user experience of prototypes, utilizing both the System Usability Scale (SUS) and User Experience Questionnaire (UEQ). The usability test using SUS calculation yielded a satisfactory score, while the UEQ test indicated that the proposed prototype delivers a positive user experience.

Research conducted by [11] examined the Cleanstic application's potential to educate the public about plastic waste processing and facilitate the sale or donation of plastic waste to those in need using an Android-based prototype. The design thinking method and prototype testing with the System Usability Scale (SUS) and User Experience Questionnaire (UEQ) were utilized. The test results demonstrated good to excellent effectiveness.

UI and UX are interconnected concepts that have a direct impact on each other. UI display features play a crucial role in enhancing user comfort and providing a positive first impression to users [12]. In UI/UX design, a methodology is required that can account for appearance and user experience in line with their needs [10]. design thinking is a problem-solving approach that is based on the designer's perspective and focuses on fulfilling human needs. Ultimately, design thinking aims to develop solutions that are more effective and successful in meeting user needs and expectations [13].

2. RESEARCH METHODS

The initial stage of this research involves several important steps to guide the process. First, a preliminary study is conducted by observing and reviewing literature on UI/UX design, including research from journals, books, and online sources. Second, the problem is formulated based on observations and preliminary studies. The research aims to address how to redesign the website of industrial engineering department at Mulawarman University using the design thinking method and compare its usability with the current website. Thirdly, the research objectives are set, focusing on explaining the redesign process and comparing the usability levels. Finally, problem boundaries are established to maintain focus and organization. The research will specifically focus on redesigning the website using design thinking, without involving development or coding. Usability testing will be conducted with the main users, such as students, lecturers, and staff of the industrial engineering department at Mulawarman University.

2.1. Data Collection

The research commences with the empathize stage, a vital data collection activity in the design thinking process. This stage is crucial for the success of the research as it seeks to comprehend the requirements of the industrial engineering department website of Mulawarman University [14]. To comprehend user behavior, researchers explore a variety of factors and implement diverse research methods, such as interviews and surveys. Additionally, they analyze existing data and literature to improve their understanding of users' perspectives [15]. The interviews assist in identifying and mapping the specific problems requiring attention in the research. The selection of data source samples is achieved using purposive and snowball sampling, beginning with individuals wielding power and authority in the social context or subject of study [16]. This allows for easy access to various sites for data collection. Data collection is conducted in accordance with research requirements and is described in more detail below.

The study's primary data was collected from a selection of target users, including students, lecturers, department staff, alumni, and prospective students. The data was obtained through user interviews and observations [17]. The interviews gathered feedback on users' challenges with the current website and their requirements for the new design. The observations involved examining how users currently navigate and interact with the site, and identifying the problems they encounter [18]. The findings underscored the significance of considering user requirements for various website elements during the UI/UX design procedure. This involves identifying the website's objectives and target audience, analyzing user behavior and preferences, selecting the best way to present information and content, designing visually appealing layouts, crafting user-friendly interfaces, guaranteeing a favorable user experience, and performing extensive testing and evaluation of the updated website to meet user expectations [4], [12], [14]. Secondary data for the research is obtained through a literature review, which involves reviewing reliable sources such as journals and books to understand the latest trends in website design and user experience. We will stick to common sentence structure and avoid unusual or ambiguous terms. Archival data such as documents from the industrial engineering department of Mulawarman University will also be collected. In addition, an analysis of current UI/UX designs on relevant websites will be conducted.

2.2. Design

This study employs the design thinking methodology to tackle UI/UX design hurdles by placing emphasis on user needs. The methodology comprises five essential steps: empathize, define, ideate, prototype, and test. These steps culminate in a prototype design that serves as a valuable guide for the industrial engineering department of Mulawarman University as they advance into the development phase.

In the design thinking process, the define phase focuses on gaining a clear understanding of the key problem. While full consensus may not always be possible, open and transparent discussions can help identify perspectives on the challenges and barriers that need to be addressed [14]. The define phase uses three techniques, affinity diagrams, user personas, and user journey maps. Affinity diagrams help categorize usability issues identified during interviews, while user personas create fictional representations of common users based on interviews and direct observations. User journey maps are used to visually organize and depict the consistent and organized process of using the product [17], [19], [20].

During the ideation phase of design thinking, researchers utilize techniques such as brainstorming and sketching to stimulate creativity and generate multiple concepts [17]. The priority matrix assists in effectively prioritizing tasks in UI/UX design, while sitemaps organize website content hierarchically to enhance the user experience [21], [22]. User flow diagrams illustrate how users interact with the product and aid in evaluating and improving system design [4], [23].

Prototyping is a crucial stage in the design thinking process for testing product features and solutions in the real world and gathering user feedback [17]. This phase encompasses two types of prototypes, wireframes and mockups [24]. Wireframes are basic visuals that illustrate the structure and primary functions of a website or

mobile application, while mockups bring the design and appearance of the user interface to life based on the previously created wireframes [25], [26]. Figma, a UI/UX design platform, is commonly utilized for prototyping [24]. The goal of prototyping is to comprehend the product's fundamental features and collect user feedback efficiently and inexpensively [17].

Wireframes, also known as low-fidelity prototypes, are plain and straightforward visual depictions that present the framework and main characteristics of a website or application. They begin with basic components such as lines and shapes and emphasize navigation, text, and graphics [25]. In the prototyping phase, mockups are employed to animate the user interface design from the wireframes. Although mockups are primarily based on wireframes, they can deviate due to input from experts, different team assumptions, and the designer's unique perspective on how to enhance prior designs [26].

