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Digitizing TB Monitoring: A Study of SISFOTBPARU in Bandar Lampung

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ABSTRACT

The pulmonary tuberculosis patient treatment monitoring information system (SISFOTBPARU) application still needs further development to ensure the implemented features function optimally. In this method, usability testing and evaluation are used to increase user satisfaction. Usability can also be used to improve usability in user interactions on the site. This study measures the level of usability of the pulmonary tuberculosis patient treatment monitoring information system (SISFOTBPARU) application website. Usability measurements are conducted to assess whether user interaction with the website is smooth and whether users can achieve their goals while visiting it. This research is quantitative, using the System Usability Scale (SUS) with 10 questions as a benchmark for usability assessment, and one open-ended question to gather information on the needs of 30 users when visiting the website. The results of the SUS measurement on the SISFOTBPARU website yielded a score of 89.76, with acceptability classified as marginally high and grade scales including A, indicating a very good level of usability. Meanwhile, hypothesis testing indicates that the developed application has a positive, significant impact on patient self-care management. This application is expected to be used in more health facilities.

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INTRODUCTION

Tuberculosis, a chronic infectious disease caused by the bacterium Mycobacterium tuberculosis, remains a global public health problem, including in Indonesia (Astuti et al., 2025). Indonesia ranked third worldwide in tuberculosis cases in 2019, underscoring the urgency of comprehensive treatment (Mursalim et al., 2025). Treatment outcomes measure the success of a tuberculosis (TB) control program. Various factors are suspected of hindering the success of TB treatment, with delays in diagnosis/detection of TB cases and treatment, and treatment failure due to non-adherence being key factors closely related to behavior. One crucial component of a TB eradication program is program monitoring and evaluation. These activities can be effective if TB program managers have easily accessible, fast, valid, and timely data and information. The current recording and reporting system remains manual, resulting in numerous challenges in data access, report generation, and indicator analysis, including increased time, effort, and error rates (Trigunarso et al., 2024).

The role of information systems in monitoring the treatment of pulmonary TB patients is crucial for ensuring the sustainability and success of therapy, as well as early detection of potential problems such as drug resistance (Amallia et al., 2021; Mursalim et al., 2025). The Pulmonary Tuberculosis Patient Treatment Monitoring Information System (SISFOTBPARU) application can facilitate two-way information exchange among healthcare workers, families, and patients. Digital health products are increasingly accessible to the public, including those supporting TB treatment and control programs. The Pulmonary Tuberculosis Patient Treatment Monitoring Information System (SISFOTBPARU) application has been developed across various health sectors. However, its use for monitoring treatment adherence with family support is limited in Indonesia.

Smartphone applications are ideal for improving health due to their popularity, connectivity, and sophistication.

The pulmonary tuberculosis patient treatment monitoring information system (SISFOTBPARU) application can support functions such as communication, enable real-time connections and feedback, be interactive, and connect to social networks/social media, thus enabling interventions to change TB treatment adherence behavior through media. The pulmonary tuberculosis patient treatment monitoring information system (SISFOTBPARU) application uses a behavior change theory approach suitable for internet-based interventions, namely the internet-based behavior change intervention model and behavior change through social communication (DiStefano & Schmidt, 2016; Trigunarso et al., 2024).

This information system, through an application program, aims to provide convenience to TB Program organizers at the Bandar Lampung City Community Health Center by designing an Android application for TB treatment adherence. This can address issues related to TB treatment adherence by involving various parties, including family/friends.

METHOD

The research was conducted qualitatively, with data collection conducted through interviews and document review. Indirect interviews were conducted with the Head of the communicable diseases control and the staff/deputy supervisor of the pulmonary TB program at 10 Community Health Centers in Bandar Lampung City. The development of the Pulmonary TB information system scheme at 10 Community Health Centers in Bandar Lampung City involved several stages, including a pre-study analysis to identify problems and opportunities for system development. The next stage was a system analysis, which included a system model, an instrument model, and a conversion from the old to the new system. The system design stage involved developing logical devices, system organization, and procedures. This research has received ethical approval and an ethical exemplified from the Health Ethics Committee of the Poltekkes Kemenkes Tanjung Karang, under license number 383/KEPK-TJK/IV/2024.

