REDESIGN OF USER EXPERIENCE IN INAPORTNET USING THE USER EXPERIENCE QUESTIONNAIRE METHOD AND USER-CENTERED DESIGN

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Abstract - The Directorate General of Sea Transportation, under Indonesia's Ministry of Transportation, developed Inaportnet as a digital platform mandated by Ministerial Regulation Number PM 8 of 2022 to streamline ship service procedures and enhance e-government implementation. This study evaluates the user experience (UX) of the Inaportnet website, focusing on its usability, security, and overall design using a user-centred design (UCD) approach and the User Experience Questionnaire (UEQ) method. Data were collected from 56 respondents, including stakeholders such as ship operators, port authorities, and service users. The findings reveal critical shortcomings: 95% of respondents encountered frequent bugs affecting usability, 65% highlighted security concerns, 60% criticised the cluttered interface, 40% experienced access failures, and 50% expressed low engagement with the platform's features. To address these challenges, the website was redesigned using UCD principles, resulting in significant improvements. The redesigned platform achieved "Good" ratings for attractiveness, stimulation, and novelty, and "Above Average" ratings for clarity, efficiency, and accuracy in UEQ metrics, indicating enhanced usability and user satisfaction. This study underscores the importance of iterative UX design in optimising digital government systems, offering actionable insights for improving public service platforms in developing countries.

Keywords - Inaportnet, User Experience, UEQ, User Centered Design, Website.

I. INTRODUCTION

Ports are vital to global trade and industry, serving as hubs for goods and passenger transportation. Given their critical role, the efficiency and transparency of port services significantly influence economic growth. To address the challenges of manual and fragmented systems, e-government initiatives have been introduced to digitize and streamline operations. One such initiative is *Inaportnet*, developed by the Directorate General of Sea Transportation under Indonesia's Ministry of Transportation. Governed by Ministerial Regulation Number PM 8 of 2022, Inaportnet is a digital platform designed to manage ship services and support the broader implementation of e-government [1]. The Inaportnet application is a ship management support system [2], [3], [4]. Therefore, the Internet security website was created where the application can make it easier for employees or officers to collect ship data. The website has various functionalities, including employees or officers having work status and access rights to the apparent website, indicating that the officer is currently on duty[5].

Previous research regarding Inapornet was quite good and interesting. The results showed that all dimensions had a "quite satisfied" satisfaction, meaning that users and service providers assessed that Inapornet's services had met expectations but were still not optimal [3], [6], [7]. Research on user experience redesign using a user experience questionnaire and user-centred design in designing applications and websites. This research carried out a design to determine user satisfaction using a user experience questionnaire and a user-centred design[8], [9],[10].To give a good initial impression to potential users and be able to compete with other competitors, the author plans a good User Interface and User experience design. User Interface (UI) is where the system and users can interact with each other through commands such as using content and entering data. Meanwhile, User Experience (UX) is an experience related to the user's reactions, perceptions, behaviour, emotions and thoughts when using the system.

User experience questionnaires (UEQ) are a valuable tool for evaluating user experience in various platforms[9], [11]. Research has shown that UEQ assessments can provide insight into multiple aspects of user experience, such as attractiveness, efficiency, dependability, stimulation and novelty. With the benefits of UEQ, researchers can measure user impressions and emotions when interacting with a website, allowing them to identify areas that need to be improved in clarity, accuracy, and stimulation. Overall, UEQ offers a standard method for measuring and improving user experience. In practice, displays often contradict the user's experience. That's where user experience design emerged to create a good user experience [12]. User Experience Design is simply the process of making a product, website and application easy to use and straightforward when used by users[13], [14].

Based on the background described, this evaluation aims to discover more deeply about the success level of the user experience on the Internet website[15]. By addressing these questions, this study aims to identify usability gaps, provide actionable recommendations for design improvements, and contribute to the development of more user-friendly and efficient digital government systems. The findings are expected to offer insights for policymakers and system developers in optimizing similar platforms to better serve their users and achieve organizational goals[16]. This research also uses UEQ for system evaluation; this method can produce user assessments, including a comprehensive impression of the user experience[17], [18]. The UCD approach aims to speed up prototyping design work, which can be seen from the process flow so that researchers do not need to design first [19].