The design thinking method includes usability testing, which utilizes the SUS questionnaire created by John Brooke. This questionnaire assesses the user's perspective on computer system usability through ten statements that are rated on a scale of one to five [27].

The department of industrial engineering at Mulawarman University's website's UI/UX redesign incorporates a test phase in the design thinking method, which entails engaging with the end users once a prototype has been devised [17]. In this phase, both the user experience questionnaire (UEQ) and the system usability scale (SUS) are employed as evaluation techniques. The UEQ assesses user experience across six scales, attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty [28].

The UEQ utilizes a 7-point scale to quantify user experience, ranging from -3 (most negative) to +3 (most positive). In order to prevent response bias, the information is categorized and transformed into mean scores per respondent via Equation (1) [29].

$$\bar{x} = \frac{\sum \bar{x}[\text{person}]}{\sum \text{item}} \quad (1)$$

By examining the value of the data conversion, the calculation of UEQ can advance to the main stage of result formulation. The first result can be computed using Equation (2) [29].

$$\bar{x} = \frac{\sum \bar{x}[\text{scale}]}{\sum \text{item}} \quad (2)$$

On the other hand, the System Usability Scale (SUS) assesses the usability of computer systems from the user's viewpoint utilizing ten statements [10], [27], [30]. Odd-numbered statements (1, 3, 5, 7, and 9) will be evaluated based on the respondent's score minus one, as shown in Equation (3) [27].

$$\text{Odd SUS score} = \sum \text{Px} - 1 \quad (3)$$

The calculation of even numbered statements' scores follows Equation (4) [27], which involves subtracting the number given by the respondent from 5.

$$\text{Even SUS score} = \sum 5 - \text{Pn} \quad (4)$$

The total scores for each respondent, from the first and second conversion levels, were multiplied by 2.5. This resulted in a score range from 0 to 100, as portrayed in Equation (5) [27].

$$\sum x = (\sum \text{Odd score} - \sum \text{Even score}) \times 2{,}5 \quad (5)$$

Once the scores of each respondent are gathered, the next step is to calculate the average score by adding all the scores and dividing by the number of respondents, as shown in Equation (6) [27].

$$\bar{x} = \frac{\sum x}{n} \quad (6)$$

The UEQ and SUS scores are computed using established equations documented in the literature review [27], [28]. To calculate the required sample size, we implement the Slovin formula as outlined in Equation (7) [31]–[33]. The formula considers the primary users of the website, including students, lecturers, and staff from the industrial engineering department at Mulawarman University. The identified population and samples will serve as the primary data source for this investigation.

$$n = \frac{N}{1+(N \times e^2)} \quad (7)$$

Before administering the questionnaire, it is essential to establish its appropriateness and reliability through validity and reliability tests. The Product Moment Correlation method will be utilized to test for validity, as indicated by Equation (8), whereas Cronbach's Alpha value will be computed to evaluate the questionnaire's reliability, as illustrated by Equation (9). If the questionnaire is deemed valid and reliable, it is deemed appropriate for utilization in this study [28], [34], [35].

$$r_{xy} = \frac{n(\sum x_i y_i) - (\sum x_i)(\sum y_i)}{\sqrt{(n(\sum x_i^2) - (x_i)^2) \times (n(\sum y_i^2) - (y_i)^2)}} \quad (8)$$

$$r_{11} = \left[\frac{k}{k\text{-}1}\right]\left[1 - \frac{\sum \sigma_i^2}{\sigma_t^2}\right] \quad (9)$$

The study's final stage involves formulating conclusions and recommendations based on its findings. The conclusions are derived from the analysis and design findings, which aim to address the research questions initially posed. Furthermore, proposed recommendations for future UI/UX design research for websites are provided.

3. RESULTS

3.1. Empathize

Interviews and observations were conducted with students, lecturers, staff, alumni, and prospective students to understand their needs and identify issues that needed to be addressed. This phase promotes creative thinking and inclusivity in the design procedure.

3.2. Define

After conducting interviews and observations with carefully selected individuals via purposive sampling, we identified multiple user groups. These groups consist of departmental coordinators, departmental staff, students, lecturers, education lab administrators, alumni, guidance counselors, and high school seniors interested in attending our institution.

To categorize ideas or information into related groups, we utilized affinity diagrams, a popular UX design technique. In the context of the website redesign for the industrial engineering department at Mulawarman University, affinity diagrams can offer valuable insights for enhancing UX design, as demonstrated in Figure 1.

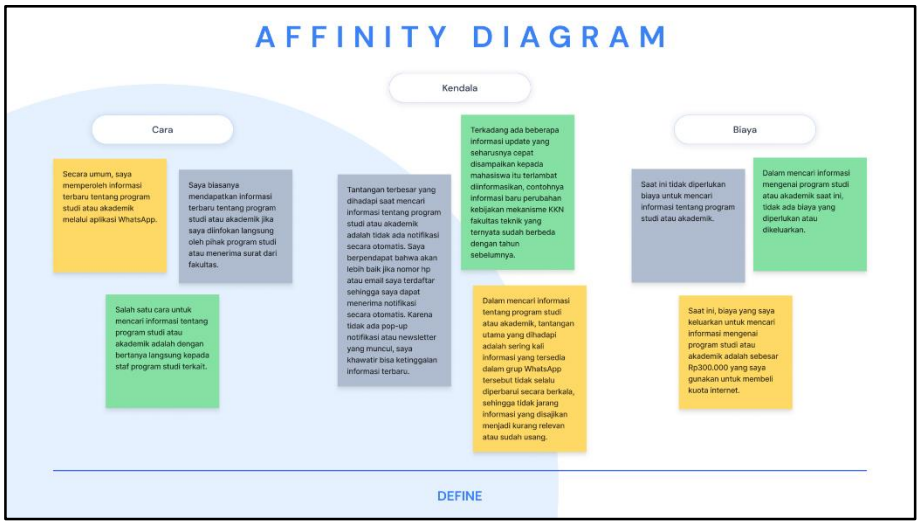

Figure 1. Affinity diagram

The process involves collecting data on sticky notes or cards, sticking them in a visible place, randomly selecting one note as the initial representation for the first group, comparing other notes to determine similarity or difference, conducting a detailed analysis of each group, giving titles to the groups, clarifying missing parts of the data, and reorganizing if necessary.

