

RESEARCH ARTICLE

Design Thinking-Based UI/UX Prototype for a Hospital Patient Registration Information System

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Abstract

The patient registration process is an important service in hospitals because it affects service efficiency and patient satisfaction. Although RSU Sari Mutiara Lubuk Pakam has implemented a patient registration system, several problems still occur, such as BPJS verification issues, inefficient queue management, and limited patient understanding of the registration process. This study aims to design a User Interface (UI) and User Experience (UX) prototype for a patient registration information system using the Design Thinking method. The research applied the five stages of Design Thinking: empathize, define, ideate, prototype, and test. Data were collected through observation, interviews, literature review, and questionnaires involving 50 respondents, including patients and registration staff. The prototype was designed using Figma and provides features such as patient type selection, BPJS and general patient verification, clinic and appointment scheduling, doctor schedule information, referral letter upload, e-ticket generation, and queue status monitoring. The prototype was evaluated using the System Usability Scale (SUS), resulting in an average score of 78.35. This score falls into the Acceptable category with a Grade B and an Excellent usability rating. The findings indicate that the proposed prototype is easy to use and can improve the efficiency and quality of the patient registration service at RSU Sari Mutiara Lubuk Pakam.

Keywords

UI/UX; Design Thinking; Patient Registration Information System; Prototype; System Usability Scale (SUS).

1 | INTRODUCTION

The development of information technology has significantly changed the way healthcare services are delivered, with hospitals expected to provide fast, accurate, and user-friendly digital services to improve service quality and patient satisfaction (Fu *et al.*, 2024). One of the most important services is the patient registration process, as it is the first step before patients receive medical treatment; an effective registration system can reduce waiting time, improve administrative efficiency, and provide a better experience for both patients and hospital staff (Rohmah *et al.*, 2024). Cyntia *et al.* (2024) also found that differences in hospital registration systems can influence patient satisfaction, indicating that the registration process is an important component of healthcare service quality. This general pattern is also reflected at RSU Sari Mutiara Lubuk Pakam, which has implemented a patient registration system to support its healthcare services but still faces several problems during the registration process, including difficulties in BPJS verification, inefficient queue management, and limited patient understanding of the registration procedure. As a result, patients often experience delays and confusion, while registration staff must spend additional time handling these issues, making the improvement of the registration system an important need to increase service efficiency and patient satisfaction.

User Interface (UI) and User Experience (UX) play an important role in the success of an information system, since a good user interface makes the system easier to understand while a good user experience ensures that users can complete their tasks comfortably and efficiently (Santoso & Sumantiawan, 2025); conversely, a system with poor UI/UX design may cause users to make mistakes, feel confused, or become dissatisfied with the service, making it essential to design a system based on user needs when developing a patient registration application. To address these problems, this study applies the Design Thinking method, a human-centered approach that focuses on understanding user needs and developing solutions based on real user experiences. The method consists of five stages, empathize, define, ideate, prototype, and test, through which designers can identify user problems, generate innovative ideas, create interactive prototypes, and evaluate the usability of the proposed solution (Putri *et al.*, 2025).

Several previous studies have demonstrated the effectiveness of Design Thinking in healthcare-related interface and registration design. Primadiningsih and Heroza (2022), for example, applied Design Thinking to redesign a hospital registration module and improved its SUS score from 26 to 87. Trifena *et al.* (2023) developed a mobile-based hospital registration application using Design Thinking and obtained a SUS score of 83. More recently, Iqbal *et al.* (2025) applied a User-Centered Design approach to a primary clinic application and reported SUS scores above 85 across patient, doctor, and administrative staff groups. These studies demonstrate that user-centered approaches can improve the usability of healthcare registration interfaces; however, the existing studies differ in their service contexts, user requirements, and registration workflows. This study therefore addresses a specific gap by designing a UI/UX prototype that integrates BPJS and general patient registration within a single registration flow, while specifically addressing the operational problems identified at RSU Sari Mutiara Lubuk Pakam, including BPJS verification difficulties, referral document verification, queue management problems, and limited patient understanding of the registration procedure. The prototype is developed based on direct observations and interviews with patients and registration staff and is evaluated using the System Usability Scale (SUS).