II. SIGNIFICANCE OF THE STUDY

User Experience

User Experience (UX) is the user's experience interacting, accessing, or using a website or application. User Experience (UX) evaluates a person's satisfaction and comfort with products, systems and services[20], [21]. A designer cannot design user experience but can create a product that will produce user experience. No matter how good the product, system or service functions, if the target audience cannot obtain satisfaction, order and comfort in interaction, the level of user experience will be very low. The development of the digital and mobile world makes UX an essential factor in determining whether information technology is adequate for its users[22], [23].

User Centred Design

User-centred design is a method included in the SDLC (System Development Life Cycle) , which is a development model that focuses on the user's role in determining their needs. UCD focuses on specific potential users, such as gender or age range[24]. It is believed that this system will continue to develop dynamically as long as there is a need for data and information that needs to be provided to parties who need its services. User-centred design (UCD) is an approach that can be used in designing systems that are flexible and interactive according to user needs[25] .

User Experience Questionnaire

The UEQ method has been widely known as a User Experience measurement tool. The User Experience Questionnaire, or UEQ, is a survey data processing tool related to user experience that is easy to apply, reliable, and valid. It can complement data from other evaluation methods with subjective quality assessments[17]. UEQ is also a part of classic usability tests to get a comprehensive impression of UX from usability and experience aspects. So, measuring user experience requires collecting feedback from a larger group of users[13], [26]. This UX Questionnaire method has 26 different pairs of assessments in evaluating parameters, namely :

1. Attractiveness: Whether a thing is liked or not, users' overall perception of it. The following items are categorized by size: good/bad, charming/unpleasant, unappealing/pleasant, attractive/unattractive, and friendly/unfriendly.

2. Efficiency: the interface's layout and the product's ability to be used quickly and effectively. Size of item: quick/slow/efficient.

3. Perspicuity: is the ease with which a thing can be used and adapted. Size items are clear/confusing, complicated/easy, easy to learn/difficult to learn, and not understandable/understandable.

4. Dependability: is the ability to meet expectations, feel secure, and have control over interactions. Item dimensions are erratic/reliable, obstructive/supportive, and safe. Not safe fulfils or falls short of expectations.

5. Stimulation: The product's intriguing and pleasurable features encourage people to use it more frequently. Size of item: better/lesser, dull/interesting, stimulating/demotivating, and not exciting/interesting.

6. Novelty: inventive and imaginative product design that draws Item size: creative/dull, inventive/conventional, usual leading-edge, conservative/innovative.

Integration of UX, UCD, and UEQ

UX, UCD, and UEQ are interrelated concepts that, when combined, offer a comprehensive framework for improving user experience. UCD serves as the foundational approach, focusing on designing systems tailored to user needs through iterative feedback and participatory methods. UEQ enhances this process by providing a structured and quantitative means to evaluate user satisfaction and system usability.In practice, UEQ enriches the UCD process by delivering actionable insights derived from user feedback, enabling designers to prioritize and address specific usability issues. Conversely, UCD can improve UEQ outcomes by ensuring that the systems being evaluated have been designed with user-centric principles, increasing the likelihood of positive user feedback. Together, these methods foster a cyclical improvement

process, where user feedback informs design enhancements and iterative development leads to continuously improved user satisfaction. This integrative approach ensures that digital platforms not only meet functional requirements but also deliver meaningful and engaging user experiences, aligning with broader goals of usability, efficiency, and satisfaction[27], [28], [29].

III. METODOLOGY

In designing Inapornet, UCD was chosen because it has specific targets such as age range and type of work. Apart from that, UCD also has the characteristic that the process is carried out iteratively, as in the picture[29], [30]. The design and evaluation process is continuously built from the initial steps to continuous implementation[31]. The principle that must be considered when using UCD is focusing on users and integrated design, from the initial stage to user testing and interactive design[20], [27].

