

Evaluation and Optimization of Interface Design and User Experience Through Design Thinking: Case Study on OSS Public Information and Service Website

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ABSTRACT

This study aims to evaluate and optimize the User Interface (UI) and User Experience (UX) on the Online Single Submission (OSS) website as a digital public service platform in Indonesia. The main problems with OSS include complex navigation, low clarity of information, and lack of support for new users. The research method uses a design thinking approach with five stages: empathize, define, ideate, prototype, and test. The evaluation was carried out through usability testing using System Usability Scale (SUS), Net Promoter Score (NPS), and User Experience Questionnaire Plus (UEQ+) instruments, as well as performance indicators such as task completion rate, error rate, and time-based efficiency. The results of the study showed that the UI/UX quality of the existing OSS website was low (SUS 49.33 – category F, NPS -23%, UEQ+ 0.77). In contrast, the OSS prototype developed showed a significant improvement (SUS 79.5 – category B, NPS 30%, UEQ+ 2.43). Improvements in the form of simple navigation, non-intrusive information banners, step-by-step guides, chatbots, and interactive indicators have been proven to improve efficiency, interaction success, and user satisfaction.

1. Introduction

The e-government system is a global initiative that utilizes information and communication technology to improve bureaucratic efficiency, the quality of public services, and the transparency of government interaction with the public. In Indonesia, the development of e-government is marked by the registration of go.id domains since 2001 to reach 3,903 domains in 2018 [1] [2], and strengthened by regulations such as Presidential Instruction No. 3 of 2003 and Presidential Regulation No. 95 of 2018. One of the important implementations is Online Single Submission (OSS), a risk-based business licensing platform in accordance with the mandate of Law No. 11 of 2020 concerning Job Creation.

However, several previous studies have shown that there are various kinds of institutional and technical barriers to the OSS system. The study from [3] highlights obstacles to system integration and the existence of digital literacy gaps in society. This is reinforced by [4] who identified the urgent need for detailed initial guidance for new users. Furthermore, [5] emphasized that technical problems such as downtime, low access speeds, and less user-friendly interfaces have the potential to trigger dependence on third parties and open gaps in illegal collection practices that are not transparent.

Evaluation instruments such as System Usability Scale (SUS), Net Promoter Score (NPS), and User Experience Questionnaire Plus (UEQ+) have been used to measure user satisfaction, loyalty, and perception. However, most of the research is still limited to technical and institutional aspects, not yet presenting a comprehensive evaluation of the quality of OSS UI/UX [6] [7].

The urgency of this research arises from the need to improve the quality of OSS as the main door for digital licensing services. By adopting a user-centered design thinking approach, this study offers an alternative method that is more iterative and validating than previous research. The purpose of the research is to evaluate the quality of the OSS user interface and experience and develop improved prototypes that can improve efficiency, satisfaction, and public trust.

Scientifically, this research is relevant to Systems and Industrial Engineering, especially in the branch of Cognitive Ergonomics and Human-Computer Interaction (HCI). UI/UX evaluation using work performance indicators (KPI Usability) is a manifestation of the principle of human-centered work system design to minimize cognitive load, prevent human error, and improve system operational efficiency.

2. Research Methods

This research departs from the concept of e-government as an electronic-based government system that utilizes information and communication technology to improve transparency, accountability, and quality of public services Communication [8] [9]. In Indonesia, the development of e-government is marked by the registration of go.id domains since 2001 to more than 3,900 domains in 2018 [2] and strengthened by regulations such as Presidential Instruction No. 3 of 2003 and Presidential Regulation No. 95 of 2018. One of the important implementations is Online Single Submission (OSS), a risk-based business licensing platform that aims to accelerate and simplify the investment climate [10].

The government website functions as the main medium for delivering information and public services, as well as the first point of contact for the community with digital services. Therefore, the quality of User Interface (UI) and User Experience (UX) is crucial in building trust and community participation. ISO 9241-210:2010 defines UX as the perception and response of users to products or services, while ISO 9241-11:2018 emphasizes usability aspects in the form of effectiveness, efficiency, and satisfaction [11].