The objective of this study is to design a UI/UX prototype for the patient registration information system using the Design Thinking method. The prototype is developed using Figma and includes features such as patient type selection, BPJS and general patient verification, clinic and doctor schedule selection, referral letter upload, electronic ticket generation, and queue status monitoring. The usability of the prototype is evaluated using the System Usability Scale (SUS) to determine whether the proposed design is easy to use and acceptable for users. The results of this study are expected to support the improvement of patient registration services and serve as a reference for future healthcare information system development.

2 | BACKGROUND THEORY

An information system is a combination of people, technology, procedures, and data that work together to collect, process, store, and distribute information efficiently. In hospitals, information systems play an important role in managing administrative and medical services, especially the patient registration process, which helps reduce manual work and improve service quality (Melisa *et al.*, 2024). A successful information system also depends on a well-designed User Interface (UI) and User Experience (UX) (Fikri *et al.*, 2025); UI refers to the visual and interactive elements through which users interact with a system, including buttons, forms, icons, menus, colors, and layouts, while UX concerns the overall experience users obtain when completing tasks, including usability, efficiency, accessibility, and satisfaction (Rachman & Sutopo, 2023). In this study, these principles influence the design decisions by emphasizing simple navigation, consistent visual elements, clear registration instructions, structured information, and visible queue status, considerations that are directly related to the problems identified during the

initial observation and interviews, particularly user confusion and difficulties in following the registration procedure (Wiwesa, 2021).

Design Thinking was selected as the main design approach because the problem investigated in this study involves different users and operational conditions that cannot be addressed only by defining functional requirements. Intal *et al.* (2022) demonstrated the application of Design Thinking in the analysis and design of a patient information system, supporting its suitability for healthcare information system development. Design Thinking provides an iterative, human-centered process consisting of empathize, define, ideate, prototype, and test: the empathize stage allows the researcher to understand patient and staff experiences, define identifies the most important registration problems, ideate translates these problems into alternative interface solutions, prototype transforms the selected solutions into an interactive design, and test evaluates whether the resulting design can be used effectively by the intended users (Kurniasari *et al.*, 2025). Previous healthcare research also indicates that Design Thinking is useful for addressing complex problems by involving end users and stakeholders throughout the design process. Compared with a conventional development approach that begins primarily from predefined system requirements, Design Thinking was therefore considered more appropriate for this study, as the main problems were identified from actual user experiences, including BPJS verification difficulties, unclear registration procedures, and queue management problems. The method thus provides a direct connection between user problems and design decisions, with the prototype stage serving as the medium for translating the identified needs into an interactive registration flow, while the test stage provides usability evidence that can be used to evaluate the proposed design.

The prototype functions as an early representation of the proposed system that enables users to experience the intended interaction before full implementation. In this study, Figma was used to develop an interactive prototype because it supports the visualization and simulation of user flows and interface interactions (Mirza *et al.*, 2023). The prototype incorporates the requirements identified during the Design Thinking process, including patient type selection, BPJS verification, referral document upload, clinic and doctor selection, appointment scheduling, e-ticket generation, and queue status monitoring (Saefudin & Perdana, 2023). Usability was evaluated using the System Usability Scale (SUS), which consists of ten statements rated on a five-point Likert scale and produces a score from 0 to 100 (Brooke, 1996). In this study, SUS was used to determine whether the proposed prototype could be understood and used effectively by the intended users, with the resulting score interpreted according to the acceptability range, grade scale, and adjective rating shown in Figure 1. This theoretical framework thus connects user needs identified through Design Thinking with concrete UI/UX design decisions and usability evaluation (Damayanti *et al.*, 2024).

Odd-numbered items

$$X_1 = R - 1 \quad (1)$$

Even-numbered items

$$X_2 = R - 1 \quad (2)$$

Final SUS score

$$SUS = (\sum X) \times 2.5 \quad (3)$$

Where R is the user's response to each questionnaire item (1–5); X_1 is the adjusted score for odd-numbered items; X_2 is the adjusted score for even-numbered items; $\sum X$ is the total adjusted score from all ten questionnaire items; and SUS is the final System Usability Scale score, ranging from 0 to 100.

