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Readiness and Acceptance of Health Providers using Clinical Decision Support System at Probolinggo Primary Healthcare Centers

Rokayah Rokayah[1,2,3], Riza Alfian[4], Yunita Nita[5*], Hanni Prihhastuti Puspitasari[5]
[1]Doctor of Pharmaceutical Science Programme, Faculty of Pharmacy, Airlangga University, Surabaya, Indonesia
[2]Clinical and Community Pharmacy Study Program, Hafshawaty Zainul Hasan University, Probolinggo, Indonesia
[3]District Level Health Office, District of Probolinggo, East Java, Java, Indonesia
[4]Department of Pharmacy, Sekolah Tinggi Ilmu Kesehatan ISFI Banjarmasin, Banjarmasin, Indonesia
[5]Department of Pharmacy Practice, Faculty of Pharmacy, Airlangga University, Surabaya, Indonesia

***Corresponding author:** E-mail address: yunita-n@ff.unair.ac.id

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ABSTRACT

Introduction: The government targets a significant reduction in antibiotic resistance by 2030 through wise antibiotic management, including implementing the Clinical Decision Support System (CDSS) for Health Providers in Non-Pneumonia acute respiratory infections (ISPA) and Non-specific Diarrhea in Primary Healthcare Centre (Puskesmas). However, the readiness and acceptance of Health Providers to CDSS need to be evaluated. This study evaluates the readiness and acceptance of doctors, nurses, midwives, pharmacists, and pharmacists' assistants in Puskesmas using CDSS.
Methods: The method used was a cross-sectional quantitative survey with snowball sampling of 185 respondents at the Probolinggo Puskesmas in July-August 2024. The questionnaire was developed based on a combination of the Technology Readiness Index and the Technology Acceptance Model (TRAM), and the data was analyzed using SEM-PLS (Structural Equation Modeling-Partial Least Squares).
Result: This study revealed that optimism contributed positively to the perception of ease of use (PEOU) and perception of benefits (PU) of CDSS. Innovation also contributed positively to PEOU, but not significantly to PU. Optimism increases PEOU and PU, while innovation only increases PEOU. Although innovation is insignificant to PU, it has a more significant impact on PEOU than optimism.
Conclusion: These findings also show that PU affects the attitude of Health Providers to use CDSS ($\beta = 0.286$, $p < 0.001$) but does not directly affect behavioral intentions ($\beta = 0.081$, $p = 0.250$). PEOU significantly affected PU ($\beta = 0.617$, $p < 0.001$) and attitude ($\beta = 0.661$, $p < 0.001$). Attitudes towards CDSS greatly influenced the behavioral intentions of healthcare providers to use it ($\beta = 0.851$, $p < 0.001$), making it a strong predictor of CDSS adoption. The integration of TRI and TAM in predicting the readiness of Health Providers has proven helpful in understanding the factors of CDSS adoption in Puskesmas. These findings highlight the importance of training for health providers to improve CDSS readiness and acceptance. In addition, the results of this study can be the basis for policy development in implementing CDSS Primary Healthcare Centers to support a more rational use of antibiotics.

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INTRODUCTION

Antimicrobial resistance (AMR) is a significant threat to public health, especially in low- and middle-income countries, such as Indonesia, which face a high AMR burden due to the unwise use of antimicrobials and environmental contamination problems (1,2). In 2019, bacterial AMR caused 1.27 million deaths globally, with the majority occurring in countries with a high infectious disease burden (3,4). The WHO said that irrational use of antibiotics is one of the leading causes of increasing antibiotic resistance. Innovative approaches are needed to manage the use of antibiotics wisely to address this AMR threat(5,6). Adherence to clinical guidelines is essential in avoiding unnecessary use of antibiotics, especially for non-pneumonia acute respiratory infections (ISPA) and non-specific diarrhea, which do not require antibiotics (7,8).