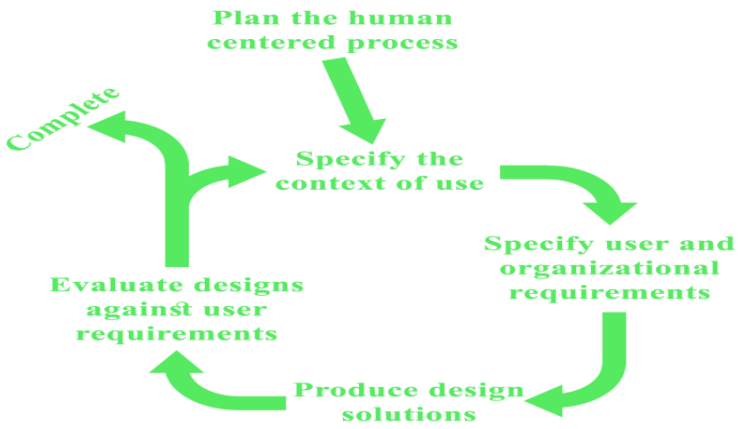

Fig 1. Stages user centered design. Sumber Iso 13409 (1999)

Understand Context of Use

In the first stage, researchers must understand potential users who will use the product or system to be created, for what purposes and in what context the user will use it.

Specify User Requirements

This study utilized Slovin's formula to determine the sample size, which is appropriate for large and finite populations when the level of precision and margin of error are clearly defined. The formula allows researchers to estimate a representative sample while accounting for acceptable variability within the population. Given the broad user base of the Inaportnet platform, including ship operators, port authorities, and administrative staff, Slovin's formula ensured a statistically significant sample size with a 95% confidence level and a 5% margin of error. The target population for this research consisted of individuals actively involved in using the Inaportnet platform. These included employees managing ship data, officers responsible for operational tracking, and other stakeholders relying on the system's functionalities. Respondents were selected using purposive sampling to ensure representation across diverse roles and levels of interaction with the platform

This process formulates user needs for the application. This process will be carried out by distributing UEQ questionnaires to target users, namely several users who use the Inaportnet website to help with their Final Project process. The Slovin formula finds the minimum sample size from a targeted respondent population.

$$n = \frac{N}{1+Ne^2}$$

Information:

n = Number of target samples

N = Total population

e = Total percent margin of error.

$$n = \frac{120}{(1+120\times(0,1)^2)}$$
$$n = \frac{120}{1+(120\times0,01)}$$
$$n = \frac{120}{2,22}$$
$$n = 54,5$$

Which can be rounded up to 55. So, the number of sample data that must be collected with a margin of error of 10% in this research is a minimum of 55 respondents.

Design Solution

Evaluate the design in the previous stage, using the ueq method and analyzing the data. Making this design solution adapts input expressed by users on the Internet website.

Evaluation

The stage that must be carried out after completing the prototype design is to evaluate the UI/UX prototype design. Evaluation is carried out repeatedly according to the previous explanation. The purpose of the review, which was carried out repeatedly, was to obtain continuous feedback on the designs previously created. This cycle is carried out iteratively until we get a UI/UX design that best meets the expectations of potential Internet users[30]. Thus, the solution design can be re-evaluated using the same method (UEQ) to determine user impressions of the new design [4]. Then, the results of the latest UX design calculations are obtained as follows :

Table 1. UX Calculation Results

Scale	Mean	Comparison to benchmark
Attractiveness	1,11	Below average
Perspicuity	1,29	Above average
Efficiency	1,20	Above average
Dependability	0,90	Below average
Stimulation	0,83	Below average
Novelty	0,54	Below average

The table above explains that the new Inaportnet UX design received a mean score of 1.11 (Attractiveness), 1.29 (Perspicuity), 1.20 (Efficiency), 0.90 (Dependability), 0.83 (Stimulation), 0.54 (Novelty). Explains the benchmark graph for the category results for each new Internet UX design aspect