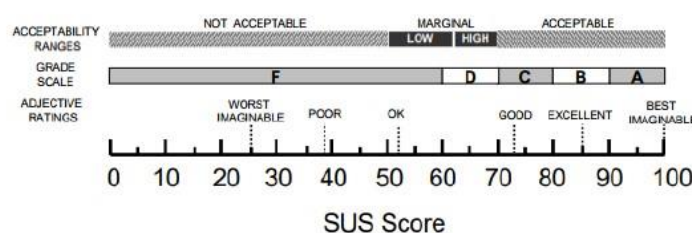


Figure 1. System Usability Scale (SUS) Interpretation
 Source: Bangor, Kortum, & Miller (2009).

3 | METHOD

This study employed the Design Thinking method to design a UI/UX prototype for the patient registration information system at RSU Sari Mutiara Lubuk Pakam. The Design Thinking method was selected because it is a human-centered approach that focuses on understanding user needs and developing solutions based on users' experiences. This method consists of five stages: Empathize, Define, Ideate, Prototype, and Test, enabling researchers to identify user problems, generate design ideas, develop interactive prototypes, and evaluate usability before system implementation (Krolikowski *et al.*, 2022). The research process began with problem identification, followed by a literature review to collect supporting theories and previous studies related to information systems, UI/UX design, Design Thinking, and the System Usability Scale (SUS). Data were collected through observations, interviews with registration staff and patients, and literature review to understand the existing patient registration process and identify user needs. The collected data were then analyzed as the basis for designing the proposed prototype. The overall research process is illustrated in Figure 2.