One strategy to increase the rationality of antibiotic use is the implementation of Antibiotic Stewardship Programs (ASP) (9,10). ASP ensures antibiotics are prescribed only when needed, following medical indications, proper dosage, and duration (11) The program includes training healthcare providers on the dangers of irrational antibiotic use and adherence to Clinical Practice Guidelines (12,13). Periodic monitoring helps identify and improve practices, aligning antibiotic use with indications and reducing AMR (14,15).

Innovative medical devices, such as CDSS, can help optimize antibiotic use and reduce antimicrobial resistance a (16). Forty-eight studies evaluating 45 CDSS found 186 significant CDSS barriers and supporting factors. Qualitatively, these barriers and supporting factors are grouped into three categories: human aspects (such as perception of usability), organizational aspects (e.g., common workflow disruptions), and technological elements, such as the ease of use of CDSS (17). Most research uses CDSS based on rules integrated with existing databases, primarily addressing disease-related issues. A review of rules-based CDSS entrenched into a patient database concluded that of 25 studies, 59.5% of CDSS support clinical practice (18).

Technological developments in the health sector have made CDSS an essential tool in evidence-based decision-making. The readiness and acceptance of health care providers towards CDSS is getting more attention (19,20). Clinical experience, CDSS use, and workplace environment are essential factors that influence physicians' perceptions of CDSS adoption. Compared to those who did not use CDSS, doctors who used CDSS tended to be more confident in this technology (OR = 0.63, 95%, CI = 0.32, 0.94) and less likely to see it as a threat to their professional autonomy (OR = 0.47, 95%, CI = 0.08, 0.83) (21).

Although CDSS has excellent potential to improve the rationality of antibiotic use, its implementation in primary health care still faces some obstacles (22). Some of the main factors that are challenges include the limitations of digital infrastructure in health centers, which can hinder the integration of the system with the Primary Health Care Center Management Information System (SIMPUS) (23,24). In addition, the resistance of health providers to new technologies is also an obstacle, mainly due to concerns related to increased workloads and changes in the flow of clinical practice that is already running (25,26).

In addition to technical factors, non-technical aspects such as healthcare providers' perception of CDSS also affect the adoption rate of this system. Several studies have shown that concerns about increased workloads and workflow changes are factors that can hinder the adoption of CDSS (21,27). Therefore, a comprehensive approach, including ongoing training and strong policy support, is needed to implement CDSS optimally. By understanding these barriers, this study can provide deeper insights into the readiness and acceptance of health providers for CDSS in Puskesmas (28,29).

One of the methods to measure the readiness of new technology one of which is the Technology Readiness Index (TRI) (30,31)**.** TRI includes four dimensions: optimism, innovation, inconvenience, and insecurity, which reflect the views, beliefs, and potential concerns of users about technology (32). The method of acceptance can be measured by the Technology Acceptance Model (TAM), which explains the acceptance of technology through perceived usefulness (PU) and perceived ease of use (PEOU), factors that affect user attitudes and intentions (33,34). The Technology Readiness and Acceptance Model (TRAM) combines TRI and TAM to describe technology acceptance (33,35). TRI serves as a predictor of the perceived usefulness (PU) and perceived ease of use (PEOU) of TAM for three main reasons: first, they explain the acceptance of the technology; second, TAM focuses on the perception of specific systems, while TRI measures an individual's general tendency towards technology; Third, the cognitive dimensions of PEOU and PU mediate individual differences in accepting new technologies (36,37).

This study aims to determine the readiness and acceptance of health providers for implementing CDSS in health centers. The results are expected to provide information for the government, health organizations, and practitioners regarding the development and adaptation of CDSS to improve the quality of health services in primary care facilities in developing countries such as Indonesia.

METHODS

The pilot survey was conducted to check the validity and reliability of the research instrument. The questionnaires were distributed to thirty health providers (Doctors, Pharmacists, Nurses, Midwives, and Pharmacy Technicians) working at Puskesmas in East Java to test the instruments among the target respondents. The pilot survey was conducted online by distributing survey links in the Puskesmas group and the Professional Organization group in East Java in July 2024. The validity and reliability test data were analyzed using the Pearson method with the help of SPSS software. The validity test was carried out to assess the extent to which the research instrument measured the intended construct. In contrast, the reliability test measured the consistency of the response in the questionnaire. The test results showed that the questionnaire was valid (r value for each item > 0.361; n = 30) and reliable with Cronbach's Alpha value > 0.70.