The selection of 10 Community Health Centers in Bandar Lampung City was based on a review of human resources, materials, organizational, financial, and technological readiness, indicating potential opportunities to implement this Pulmonary TB information system. Based on data entry on a pre-designed form, the Pulmonary TB application program can automatically generate indicators and reports. Reports generated by other systems include medication schedules, treatment schedules, medication collection schedules, and important indicators required by the Pulmonary TB Program organizers at the 10 Community Health Centers in Bandar Lampung City.

The information system implementation/trial was then tested on 30 system users (respondents). The steps for the information system implementation/trial were as follows:

a. System Trial Activity. This activity began with user socialization about the integrated TB information system. This was followed by a brief training session for system users to ensure they fully understood how to operate the new information system. The system users included TB data officers and TB program managers. The primary objective of the integrated TB information system trial was to ensure the system met user expectations. The data used in this system trial was TB data from 2024.
b. Comparing Information Quality Before and After the Information System was Developed: Before the new system trial, system users were asked to complete a closed-ended questionnaire to measure information quality compared to the old system. They were asked to respond with "Strongly Agree (SS)," "Agree (S)," "Disagree (TS)," or "Strongly Disagree (STS)" for each question. Each answer choice has a score: SS is scored 4, S is scored 3, TS is scored 2, and STS is scored 1. Afterward, a trial of the integrated pulmonary TB information system was conducted.

Users were then asked to complete a new, closed-ended questionnaire to measure the information quality of the newly developed system using the same procedure as for testing the old system. The difference in information quality before and after the system was developed was measured using a Likert-scale weighted average to test the hypothesis that information quality differs before and after the system was developed.

RESULTS

The steps required in a monitoring service scenario using the system are as follows:
1. A patient arrives. Those who do not yet have a TB-01 form will have one created first. If the patient already has a TB-01 form, the staff member will locate it in the healthcare facility's file storage area.
2. The staff member will complete the TB-01 form.
3. Patients who do not yet have an account will have one created.

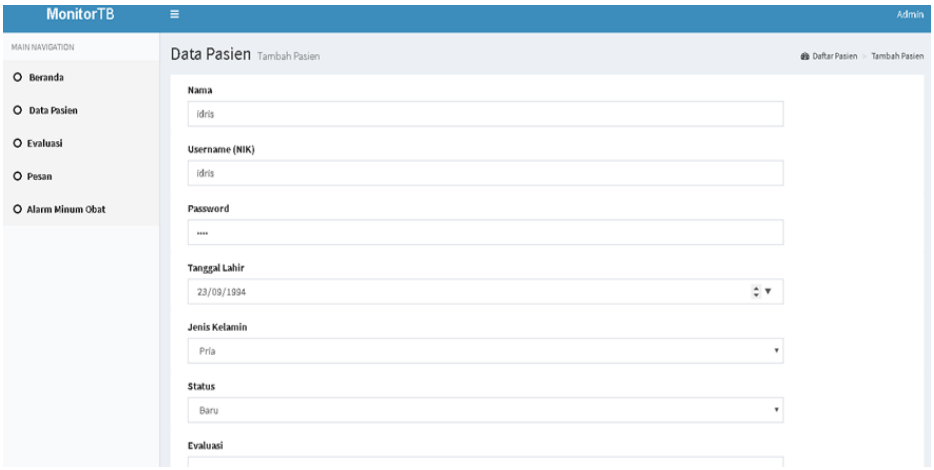

Figure 1. Menu of "add patient."

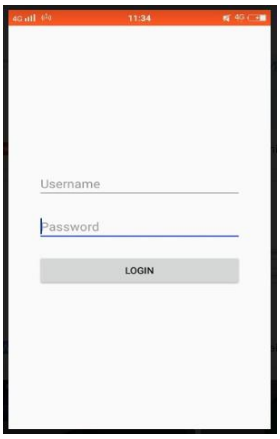

Figure 2. Menu of "login patient."