UI/UX evaluation is conducted with instruments such as the System Usability Scale (SUS) to measure satisfaction and effectiveness, Net Promoter Score (NPS) to assess user loyalty, and the flexible User Experience Questionnaire Plus (UEQ+) in measuring aspects of user experience [6] [12] [13]. Additionally, UX KPI indicators such as task success rate, error rate, and time-on-task are used to turn abstract experiences into measurable data [14].

This study did not conduct conventional validity and reliability tests (such as Pearson or

Cronbach's Alpha manual) because the three instruments used—System Usability Scale (SUS), Net Promoter Score (NPS), and User Experience Questionnaire Plus (UEQ+)—are international standardization instruments. The UEQ+ modular scale used has been validated globally and cross-culturally in Indonesia by UX experts [7], while the SUS reliability score has been proven to be stable in various industries through dozens of empirical studies.

Previous research has shown a variety of approaches: evaluating the application of Halodoc with UEQ; validate UEQ+ in Indonesia; improving the interface of the Bandung Regional Budget website with a Human-Centered Design approach; and improving the Inaportnet site with a User-Centered Design approach. However, most research is still limited to technical or institutional aspects [12] [7] [15] [16].

To fill this gap, this study uses a combination of SUS, NPS, and UEQ+ with a user-centered, iterative, and enabling prototype validation through usability testing. Thus, this research is expected to produce a comprehensive evaluation as well as better design recommendations for OSS as a digital public service.

This research began with a literature study on the object of observation, namely the Online Single Submission (OSS) website as a digital public service platform, as well as literature on UI/UX evaluation methods. The literature review includes e-government theory, interface design principles and user experience, as well as evaluation instruments such as System Usability Scale (SUS), Net Promoter Score (NPS), and User Experience Questionnaire Plus (UEQ+).

Conceptually, the research uses a design thinking approach with five stages: empathize, define, ideate, prototype, and test. The research was carried out in the April-May 2026 period in Surabaya, involving 30 OSS user respondents for the evaluation of existing websites, as well as 10 additional respondents for prototype testing. The research subjects were purposively selected to represent the actual users.

The evaluation using standard questionnaires (SUS and UEQ+) involved 30 active business actors (MSEs and non-MSEs) experienced using the OSS website in the last 6 months, where the determination of the $N \geq 30$ sample was based on the Central Limit Theorem

to meet the normal distribution assumptions. Meanwhile, the prototype testing through usability testing involved 10 new respondents (general users and new business actors) who had never seen a prototype before in order to maintain the objectivity of the think-aloud method. The number of these 10 respondents referred to the theory of [17] which stated that a sample of 5–12 participants in a controlled environment had been effective in finding 80–90% of the main usability problems of the system.

Table 1. Stages *Design Thinking*

Phase	Description	Output Produced
Emphatize	At this stage, the researcher conducts observations with user experience questionnaires and identifies user problems and needs.	List of <i>user pain points</i> and <i>user needs</i> .
Define	The researcher summarizes the results of the <i>emphatic stage</i> and analyzes it so that it produces a formulation of the problem according to what is obtained.	List of <i>problem statements</i> .
Ideate	At this stage, the researcher comes up with several ideas to solve the problem.	List of solution ideas based on <i>How Might We</i> .
Prototype	The researcher created a prototype with the main functions of the website to <i>strengthen the ideate process</i> .	Test prototype
Test	After the prototype is completed, the researcher conducts prototype testing and finalizes the prototype.	Prototype usage experience data.

The research procedure includes the distribution of online questionnaires (SUS, NPS, UEQ+, and open-ended questions), identification of user problems and needs, formulation of problem statements, preparation of improvement recommendations, prototyping using Figma, and testing of prototypes through usability testing based on task scenarios. Analysis techniques were carried out quantitatively (task completion rate, error rate, time-based efficiency, SUS, NPS, UEQ+ scores) and qualitatively (open input, observation, think-aloud protocol).