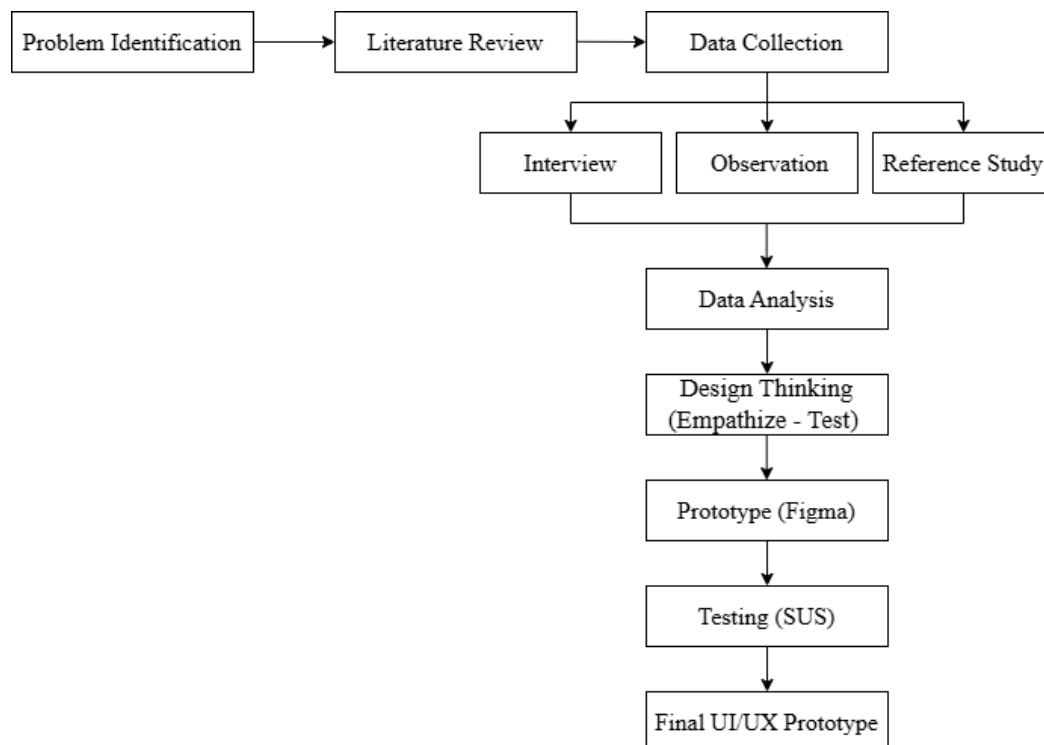


Figure 2. Research Framework

Figure 2 illustrates the research framework used in this study. The research began with problem identification, followed by literature review and data collection through interviews, observations, and reference study. The collected data were analyzed using the Design Thinking method to develop a UI/UX prototype in Figma. The prototype was then evaluated using the System Usability Scale (SUS) to determine its usability and user acceptance. The Design Thinking method was implemented through five stages. During the Empathize stage, observations and interviews were conducted to understand user needs and identify problems in the existing registration process. The Define stage focused on analyzing the collected data to determine the main problems and user requirements. Based on these findings, the Ideate stage generated interface concepts, user flows, and navigation structures for the proposed system. The selected design was then developed into an interactive prototype using Figma during the Prototype stage, and the Test stage evaluated the usability of the prototype using the System Usability Scale (SUS) questionnaire.

The usability evaluation involved 50 respondents selected using purposive sampling. The respondents consisted of patients and registration staff who represented the primary users and stakeholders of the proposed patient registration system. The patient respondents were individuals who had previously or were currently undergoing the registration process at RSU Sari Mutiara Lubuk Pakam, while the staff respondents were registration personnel who understood the patient registration workflow. Respondents were at least 17 years old, able to use a smartphone, and willing to interact with the prototype and complete the SUS questionnaire. Of the 50 respondents, 10 were patients and 40 were registration staff. The use of purposive sampling ensured that the usability evaluation

was based on participants with direct experience or relevant knowledge of the registration process. The usability instrument used in this study was the original ten-item System Usability Scale (SUS) developed by Brooke (1996). Each statement was rated using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The original SUS instrument was adopted without adding or removing items, and the scoring procedure followed the standard SUS calculation; therefore, no separate item development or local instrument validation was conducted in this study. The interpretation of the resulting SUS score followed the established SUS interpretation framework, including acceptability range, grade scale, and adjective rating.

4 | RESULTS AND DISCUSSION

This study applied the Design Thinking method to design a UI/UX prototype for the patient registration information system at RSU Sari Mutiara Lubuk Pakam. The design process consisted of five stages, Empathize, Define, Ideate, Prototype, and Test. Each stage produced important findings that contributed to the development of a user-centered prototype and ensured that the proposed design addressed the actual needs of patients and registration staff.

4.1 Results

1) Empathize

The first stage was conducted through observations and interviews with registration staff and patients. The results revealed several problems in the existing registration process. Patients often experienced difficulties during BPJS verification, while the queue management system was not efficient. In addition, many patients did not fully understand the registration procedure, which caused delays and confusion during the registration process. These findings provided valuable insights into user behavior and became the foundation for identifying user needs and improving the registration workflow.

2) Define

Based on the findings from the Empathize stage, the main problems and user requirements were identified. The current registration system required a simpler and more user-friendly interface to reduce user confusion and improve accessibility. Users also needed clear navigation, faster access to registration services, complete information about doctor schedules, and real-time queue status. These requirements became the primary objectives in designing a more effective and user-centered patient registration prototype.

3) Ideate

During the Ideate stage, several design ideas were generated to address the identified problems. The researcher developed user flows, navigation structures, and interface concepts that emphasized simplicity, consistency, and ease of use. The proposed solution integrates the registration process for both BPJS and general patients into a single application while providing a more organized registration flow. In addition, the interface was designed to present information clearly and minimize the number of steps required to complete the registration process, thereby improving service efficiency and user experience.

4) Prototype

The selected design ideas were implemented into an interactive prototype using Figma. The prototype was developed to simulate the actual patient registration process and allow users to interact with the system before implementation. It includes several key features, such as patient type selection (BPJS or General Patient), BPJS verification, general patient registration, referral letter upload, clinic selection, doctor schedule information, appointment scheduling, electronic ticket (e-ticket) generation, and queue status monitoring. The interface was designed with consistent colors, intuitive navigation, and clear visual elements to provide a simple, efficient, and user-friendly registration experience.