The account obtained will be used to complete medication attendance online and receive online check-up/visit schedules.
1. Patients will be directed to use the application and encouraged to log in to the mobile app.
2. Healthcare facility staff will send medication alarm schedules to patients using the system.

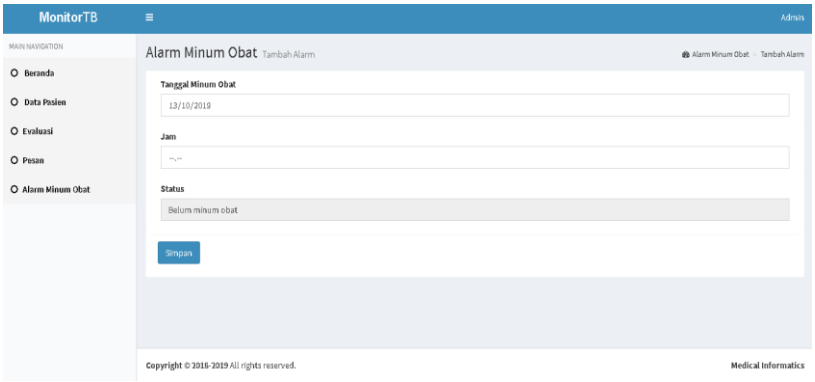

Figure 3. Menu of "add medication alarm."

The medication alarm schedule will be sent to the patient via the app on their phone. The alarm can be viewed under the "Take Medication" menu.

1. The medication alarm schedule sent will be received by the patient via the app on their phone. The alarm can be viewed under the "Take Medication" menu.
2. Healthcare facility staff will also send a visit schedule (check-up) message to the patient using the system.
3. The patient can then receive the message via the app on their phone. Received messages can be viewed under the "Messages" menu.

Application testing

Table 1. SUS (System Usability Scale) value

Respondent	Questions on SUS										SUS value
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	
R1	3	2	4	2	4	2	3	2	4	2	70.0
R2	4	3	4	2	3	3	4	3	3	4	57.5
R3	3	2	4	3	3	2	3	2	4	3	62.5
R4	5	4	3	2	3	2	2	3	3	4	52.5
R5	5	2	4	1	5	4	3	2	4	3	72.5
R6	5	3	4	2	4	2	4	2	4	2	75.0
R7	5	4	2	2	4	4	4	3	4	4	55.0
R8	4	2	4	3	4	1	4	1	5	2	80.0
R9	5	2	4	3	3	2	2	1	3	5	60.0
R10	4	2	4	3	4	2	4	2	4	3	70.0
R11	5	2	5	3	2	2	2	2	4	4	62.5
R12	4	2	4	3	4	1	4	1	5	2	80.0
R13	4	2	4	3	2	4	3	2	4	3	57.5
R14	5	2	4	1	4	2	2	3	2	2	67.5
R15	5	1	5	1	5	2	5	2	5	2	92.5
R16	4	2	4	3	4	1	4	1	5	2	80.0
R17	4	3	3	1	3	2	3	3	3	3	60.0
R18	5	2	4	4	5	4	5	2	4	2	72.5
R19	4	2	4	2	3	2	4	2	4	3	70.0
R20	4	2	4	1	4	3	4	1	5	1	82.5
R21	4	2	3	1	5	2	3	2	4	4	70.0
R22	5	3	3	2	5	2	4	2	1	2	67.5
R23	5	1	5	1	5	2	5	2	5	2	92.5
R24	4	3	4	2	4	2	3	2	4	2	70.0
R25	4	2	4	1	4	3	4	1	5	1	82.5
R26	3	2	4	2	3	3	3	2	3	3	60.0
R27	4	3	3	2	4	3	4	2	3	3	62.5
R28	4	2	5	2	3	3	4	2	4	3	70.0
R29	4	2	4	2	4	2	4	2	5	2	77.5
R30	5	2	4	2	2	2	2	2	3	3	62.5
Average value											69.8

During the application testing phase, the system was tested. Testing was conducted to determine the extent to which the system met user needs. Data collected through usability testing, interviews, and questionnaires were analyzed to determine the usability of the pulmonary tuberculosis patient treatment monitoring information system (SISFOTBPARU) application. Satisfaction was the final aspect to be measured. In this study, satisfaction was measured using the System Usability Scale (SUS) questionnaire.