Figure 2. User persona

After conducting the affinity diagram grouping, we identified the target users. The target users include individuals requiring information, such as students, prospective students, lecturers, educational laboratory administrators, and alumni. On the other hand, individuals distributing information include departmental coordinators, departmental staff, and guidance counselors. These categories encompass

various aspects related to department, academics, and lectures. To offer a more comprehensive illustration, we formulated user personas to embody each user role, as illustrated in Figure 2.

After generating user personas, the process to create a user journey map for website UI/UX redesign, depicted in Figure 3, is initiated.

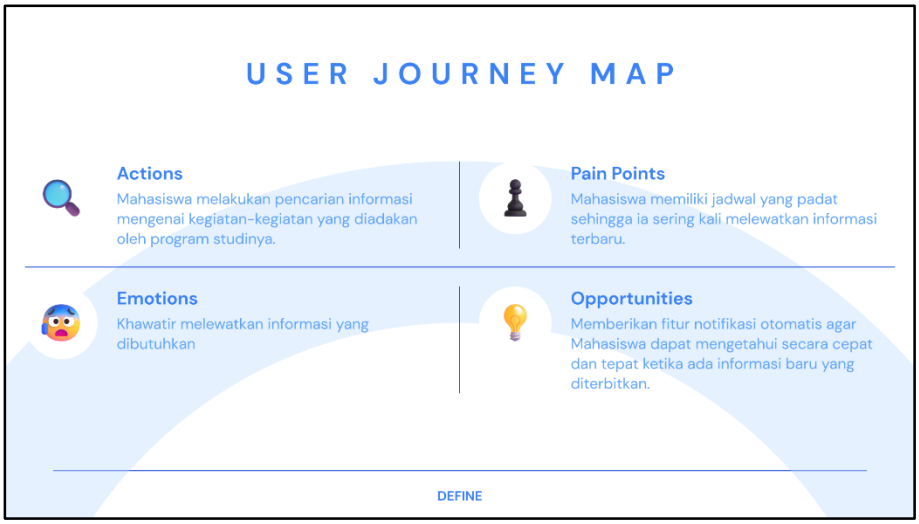

Figure 3. User journey map

The user journey map uncovers various chances to enhance the user encounter on the department's website. These prospects comprise furnishing dependable and validated departmental information, executing automated notification capabilities, providing well-organized and pertinent information integrated with search functionality, incorporating interactive document repositories, and supplying contact details for users to reach the department. It is essential that the website is informative and readily reachable for potential students.

In addition, optimizing the website as a means of disseminating information and advertising, displaying alumni accomplishments, and integrating visually engaging content and sharing features can enhance user satisfaction and potentially cultivate enduring user loyalty.

3.3. Ideate

The ideation stage in the UI/UX redesign process of Mulawarman University's industrial engineering department website includes generating creative solutions for pre-defined problems. During this stage, designers employ brainstorming and worst possible idea techniques to generate as many potential ideas as possible, as depicted in Figure 4.

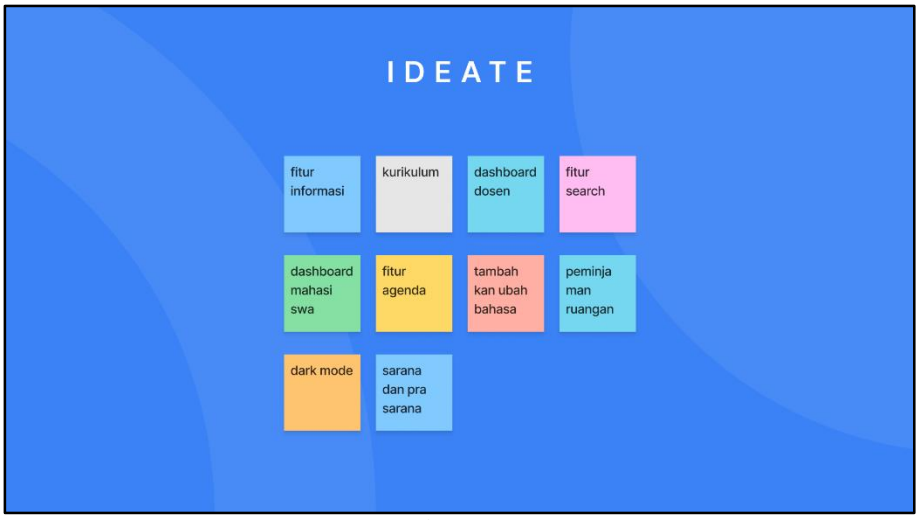

Figure 4. Set of ideas at the ideate stage

The designer will generate ideas without bias, in order to enhance creativity and imagination for problem-solving. Once ideation is finished, a pool of concepts will be compiled for the subsequent stages of the department of industrial engineering,

Mulawarman University's UI/UX website redesign process.