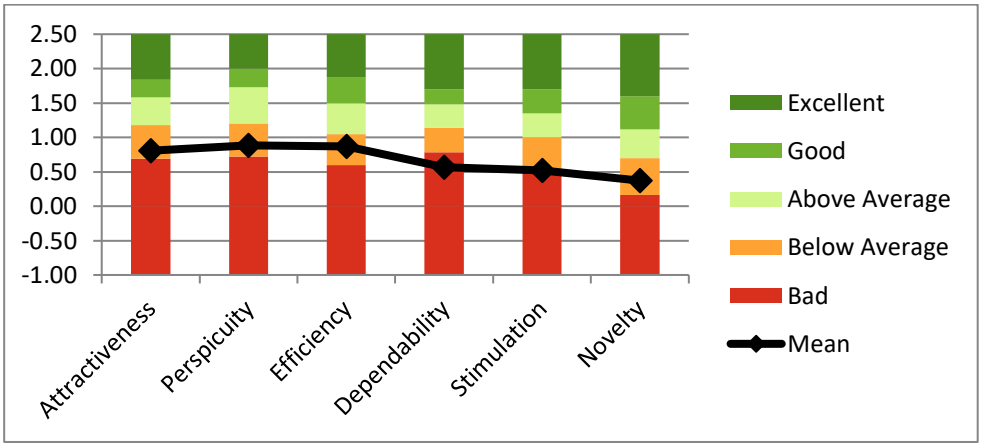

Fig 2. Benchmark User Experience Questionnaire

IV. RESULTS AND DISCUSSION

This chapter explains the analysis and design of user interfaces based on solutions that will be created based on the concept of user-centred design, which starts with understanding the user, continues with defining, namely understanding the user's needs, and then at the ideate stage by looking for solutions and ideas from problems that have been obtained previously.

Application Introduction

The goal of the design process is to create a prototype of the Internet website that can be evaluated and tested at the next stage. According to Ariq Hendrian in his journal[17] it is stated that the prototyping process for system developers has the aim of obtaining information on user responses to the system through user interaction with the prototype being developed, the reason is because the prototype adequately describes the initial version of the actual system. Still, in the same journal, it is stated that the reason for making a prototype design is because the prototype can be added or reduced easily according to the development process. An equally important benefit is that it can save time, funds and resources. Designing a UI/UX prototype design for the Internet website. The results of the analysis process will become a reference for the author to create a prototype design regarding what the user needs. The results of this design will become the UI/UX prototype design of the current Internet website. The design process will be made as good as possible based on the analysis that has been carried out previously, including the most important thing is suggestions from stakeholders. The resulting design, apart from being a graphic design, is also an interactive design so that it can easily be used by potential users for the evaluation process. The results of the design of the UI/UX prototype design for the Internet website will be tested directly on users repeatedly so that the design process will also be iterative, the design at the initial stage will be used as evaluation material to become a reference for implementation in the next stage, the results of the implementation will be re-evaluated for implementation. redesign if needed, the process continues to repeat until we get the best design according to the user's wishes.

Implementation Result

The final stage of the iterative UI/UX design process involves translating the evaluated design into an operational website. However, this stage does not signify the conclusion of the process, as iterative methodologies allow for subsequent refinements based on further evaluations. The website design was developed using Figma, requiring meticulous attention to detail to avoid

errors that could compromise quality. The duration of implementation varies depending on the number of pages and the team size. Internal evaluations were conducted in parallel with implementation, where team members reviewed completed pages to identify discrepancies between the design plan and the actual implementation or detect other errors. The incremental implementation of the Inaportnet UI/UX design spanned several days to ensure precision and quality. However, implementation outcomes sometimes deviated from the initial designs due to factors such as design complexity, reduced responsiveness on devices like smartphones and tablets, and browser compatibility issues. To address these challenges, adjustments were made during the implementation process to preserve the integrity and functionality of the original design.