Table 2. Statement *System Usability Scale (SUS)*

No.	Statement
1.	I think I will use this website often.
2.	I feel that this website is too complicated when it could be made simpler.
3.	I think this website is easy to use.
4.	I think I need help from a technical person to be able to use this website.
5.	I found that there are a wide variety of websites that are well integrated into the system.
6.	I think there are a lot of inconsistent things on this website.
7.	I think the majority of users will be able to learn this website quickly.
8.	I found that this website is very impractical when used.
9.	I am very confident that I can use this website.
10.	I had to learn a lot of things first before I could use this website.

Sources: [18]

SUS is a standard questionnaire consisting of 10 statements with a Likert scale of 1–5, where scores are calculated through special rules and the results are multiplied by 2.5 to obtain a final score. The interpretation of SUS scores ranges from *the Awful* to *Excellent categories*.

Table 3. Questions *Net Promoter Score (NPS)*

No.	Questions
1.	How likely are you to recommend this website to friends or relatives?

Sources: [19]

NPS is used to measure user loyalty through a single question on a scale of 1–10, which is then classified into promoter, passive, and detractor. The NPS score is calculated by subtracting the percentage of detractors from the percentage of the promoters, with a value range of -100 to +100.

Table 4. Statement *User Experience Questionnaire Plus (UEQ+)*

Scale	Statement Items	Answer Items
<i>Trustworthiness of content</i>	In my opinion, the information and data on this website	useless/useful
		Absurd / Absurd
		untrustworthy / trustworthy
		inaccurate / accurate

Scale	Statement Items	Answer Items
	I think the characteristics of the website described above as	completely irrelevant / very important
<i>Quality of content</i>	In my opinion, the information and data on this website	Obsolete/Latest
		Unattractive / Attractive
		not well prepared / well prepared
		incomprehensible/comprehensible
	I think the characteristics of the website described above as	completely irrelevant / very important
<i>Display clarity</i>	In my opinion, the appearance of the website interface is visible	poorly grouped / well grouped
		unstructured / structured
		unsorted / sorted
		irregular / irregular
	I think the characteristics of the website described above as	completely irrelevant / very important

Sources: [7]

Meanwhile, UEQ+ is a modular questionnaire that can be adjusted to the needs of the product or service. For public websites, the scale used includes trust in the content, content quality, and clarity of view. Each scale is graded using a 7-point Likert (-3 to +3), and the calculation is done automatically through the official UEQ+ template in Excel format.

Table 5. Open-ended questions

No.	Questions
1.	What do you think are the main obstacles or difficulties you experience when using the OSS website?

2.	What suggestions or feedback do you think can improve the ease of use or user experience of the OSS website?
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Prototype testing was conducted for ± 30 minutes via the Zoom platform to facilitate the recording of results. The testing stages include an initial briefing by the evaluator, prototype exploration for 2–3 minutes, implementation of task scenarios with indicator recording, as well as filling out SUS, NPS, UEQ+, and open-ended questionnaires. The quantitative indicators used consist of:

- Task completion rate: measures the percentage of tasks that are successfully completed by users/respondents.

$$\text{Task Completion Rate} = \frac{\text{Number of Successful Task}}{\text{Total Number of Task}} \times 100\%$$

- Error rate: records the number of errors admitted during the completion of a task.

$$\text{Error Rate} = \frac{\text{Number of Error}}{\text{Number of Task Attempts}} \times 100\%$$

- Time based efficiency: calculates the average time it takes to complete each task.

$$\text{Time - Based Efficiency} = \frac{\text{Total Time to Finish All Task}}{\text{Number of Successful Tasks}}$$

The results of the analysis became the basis for the design iteration so that it produced a final prototype that was more optimal and ready to be used as a reference for the implementation of the OSS website.

3. Results and Discussions

The data collection stage is carried out through evaluation of the UI/UX design of the existing OSS website, identification of key problems, and mapping user needs. The evaluation was carried out by distributing questionnaires to 30 active respondents who had used OSS, through Google Forms which were shared via WhatsApp, Instagram, and Threads. The instruments used were System Usability Scale (SUS), Net Promoter Score (NPS), and User Experience Questionnaire Plus (UEQ+).