The priority matrix divides tasks into four quadrants based on their urgency and importance: urgent and important, important but not urgent, urgent but not important, and not urgent or important. This categorization allows for efficient completion of tasks.

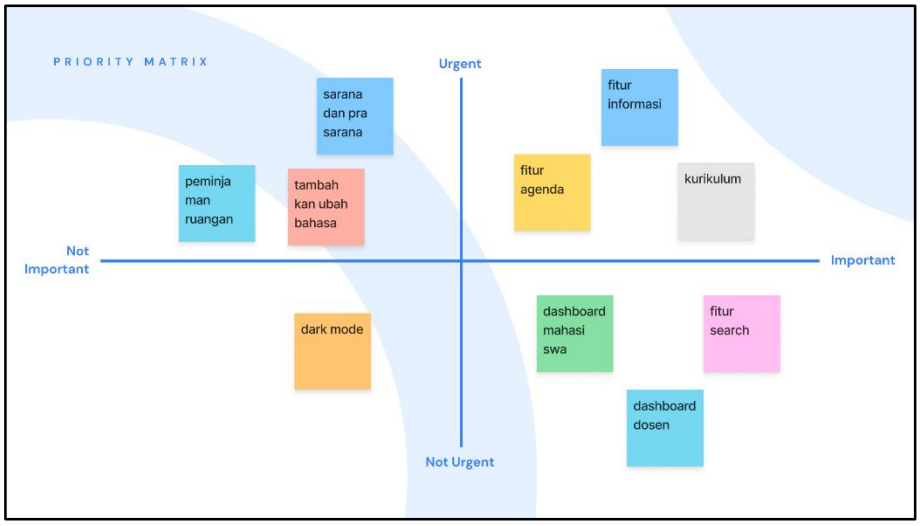

Figure 5. Priority matrix at the ideate stage

By prioritizing ideas based on their urgency and importance, designers can efficiently address essential tasks. This prioritization process is illustrated in Figure 5.

After its prioritization, the department of industrial engineering's redesigned website at Mulawarman University now features a sitemap as a navigational tool for swift information access, as depicted in Figure 6.

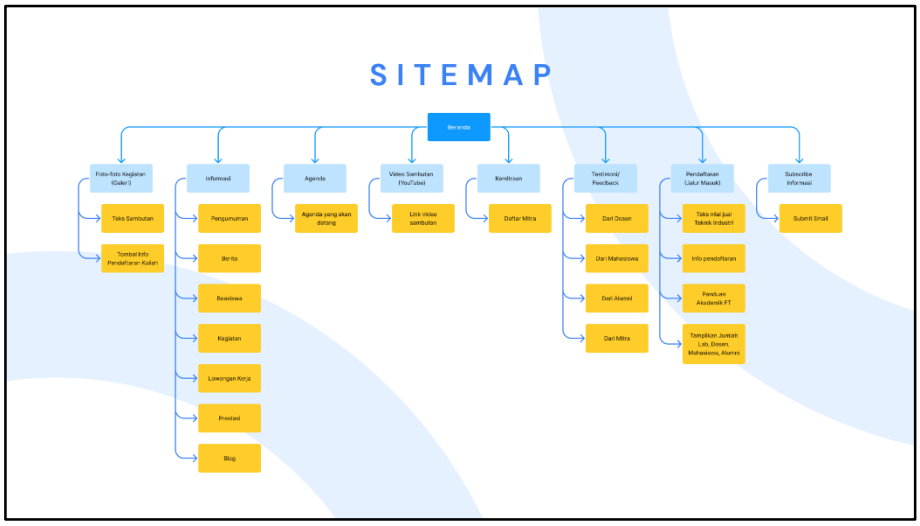

Figure 6. Sitemap Department's redesigned website

The sitemap comprises three principal sections: the Main Page, Login, and Footer. The Main Page section houses pages including Home, Profile, Academics, Research and Service, Quality Assurance, Student Affairs, and Facilities, each with their subpages. The Login section authorizes site access by requesting a username, password, and designated roles from users. Finally, the Footer section contains pages such as Identity, UNMUL Services, Student Affairs, Journal, and Library. These pages offer crucial information concerning the industrial engineering department at Universitas Mulawarman.

The user flow of the industrial engineering department Mulawarman University's website redesign for UI/UX includes the pages users will visit, the actions they will perform on each page, and how they can navigate from one page to another, as illustrated in Figure 7.

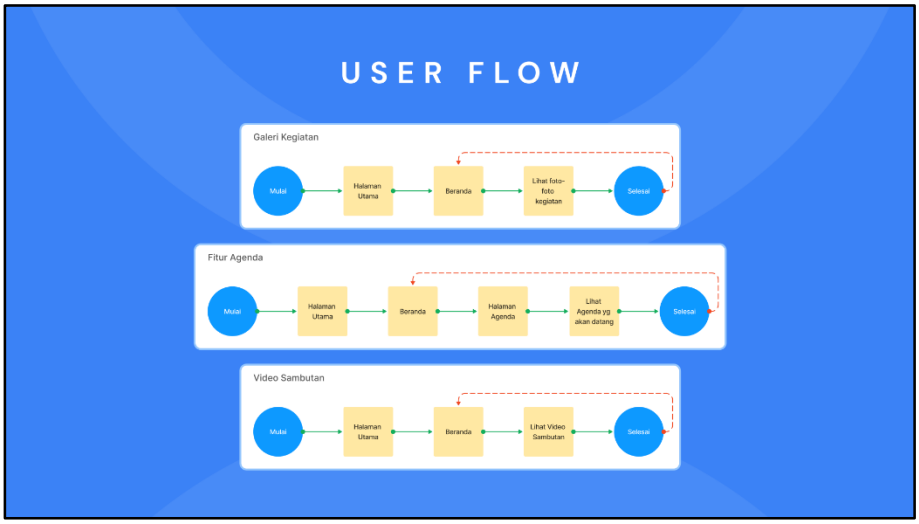

Figure 7. User flow Department's redesigned website

By focusing on the user flow, the UI/UX designer can enhance the user experience and facilitate seamless navigation throughout the website. In addition, this practice can pinpoint areas requiring modifications or enhancements to enhance user satisfaction.