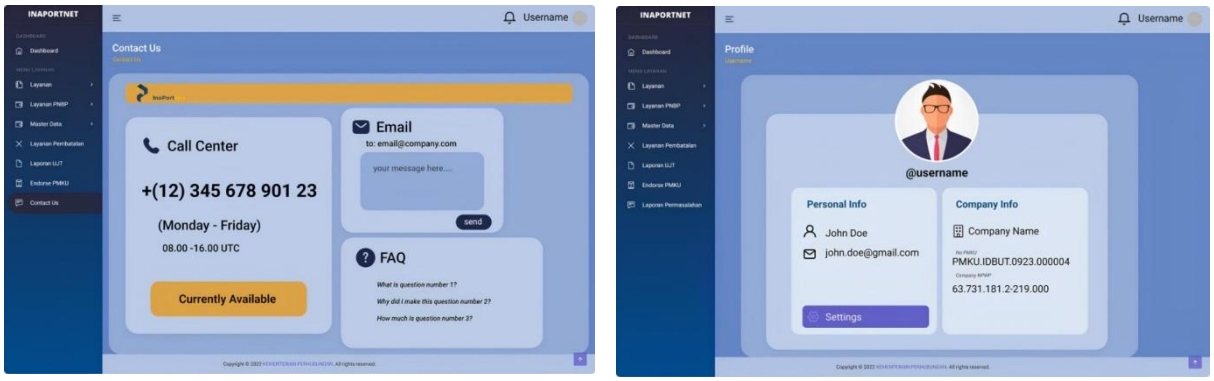

Fig 3. website Inapornet

The results of the UI/UX design for Placeplus using the UCD approach are presented below. The initial analysis phase provided an overview of the UI/UX design, culminating in a prototype design as illustrated in the accompanying image. One key outcome from stakeholder interviews was the suggestion to refine the login method, leading to the prototype design displayed in the image. Evaluation of the initial design revealed issues such as overly bright bluish-purple colouring, difficulties with date selection layout, and oversized icons on the detail page. Changes during the implementation phase were informed by coding constraints and considerations of responsive display compatibility across devices. The results of the initial implementation phase are presented in the image, showing further evaluation findings: the home section needed a more precise description, the footer size was too large, facility icons required consistent positioning, and the colour of critical information was deemed inappropriate. Following these evaluations and redesign efforts, stakeholders noted that the revised UI/UX design was generally user-friendly and provided a positive user experience.

Testing

After I updated the Inapornet website, then I tested it again on Inapornet users using UEQ, it can produce something like the table below, the results of the table state that the Inapornet website update is quite satisfactory. According to the benchmark table above, the results after implementing the website are described in the benchmark as quite good, where attractiveness is (1.50) good, clarity (1.70) good, efficiency (1.70) good, accuracy (1.25) above average, stimulation (1.10) above average, novelty (0.90) above average.

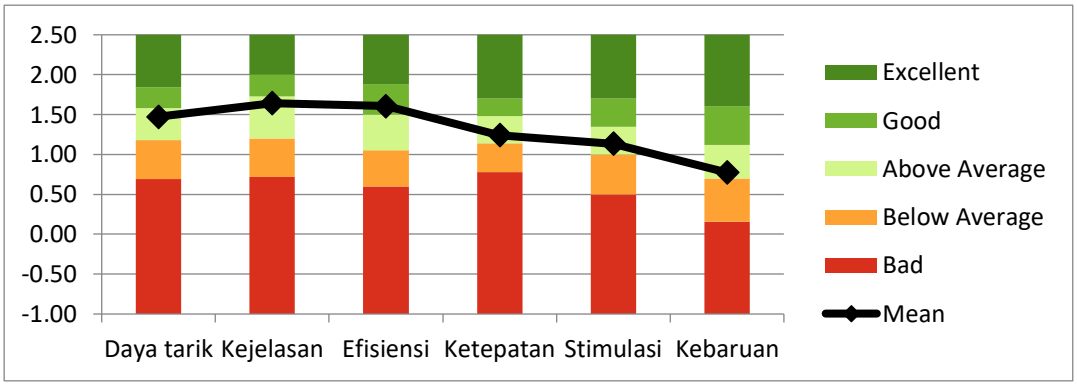

Fig 4. Benchmark User Experience Questionnaire

V. ACKNOWLEDGMENT

The evaluation of the Inaportnet website, conducted through a survey of 52 respondents, revealed significant shortcomings in user experience, including frequent bugs (reported by 95% of respondents), inadequate security measures (65%), disorganized features and interface design (60%), accessibility issues (40%), and low user engagement with provided features (50%). These findings indicate that the platform fails to meet user satisfaction, challenging the assumption that it effectively supports its intended audience. The identified deficiencies not only hinder usability but also undermine confidence and interest in using the system. To address these issues, the study implemented a redesign based on User-Centered Design (UCD) principles, focusing on interface improvements and the addition of a new menu feature, previously inaccessible to contact persons, now operational. This iterative approach demonstrates the importance of user feedback in optimizing e-government platforms, emphasizing the need for continuous improvement to enhance usability, security, and user satisfaction.

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