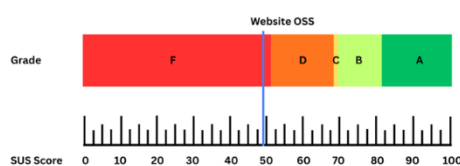


Image 1. SUS Existing Website Diagram

The results of the SUS calculation showed an average score of 49.33 with category F (awful), indicating that the website is difficult to use, especially in the learnability aspect.

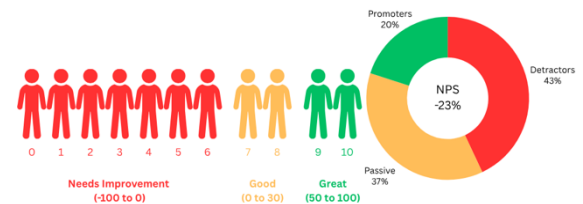


Image 2. NPS Existing Website Diagram

An NPS value of -23% indicates that the number of users who are not willing to recommend OSS is more than those who are willing, thus confirming the existence of dissatisfaction.

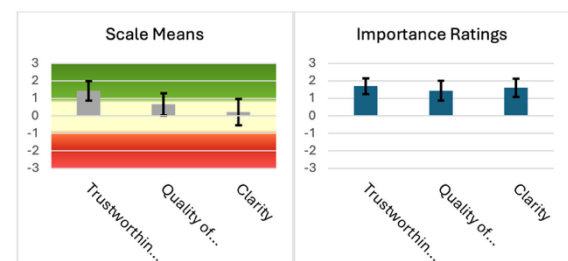


Image 3. UEQ+ Existing Website Diagram

Meanwhile, the UEQ+ results showed an average score of trustworthiness of content = 1.48, quality of content = 0.65, and clarity = 0.21, with an overall KPI of 0.77. This indicates that the user experience is still low and inconsistent.

The problem identification stage is carried out through open-ended questions in a questionnaire. The results show major constraints on system performance (slow, errors, long verifications), interface design (confusing navigation, inconsistent fonts, annoying pop-ups), and service support (slow call centers, unclear guidance). Based on these findings, the define stage produces a problem statement that OSS has not been able to provide a simple, efficient, and transparent licensing experience for users.

Table 6. List of Problems and User Needs

No.	User Pain Points	User Needs
1.	Some page errors; slow system; Old verification process	There is a need to improve the performance of the system; Acceleration of the verification process

No.	User Pain Points	User Needs
2.	The thumbnail of the same guide makes users confused looking for a guide	Thumbnails are differentiated so as not to confuse
3.	The integration of AMDAL and NPWP is confusing; Old Call Center in Response	It takes an alternative to respond to confusion faster; Provision of clearer and more interactive guidance
4.	The word used in the main manu is confusing	It takes time to learn and get used to the website
5.	Information grouping and navigation are not intuitive	More intuitive grouping of information and navigation
6.	The layout is not easy to understand; the display and navigation are not user friendly; inconsistent fonts	Better layout; Simple and easy-to-understand initial view
7.	Annoying poster pop up	Unobtrusive poster display

Table 7. Questions and Problem Statements

No.	Problem Questions	Problem Statement
1.	What's the problem?	OSS websites are often error and slow, information grouping and navigation are confusing
2.	Why is that a problem?	This hinders the smooth licensing process and reduces user satisfaction
3.	Who is in trouble?	Business actors, general users, and system admins
4.	Who needs it?	OSS users who want a fast and smooth process
5.	When did the problem occur?	When a user accesses a specific page (KBLI, regulation) or document verification
6.	Where does the problem occur?	On the OSS website, especially on the page (KBLI, regulations) and document verification
7.	How is the current issue being addressed?	By waiting for a call center response, looking for manual guidance, retrying access

The data processing stage is carried out through the preparation of improvement recommendations, prototyping, and prototype testing. The preparation of recommendations is carried out using the How Might We method, resulting in solutions such as backend optimization, more intuitive navigation, simple layout, interactive guides, and reduction of pop-up distractions. Priority is determined with a 2×2 matrix based on values and possible implementations, so the focus is directed to realistic navigation improvements and interface layouts to be carried out.