Figure 3. Splash Screen Page



Figure 4. Patient Type Selection Page

Figure 3 and Figure 4 present the initial interface of the proposed patient registration information system. The splash screen displays the identity of RSU Sari Mutiara Lubuk Pakam through the hospital logo, name, and a "Start Registration" button that directs users to the main registration process. After entering the application, users are presented with the patient type selection page, where they can choose either BPJS Registration or General Registration. The interface uses simple navigation, clear icons, and different colors to distinguish each registration option, making it easier for users to understand the available services and continue the registration process efficiently.

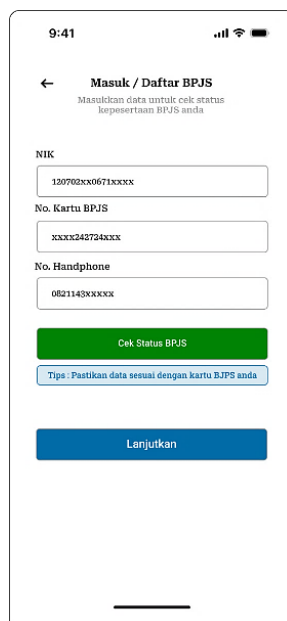


Figure 5. BPJS Registration Form Page

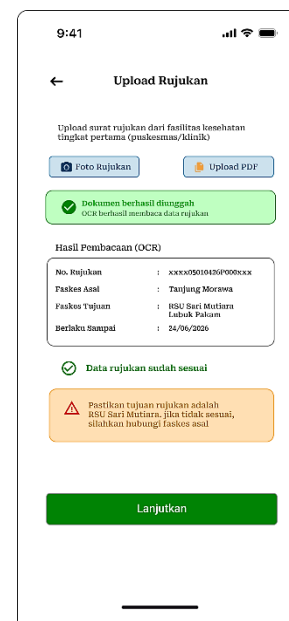


Figure 6. Referral Letter Upload Page

Figure 5 and Figure 6 illustrate the BPJS registration and referral verification process in the proposed patient registration system. Figure 5 shows the BPJS verification page, where patients enter their National Identity Number (NIK), BPJS card number, and phone number to verify their membership status before proceeding with registration. After successful verification, patients are directed to the referral upload page shown in Figure 6. On this page, users can upload their referral letter as an image or PDF file, and the system automatically displays the referral information for verification. This process helps ensure that patient data is accurate and complete before continuing

to the next stage of registration, thereby improving the efficiency and reliability of the registration process.

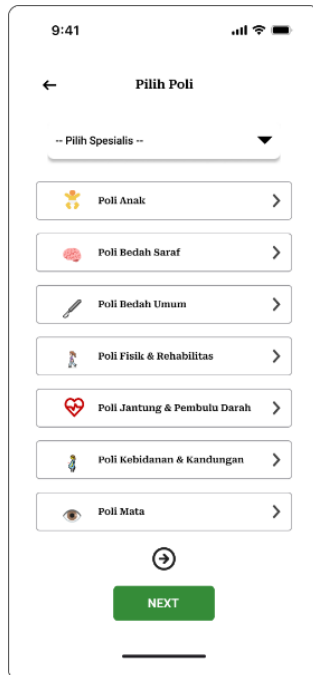


Figure 7. Clinic Selection Page

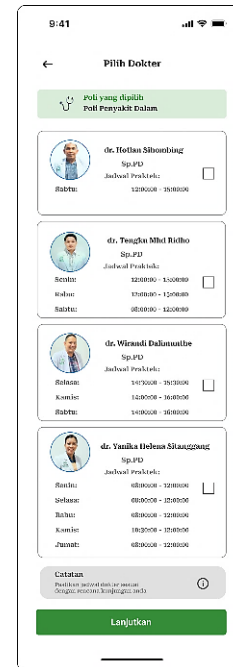


Figure 8. Doctor Selection Page

Figure 7 and Figure 8 present the clinic and doctor selection interfaces of the proposed patient registration system. Figure 7 allows patients to select the desired medical department from the available list of clinics based on their healthcare needs. After selecting a clinic, users proceed to the doctor selection page shown in Figure 8, where they can view the available doctors along with their specialties and practice schedules. This design provides clear and organized information, enabling patients to choose the appropriate clinic and doctor more easily while improving the efficiency of the appointment registration process.