3.4. Prototype

The redesign of the Mulawarman University industrial engineering department website is implemented by creating wireframes and mockups during the prototyping phase.

During the website redesign process wireframes play a crucial role in website design. They are typically implemented during the prototyping phase of the design thinking process, providing a clear visualization of the site structure, and aiding in the organization of the various elements on each page. Refer to Figure 8 for a visual representation.

Figure 8. Wireframe Department's redesigned website

In the wireframing stage, the UI/UX designer generates a basic outline that demonstrates the essential elements of each page, such as the header, navigation menu, main content, sidebar, footer, and other pertinent features.

This prototype acts as a model for the planned website design, enabling developers and intended users to offer input prior to continuing with additional development, as exhibited in Figure 9.

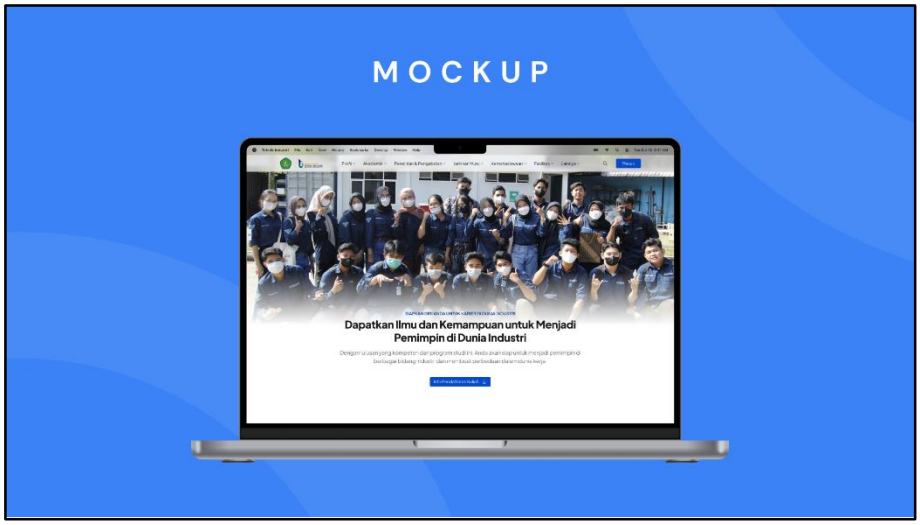

Figure 9. Mockup Department's redesigned website

Designers create multiple design options to be tested by target users objectively to ensure that the resulting design aligns with stakeholders' needs and expectations. By utilizing mockups in the industrial engineering department at Mulawarman University's UI/UX website redesign, the aim is to produce more focused designs that cater to existing target users' requirements.

3.5. Test

Two types of user feedback tests, the UEQ and SUS, were administered to enhance the website's design and usability.

To determine the appropriate sample size for testing using the UEQ and SUS methods, the Slovin method was utilized. With an error significance level of 10%, the intended population of 233 participants, encompassing active students, lecturers, departmental staff, and the educational laboratory administrator, the calculated sample size required was 70 persons.

$$n = \frac{N}{1+(N\times e^2)}$$

$$= \frac{233}{1+(233\times 0{,}1^2)}$$

$$= 69{,}96997$$

$$\approx 70 \text{ people sample}$$

The results from UEQ testing offer valuable insights into optimizing website design and meeting user requirements.

Validity tests for the questionnaire were conducted prior to UEQ testing utilizing pearson product moment as presented in Table 1. Furthermore, reliability tests for the questionnaire were conducted before UEQ testing by employing cronbach's alpha as demonstrated in Table 2.

These experiments were conducted on a predetermined sample, and the calculations were accurately performed using Excel and SPSS.

Table 1. Validity test results on UEQ items

Items	Value of R Table	Value of R Count	Status
1	0.2352	0.7050	Valid
2	0.2352	0.6571	Valid
3	0.2352	0.7885	Valid
4	0.2352	0.6724	Valid
5	0.2352	0.6739	Valid
6	0.2352	0.7956	Valid
7	0.2352	0.7832	Valid
8	0.2352	0.3958	Valid
9	0.2352	0.6098	Valid
10	0.2352	0.6307	Valid
11	0.2352	0.7185	Valid
12	0.2352	0.7787	Valid
13	0.2352	0.3844	Valid
14	0.2352	0.8575	Valid
15	0.2352	0.7053	Valid
16	0.2352	0.7722	Valid
17	0.2352	0.6260	Valid
18	0.2352	0.8235	Valid
19	0.2352	0.8261	Valid
20	0.2352	0.8803	Valid
21	0.2352	0.8159	Valid
22	0.2352	0.7164	Valid
23	0.2352	0.7547	Valid
24	0.2352	0.7140	Valid
25	0.2352	0.7267	Valid
26	0.2352	0.7269	Valid

The validity tests for the UEQ questionnaire confirm the validity of its items. Thus, it can be utilized as a tool for UEQ testing on the targeted participants.