Table 8. How Might We Questions and Answers

No.	How Might We Question	How Might We Answer
1.	How can we speed up the verification process?	With backend system optimization and document verification automation
2.	How can we make the guide easier to find?	By differentiating guide thumbnails and adding search features
3.	How can we reduce the confusion of the integration of AMDAL and NPWP	By providing interactive guides and responsive chatbots
4.	How can we make navigation more intuitive?	By grouping information by category and improving the main menu
5.	How can we improve the appearance to be more user friendly?	With a simple layout, font consistency, and minimalist design
6.	How can we reduce distractions from poster pop-ups?	By displaying the poster on a special page or adding a dismiss option
7.	How can we speed up call center responses?	By providing alternative channels such as live chat or automated FAQs

Table 9. Improvement Recommendation Matrix

High value, it is possible to do:	High value, impossible to do:
- Navigation: clearer main menu; grouping information by category; breadcrumb to guide the groove. - Simple layout: the initial display is easy to understand; consistency of fonts, spacing, and icons.	- Backend optimization: speed up the document verification process. - System integration is clearer: an interactive guide to AMDAL and NPWP so as not to be confusing.
Low values, it is possible to do:	Low value, impossible to do:
- Guide thumbnails are different: so that users don't get confused about looking for a guide. - Non-intrusive pop-up posters: the option to dismiss or be displayed on a different page.	- Live chat support or automated FAQs; - Responsive chatbot - Interactive guide: step-by-step guide; search with filters.

The prototype was then developed using Figma as a visual representation of the improvement recommendations. Improved elements implemented include clearer navigation, landing page onboarding, simple card grid, status tracking bar, tooltip, chatbot, breadcrumb trail, step-by-step guide, more informative error page, loading indicators, category filters, and consistency style guides. This prototype was tested through usability testing with 10 respondents.

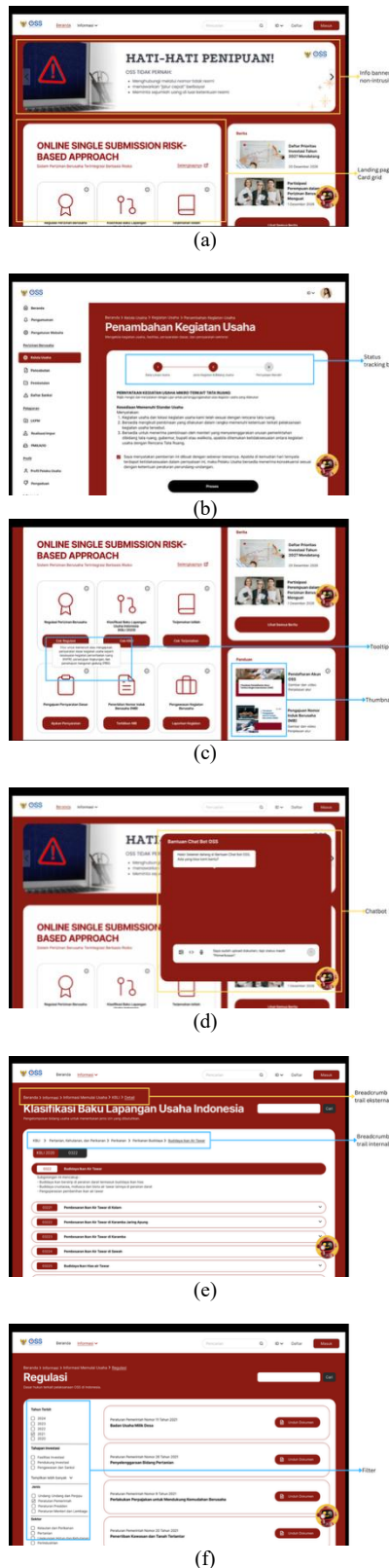


Image 4. Prototype Improvement Results

The test results showed a significant improvement. The task completion rate reached 100% in four of the five scenarios, with one task being worth 80%. The highest error rate was found in Task 3 (310%), while the lowest was

in Task 5 (10%). The highest time-based efficiency was found in Tasks 2 and 4 (61–67 seconds), while Task 3 was the lowest (100 seconds).