Calculations were performed on all respondents, and the following is an example of the calculation for respondent 1:

Respondent 1 = ((P1-1)+(5-P2)+(P3-1)+(5-P4)+(P5-1)+(5-P6)+(P7-1)+(5-P8)+(P9-1)+(5-P10)) X 2.5
= ((3-1)+(5-2)+(4-1)+(5-2)+(4-1)+(5-2)+(3-1)+(5-2)+(4-1)+(5-2)) X 2.5
= 70

After being carried out on all respondents, the following are the calculation results, presented in Table 1.

Table 1 shows that the average satisfaction score in this study was 69.8. When viewed in Table 1, the satisfaction aspect in this study falls within the "GOOD (C)" range, while the average SUS value is 68. In this case, it means that the Application of the pulmonary tuberculosis patient treatment monitoring information system (SISFOTBPARU) can be categorized as good.

DISCUSSION

The research results indicate that users are satisfied with the application's functionality and ease of use in supporting medication adherence. This study confirms that implementing an integrated digital information system can significantly improve the quality of TB patient monitoring and compliance, in line with the system's initial objectives.

Moreover, the high user satisfaction scores underscore the effectiveness of the system's design in meeting the practical needs of both patients and healthcare providers (Lima et al., 2023). This finding aligns with previous research highlighting the positive correlation between system quality and user satisfaction in health information systems (Yunis et al., 2017). The usability of the developed system, as evidenced by System Usability Scale scores averaging 76, further supports its practical utility and user acceptance (Rahayu et al., 2022). This result is consistent with studies that emphasize that an intuitive user interface and an effective user experience are crucial for the successful adoption of digital platforms in healthcare (Rahmanto et al., 2024). Specifically, a System Usability Scale score above 68 typically indicates good usability, with scores reaching 71.79 and 84.35 in similar contexts, suggesting that the current system's average of 76 is well within an acceptable and even commendable range (Fibriasari et al., 2024; Hidayati & Lazuardi, 2024; Munandar & Santoso, 2025). Such high usability scores often translate into enhanced user engagement and more efficient data management, which are critical for effective oversight of complex treatment regimens such as those for tuberculosis (Fauzi et al., 2022). Furthermore, the observed user satisfaction and usability metrics are comparable to other digital adherence technologies used for tuberculosis, which have shown similarly positive user impressions and feasibility (Guzman et al., 2023).

The model assumptions from this study are based on studies on the treatment of pulmonary tuberculosis patients at home, homecare services, and the roles and tasks of families as family caregivers. The model of the pulmonary tuberculosis patient treatment monitoring information system (SISFOTBPARU) web-based homecare services is expected to increase family resilience by improving knowledge, attitudes, and skills, enabling them to support and continue the treatment of pulmonary tuberculosis patients at home. Researchers' assumption that the model of the pulmonary tuberculosis patient treatment monitoring information system (SISFOTBPARU) in the form of web-based homecare services is more suitable for families treating pulmonary tuberculosis patients at home.

CONCLUSION

The pulmonary tuberculosis patient treatment monitoring information system (SISFOTBPARU) application is considered good. It is quite easy to understand and can facilitate reminders and medication schedules, which is expected to encourage patient adherence to medication, as almost everyone has a device these days. The application is also considered more capable and easier for monitoring than conventional methods, as it can reduce distance and time. This application is expected to be used in more health facilities.

AUTHOR'S DECLARATION

Authors' contributions and responsibilities

SIT: Writing original draft, conceptualization, data analysis, editing; **ZM:** writing original draft (supporting), data analysis, article layout, methodology, editing; **AH:** data collection, visualization, article review, and editing.

Availability of data and materials
All data are available from all authors.

Competing interests
There is no conflict of interest in this study.

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