Table 2. Reliability test results on UEQ items

Sum of Item Variance	Total Variance	Cronbach's Alpha Value	Reliability
55.937	734.895	0.961	Very high

The results of the reliability tests for the UEQ questionnaire indicate that the questionnaire items are reliable. Consequently, the UEQ questionnaire can serve as a reliable tool for conducting UEQ tests on targeted respondents.

After completing the validity and reliability tests for the UEQ questionnaire items, we proceeded with testing on the existing website of the industrial engineering department at Mulawarman University. Figure 10 visually displays the results, and Table 3 provides a summary of the findings.

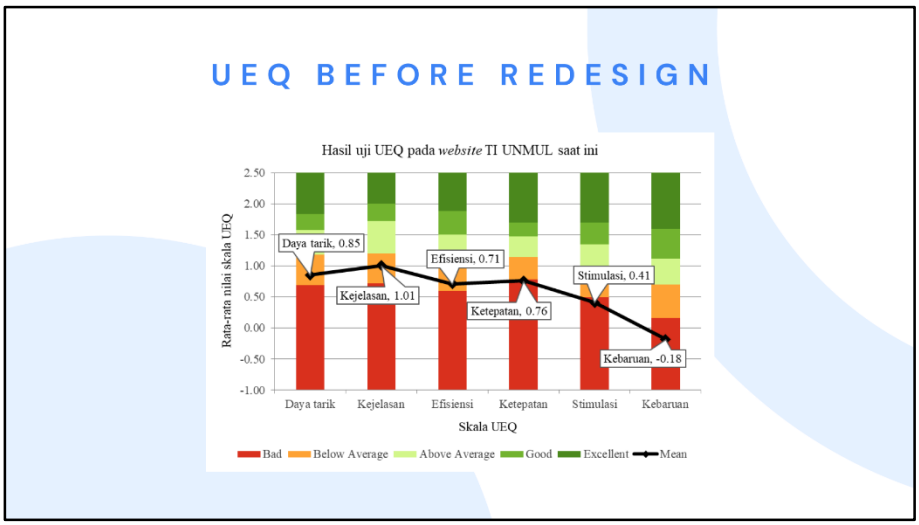

Figure 10. UEQ test results on the current website

The calculation results from the user experience questionnaire (UEQ) evaluating the department of industrial engineering website at Mulawarman University indicate that the user experience level is subpar.

Table 3. UEQ test results on the current website

Scale	Mean	Comparison to benchmark	Interpretation
Attractiveness	0.85	Below average	50% of results better, 25% of results worse
Perspicuity	1.01	Below Average	50% of results better, 25% of results worse
Efficiency	0.71	Below Average	50% of results better, 25% of results worse
Dependability	0.76	Bad	In the range of the 25% worst results
Stimulation	0.41	Bad	In the range of the 25% worst results
Novelty	-0.18	Bad	In the range of the 25% worst results

The website's attractiveness received a value of 0.85, indicating below-average performance, with 50% of the scores surpassing the average and 25% scoring lower.

Similarly, the perspicuity of the website scored below average with a score of 1.01. Just like attractiveness, 50% of the scores were above average, while 25% of the scores were below. This suggests that users find the website unclear or lacking in information.

Efficiency is below average, receiving a score of 0.71. Half of the scores received a mark above average, while the remaining 25% experienced below-average performance. This indicates that users encounter difficulties with navigating the site or accessing necessary information.

The site's dependability ranks in the bottom 25% of scores, receiving a score of 0.76. There are reliability issues with the information presented on the website, highlighting the need for enhancements to ensure accurate and dependable content.

Furthermore, the stimulation factor received a score of 0.41, indicating a poor user experience. This score ranks in the lowest 25% of results. This suggests that users do not find the site engaging or intriguing, and it lacks the capability to pique their interest or encourage further exploration.

Additionally, the novelty factor received a score of -0.18, which is deemed subpar and falls within the bottom 25% of results. This implies that the site does not provide imaginative or original features or content that can draw in users and set it apart from other sites.

After conducting a UEQ test on Mulawarman University's industrial engineering department website, the next step is to redesign its UI/UX. The UI/UX prototype was then subjected to UEQ testing, and the derived test outcomes are presented in Figure 11 and Table 4.

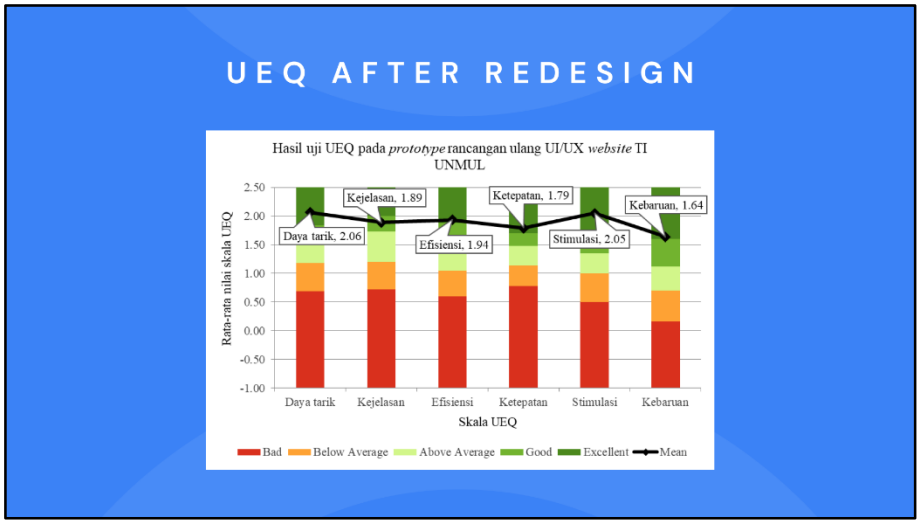

Figure 11. UEQ test results on website UI/UX redesign prototype

The results of the UEQ questionnaire were utilized to assess the user experience level on the industrial engineering department website's UI/UX redesign prototype at Mulawarman University. The questionnaire gauges numerous user experience aspects, and the data is then analyzed and interpreted.