The usability testing results demonstrate that Task 3 (understanding the step-by-step NIB guide) serves as the primary system bottleneck, yielding a critical error rate of 310% and an extended completion time of 100 seconds. This notable navigation friction directly confirms the digital literacy gaps highlighted by [3]. Qualitative insights from the think-aloud protocol revealed that the legacy guide layout significantly overloaded the users' cognitive capacity due to heavy text blocks and complex bureaucratic jargon, causing users to make repetitive misclicks. Practically, this phenomenon provides vital strategic implications for the Ministry of Investment/BKPM as the core system administrator. To prevent entrepreneurs from abandoning the self-service portal and relying on non-transparent third-party intermediaries, a severe risk thoroughly warned by [5] BKPM must abandon exhaustive text-based manuals. Implementing the optimized interface architecture from this study, which integrates an automated chatbot and repositions the interactive guide card to the prominent top-right visual zone with distinct blue decision buttons, creates a self-explanatory user flow. This framework successfully minimizes navigation errors, ensures a transparent business licensing experience, and reduces support ticket overloads on public call centers.

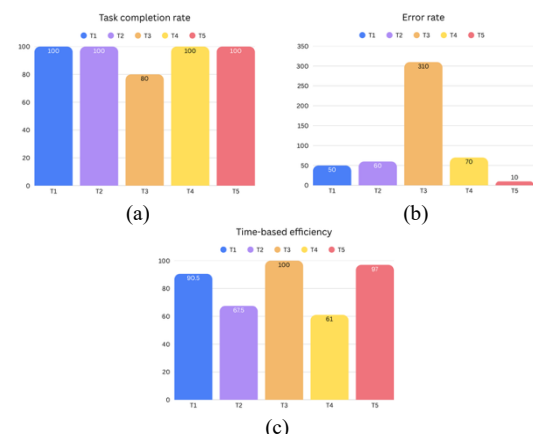


Image 5. Usability Testing Diagram (a) Task Completion Rate; (a) Error Rate; (c) Time-Based Efficiency

The efficiency indicator is proven quantitatively through Time-Based Efficiency where the work on crucial flows such as Task 2 (KBLI Check) and Task 4 (Add Location) was successfully cut to 67.5 seconds and 61 seconds only. Meanwhile, user satisfaction is directly reflected in the dramatic jump in the SUS score from 49.33 (F/Awful category) to 79.5 (B/Good category) and the NPS improvement to 30% (Positive).