Figure 9. Queue E-Ticket Page



Figure 10. Queue Status Page

Figure 9 and Figure 10 illustrate the final stage of the patient registration process. Figure 9 shows the electronic ticket (e-ticket) generated after the registration is successfully completed. The e-ticket contains important information, including the queue number, booking code, selected clinic, doctor, appointment date and time, as well

as a QR code for verification at the hospital. After receiving the e-ticket, patients can access the queue status page shown in Figure 10 to monitor the current queue number and estimate their waiting time. This feature helps patients prepare for their visit more efficiently and reduces unnecessary waiting time at the hospital.

5. Test

The usability of the prototype was evaluated using the System Usability Scale (SUS) questionnaire. A total of 50 respondents, consisting of patients and registration staff, participated in the evaluation after using the interactive prototype. Each respondent completed the SUS questionnaire consisting of ten statements to assess the usability and user experience of the proposed system. The responses were calculated according to the SUS scoring method, and the average score was interpreted using the SUS interpretation scale, as presented in Table 1.

Table 1. SUS Evaluation Results

Evaluation Criteria	Result
Average SUS Score	78.35
Acceptability Range	Acceptable
Grade Scale	B
Adjective Rating	Excellent

As shown in Table 1, the developed prototype achieved an average SUS score of 78.35. Based on the SUS interpretation scale, this score falls within the Acceptable range, corresponds to Grade B, and is categorized as Excellent. These results indicate that users were generally satisfied with the usability of the proposed system and were able to complete the registration process with ease. The simple interface, clear navigation, and well-organized registration flow contributed to a positive user experience during the evaluation, suggesting that the proposed UI/UX prototype has strong potential to improve the efficiency and quality of the patient registration process at RSU Sari Mutiara Lubuk Pakam.

4.2 Discussion

The SUS result of 78.35 indicates that the proposed prototype has an acceptable level of usability, with a Grade B and an Excellent adjective rating. This result is comparable with previous healthcare UI/UX studies using SUS. Trifena *et al.* (2023) reported a SUS score of 83 for a mobile-based hospital registration application developed using Design Thinking, while Iqbal *et al.* (2025) reported scores of 86.75 for patients, 87.50 for doctors, and 85.83 for administrative staff in a primary clinic application using User-Centered Design. Compared with these studies, the SUS score obtained in the present study is lower, but it remains within the Acceptable range and receives an Excellent adjective rating. The difference may be related to differences in the healthcare context, user groups, registration workflows, and design requirements. In addition, Primadiningsih and Heroza (2022) reported an initial SUS score of 26 for a hospital registration module before redesign and a final score of 87 after applying Design Thinking. Dzaky *et al.* (2025) also developed a mobile-based patient registration management application using the Design Thinking method, and their findings further support the application of a user-centered design approach in developing digital patient registration services. Similarly, the present study applies Design Thinking to address the specific registration conditions and user needs at RSU Sari Mutiara Lubuk Pakam. This comparison suggests that user-centered design can substantially improve usability, while the score of 78.35 in the present study indicates that the proposed prototype already provides good usability but may still require further refinement before implementation.

5 | CONCLUSIONS AND FUTURE WORK

This study successfully designed a UI/UX prototype for a hospital patient registration information system using the Design Thinking method. The design process addressed the main problems identified at RSU Sari Mutiara Lubuk Pakam, particularly BPJS verification difficulties, referral document verification, queue management problems, and limited patient understanding of the registration procedure. The resulting prototype integrates BPJS and general patient registration and provides features for patient type selection, BPJS verification, referral letter upload, clinic and doctor selection, appointment scheduling, e-ticket generation, and queue status monitoring. The usability evaluation involving 50 respondents produced an average SUS score of 78.35, which falls within the Acceptable range, obtains Grade B, and receives an Excellent adjective rating, indicating that the proposed prototype provides good usability and a clear registration flow for the intended users.

The prototype has not been implemented as a functional information system and has not been integrated with

the hospital database, BPJS services, or electronic medical record systems, while the evaluation was also conducted at a single healthcare institution and involved a specific group of users. Future research should implement the prototype as a functional application, integrate it with relevant hospital and BPJS systems, and conduct usability testing with larger and more diverse user groups across multiple healthcare institutions.

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