Table 4. UEQ test results on website UI/UX redesign prototype

Scale	Mean	Comparison to benchmark	Interpretation
Attractiveness	2.06	Excellent	In the range of the 10% best results
Perspicuity	1.89	Good	10% of results better, 75% of results worse
Efficiency	1.94	Excellent	In the range of the 10% best results
Dependability	1.79	Excellent	In the range of the 10% best results
Stimulation	2.05	Excellent	In the range of the 10% best results
Novelty	1.64	Excellent	In the range of the 10% best results

In terms of attractiveness, the average score obtained was 2.06, which is a commendable score. This outcome indicates that the prototype UI/UX redesign website ranks in the top 10% of attractiveness compared to other benchmarks. Therefore, it can be inferred that users found the site visually pleasing.

For perspicuity, the average score obtained was 1.89, indicating a commendable level of user experience. Compared to the benchmark, attaining a score better than 10% is considered good, whereas scoring less than 75% is considered poor. This demonstrates that although the website is generally easy to comprehend, there is still room for enhancing its user-friendliness.

In terms of efficiency, the average score was 1.94, which is very good. The redesigned prototype is among the top 10% of benchmark outcomes for efficiency, indicating that users can effortlessly and quickly complete activities on the site without any undue hindrances.

Dependability received an average score of 1.79, indicating an outstanding level of user experience. The redesigned prototype website scored in the top 10% of the benchmark results for accuracy. This suggests that users found the information and features on the site to be accurate and dependable.

Regarding stimulation, the average score was 2.05, which is highly commendable. The redesigned prototype website is among the top 10% for providing an engrossing user experience. The site was found to be engaging, interactive, and attractive by users, which likely contributed to a positive experience.

The Novelty score of 1.64 indicates an excellent level of user experience, with the redesigned prototype site ranking in the top 10% in terms of novelty compared to other benchmarks. Users found the site to be fresh, innovative, and distinct, contributing to a positive user experience.

The process of redesigning the Mulawarman University industrial engineering department website's UI/UX involves measuring usability through SUS testing. Prior to administering the SUS tests, validity assessments were executed on the questionnaire items utilizing the pearson product moment. The findings from these tests are displayed in Table 5.

Table 5. Validity test results on SUS items

Items	Value of R Table	Value of R Count	Status
1	0.2352	0.3226	Valid
2	0.2352	0.5791	Valid
3	0.2352	0.5928	Valid
4	0.2352	0.3187	Valid
5	0.2352	0.4619	Valid
6	0.2352	0.6040	Valid

Items	Value of R Table	Value of R Count	Status
7	0.2352	0.6470	Valid
8	0.2352	0.7287	Valid
9	0.2352	0.5871	Valid
10	0.2352	0.4842	Valid

The validity tests performed on the SUS questionnaire suggest that its items are valid, confirming the questionnaire's suitability for conducting SUS testing on the intended respondents.

Before administering the SUS tests, we conducted reliability tests on the questionnaire items using cronbach's alpha methods. The test outcomes are displayed in Table 6.

Table 6. Reliability test results on SUS items

Sum of Item Variance	Total Variance	Cronbach's Alpha Value	Reliability
11.361	31.400	0.713	High

The results of the reliability tests on the SUS survey indicate that the items in the survey are dependable. Consequently, the SUS questionnaire is a suitable tool for conducting SUS testing on the intended participants.

After conducting validity and reliability tests on the items of the UEQ questionnaire, we conducted tests on the current website of the department of industrial engineering at Mulawarman University. The results of the tests are presented in Figure 12 as a graph.

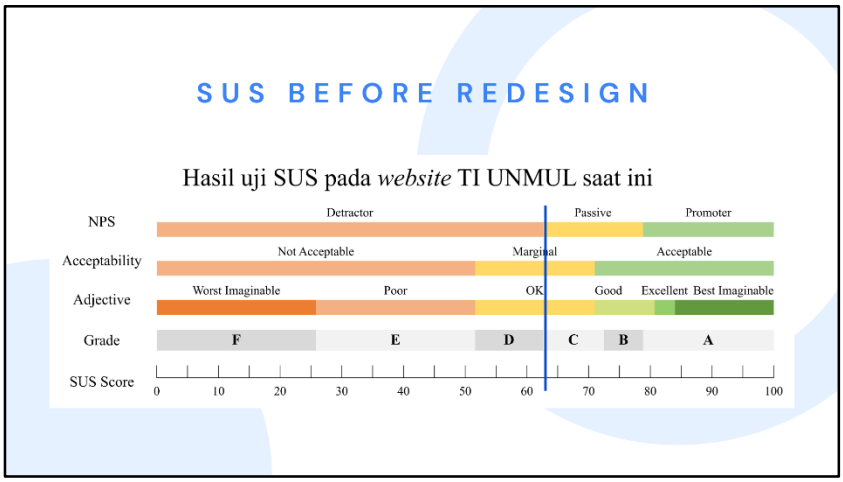

Figure 12. SUS test results on the current website

The website of the industrial engineering department at Mulawarman University underwent a usability evaluation through SUS survey. The findings demonstrate a point average of 63, indicating a need for improved usability. The Net Promoter Score is in the "passive" category, reflecting mixed feedback from users. Furthermore, the Acceptability Score is categorized as "marginal," which means there are areas that need enhancement to increase customer gratification. The score for the adjective was rated as "OK," indicating a moderate level of user experience. In general, the results suggest that while some users may recommend the site, there is room for improvement to address specific issues and increase user satisfaction.