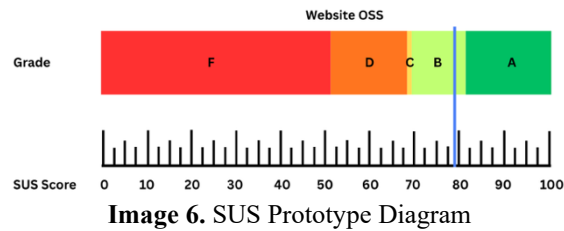


Image 6. SUS Prototype Diagram

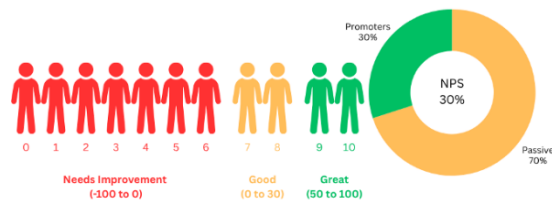


Image 7. NPS Prototype Diagram

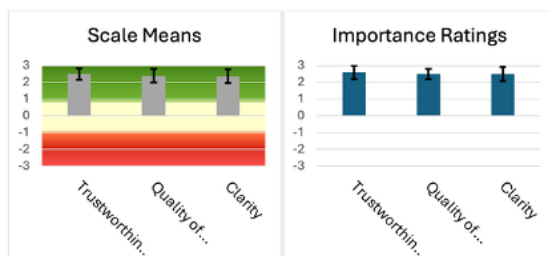


Image 8. UEQ+ Prototype Diagram

The quantitative breakthrough from an 'Awful' grade (SUS 49.33) to a 'Good' standard (SUS 79.5) strongly resonates with the theoretical framework of [11], who argued that local government public platforms must minimize visual complexity to secure community trust. While the legacy OSS website suffered from severe learnability vulnerabilities as conceptualized by [4], the restructured card grid and intuitive navigation architectures successfully transformed user orientation. Furthermore, the stabilization of the Net Promoter Score (NPS) into a positive 30% margin indicates a massive reduction in

behavioral friction, which directly addresses the structural bottlenecks of system accessibility previously identified by [5]. By shifting the overall User Experience Questionnaire Plus (UEQ+) KPI value to a stable 2.43 baseline with minimal variance, the developed prototype structurally proves that modular interface clarity remains the primary catalyst for user task success within digital public service domains [6], [12].

The final prototype was enhanced with the addition of sort features, improvements to the guide column, detail/compact menu, decision button color changes, and consistency of style guide.

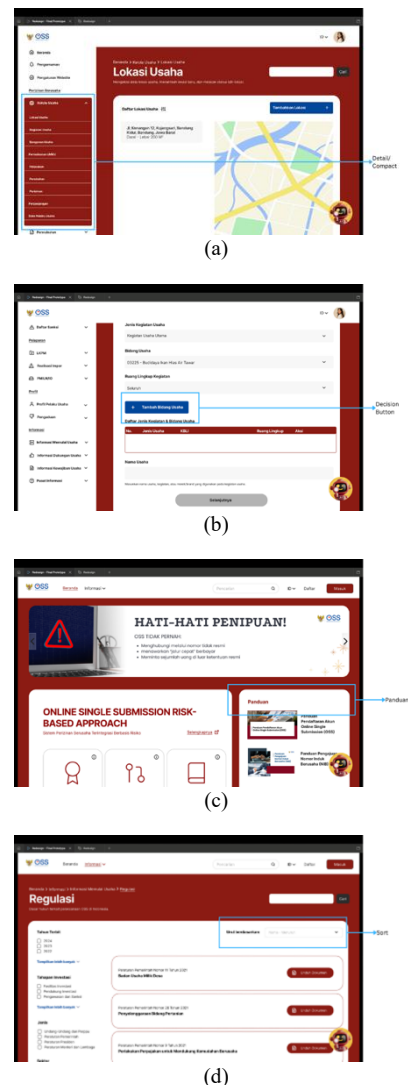


Image 9. Prototype Finalization Results

Thus, the OSS RBA prototype developed is considered more stable, efficient, and user-friendly, and can be used as a reference for the

implementation of the digital licensing system in Indonesia.

4. Conclusions and Suggestions

This study shows that the UI/UX quality of the existing OSS website is still low, with a SUS value of 49.33 (category F), NPS -23%, and UEQ+ KPI of 0.77 which indicates that the user experience is inconsistent. In contrast, the OSS prototype developed managed to significantly improve quality with a SUS of 79.5 (category B), an NPS of 30%, and a UEQ+ KPI of 2.43 with a more consistent perception. The results of usability testing prove that the new design is easier to use, efficient, and able to meet user needs.

Relevant agencies are advised to conduct periodic testing and continuous improvement of the UI/UX OSS to maintain the quality of digital public services. Further research can involve more respondents from various backgrounds, conduct direct testing on existing websites to strengthen validity, and add qualitative analysis such as interviews or focus group discussions to delve deeper into user perceptions and barriers.

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