Following the evaluation of usability by applying the SUS questionnaire to the website of the department of industrial engineering at Mulawarman University, the subsequent step is to redesign the user interface and user experience (UI/UX) of the website. Once the UI/UX redesign prototype is completed, SUS testing is performed to assess its usability. The findings of this examination are illustrated in Figure 13.

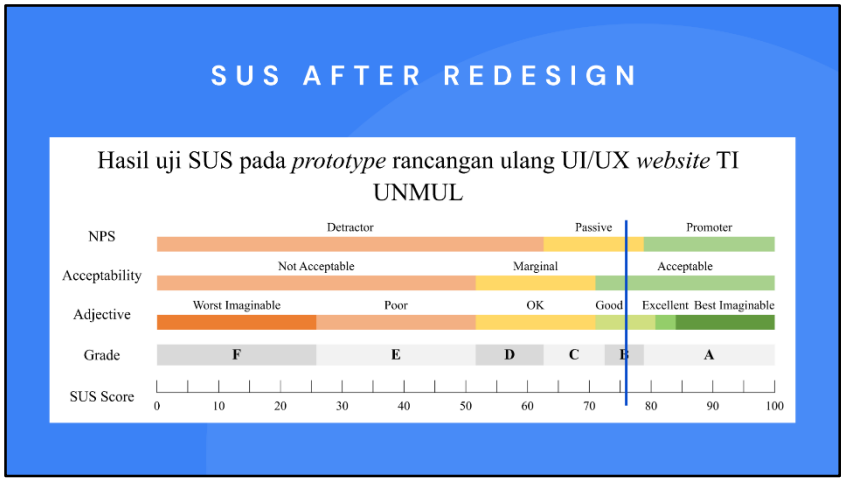

Figure 13. SUS test results on website UI/UX redesign prototype

In the second round of testing, the industrial engineering department of Mulawarman University's redesigned prototype website underwent evaluation utilizing the system usability scale (SUS). The results displayed an average score of 76 points, which indicates reliability but also suggests room for improvement in user experience. The net promoter score was classified as "passive," suggesting mixed recommendations. Overall, the acceptability score was "acceptable," and the adjective score was "good." These outcomes produced a grade B rating, establishing the website as usable.

4. DISCUSSION

The UI/UX design research presented on Mulawarman University's website underscores specific crucial aspects. The study reasserts the value of the design thinking approach, supported by previous research [4], [8]–[11]. The approach emphasizes empathy, user-centricity, and iterative design as crucial elements for improving user experiences. The study reveals that UI and UX are interconnected, as demonstrated in [12]. While effective UI is necessary, achieving genuine success occurs when it aligns harmoniously with user requirements and enhances the overall experience. Our initial phases included analyzing user groups and developing personas, which align with previous research [4], [9], [10]. This comprehensive understanding guides a user-centered design. The ideation and priority matrix approach enabled innovative solutions and task prioritization, which is a commonly used method [13]. We utilized wireframes, mockups, and user feedback, following UI/UX best practices [12]. Stakeholder engagement ensured a design that aligned with user needs. UEQ and SUS tests, in addition to benchmark comparisons, provided thorough insights into usability [12]. Though our prototype showed significant improvements in various aspects, there remains a need for further attention towards user-friendliness, as consistent with previous literature [4], [8]–[11]. UI/UX design is a continuous process that necessitates ongoing user feedback and iterative improvements to stay up to date with evolving needs and standards [12]. In conclusion, this study adds to the evidence supporting the effectiveness of design thinking and emphasizes the significance of maintaining seamless UI/UX alignment and ongoing improvement efforts to ensure exceptional user experiences.

5. CONCLUSION

The industrial engineering department website of Mulawarman University underwent a redesign utilizing the design thinking approach, which followed a structured process comprising of empathize, define, ideate, prototype, and test phases. These phases incorporated diverse techniques to comprehend user requirements, create solutions, and collect feedback.

Usability assessments conducted using the user experience questionnaire (UEQ) and system usability scale (SUS) tests revealed a significant improvement in usability after the website redesign, going from a low level to a very good one. Usability assessments conducted using UEQ and SUS tests revealed a significant improvement in usability after the website redesign, going from a low level to a very good one. Excluding subjective evaluations unless clearly marked as such, the text adheres to the other given principles. Positive shifts in net promoter score (NPS) and acceptance scores indicate an increase in user satisfaction.

In brief, by using design thinking and conducting extensive usability testing, the website's usability and user experience were significantly enhanced, resulting in an impressive grade of B.

For future research, prioritize continuous iteration to emphasize ongoing user feedback and iterative improvements to maintain high usability standards. Ensure accessibility of the website to individuals with disabilities. Optimize mobile devices to cater to a broader user base. Focus on providing valuable and relevant content aligned with user needs in a user-centric manner. Cross-Platform

Compatibility is crucial to ensure that the website functions seamlessly on various browsers and platforms. Priority should be given to user data security, particularly for sensitive transactions. Integrating these elements into future research and design endeavors will improve user experience and usability significantly.

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