The main survey was conducted in August 2024; the researcher used online and offline survey methods. Respondents were contacted by phone privately and WhatsApp groups with reminders to complete survey questionnaires. A total of 185 valid responses were collected. This study uses a cross-sectional survey conducted at the Health Center in Probolinggo Regency, East Java, from July to August 2024. Respondents were health providers recruited through snowball sampling: doctors, nurses, midwives, pharmacists, and pharmacist assistants.

The questionnaire used in this study consists of three parts. Part 1 collects demographic information of respondents. Part 2 collects information related to healthcare providers' experiences using technology devices and health applications in the workplace, such as the Primary Health Care Center Management Information System (SIMPUS) or other health applications. Part 3 measures the readiness and acceptance of health providers for CDSS based on the TRI and TAM.

The questionnaire comprised 34 questions that assessed individuals' perceptions of CDSS technology, divided into several constructs. Questions 1–4 measure Optimism (OPT), including the contribution of technology to quality of life, freedom of movement, work efficiency, and interest in new technologies in health services. Questions 5–8 related to Innovation (INN) assess the tendency to try new technologies, the ability to understand technology independently, interest in the latest developments, and preferences for using advanced technology. Questions 9–12 cover Insecurity, focusing on concerns about the negative impact of technology, the security of personal information, mistrust in online transactions, and the inconvenience of sharing information. Questions 13–16 measure Inconvenience, including the view that technology is not always user-friendly, health risks, caution in replacing human roles, and risk of technology failure. Questions 17–21 assess CDSS's Perceived Benefits (PU), such as efficiency, performance improvement, effectiveness, ease of service, and overall benefits. Questions 22–26 related to Perception of Ease of Use (PEOU), including ease of learning CDSS, clarity of use, and mastery of skills. Questions 27–30 assess Attitudes (ATT) towards CDSS, including pleasure, positive outlook, effectiveness, and likability. Finally, questions 31–34 measure Behavioral Intent (BI) for future use of CDSS, with indicators of routine usage intent, frequency, and usage if access is available. The answers to this questionnaire were measured on a five-point Likert scale: strongly disagree, disagree, neutral, agree, and strongly agree.

The data produced was then analyzed using the Structural Equation Modeling-Partial Least Squares (SEM-PLS) method. SEM-PLS analysis is carried out in two stages: model measurement (outer model) to test the validity and reliability of indicators against latent variables, and structural model (inner model) to analysed the relationship between latent variables in the research model.

RESULTS

The study involved 185 respondents. Table 1 shows their demographic data.

Table 1. Demographic profiles of respondents

Characteristic		n (%)
Gender	Female	140 (76.00%)
	Male	45 (24.00%)
Age	17-25 Year	1 (0.50%)
	26-35 Year	98 (53.00%)
	36-45 Year	57 (30.80%)
	46-55 Year	26 (14.10%)
	>55 Year	3 (2.00%)
Profession	Doctor	7 (3.80%)
	Pharmacist	20 (10.80%)
	Nurse	82 (44.30%)
	Midwife	57 (30.80%)
	Pharmacy Technician	14 (7.60%)
Last Education	Diploma (D3)	96 (51.90%)
	Bachelor's Degree (S1)	80 (43.20%)
	Professional Degree	7 (3.80%)
	Postgraduate	2 (1.10%)

Source(s): Table by author

Among the 185 Health Providers participating in this study, the majority were women (76%), while 24% were men. The dominant age group was 26-35 years (53%), followed by 36-45 years (30.8%), 46-55 years (14.1%), and >55 years (2%). The professions of respondents were primarily Nurses (44.3%), Midwives (30.8%), Pharmacists (10.8%), Pharmacy Technician (7.6%), and Doctors (3.8%). The majority of educational backgrounds are D3 (51.9%), followed by undergraduates (43.2%), professional undergraduates (3.8%), and postgraduates (1.1%).

Table 2. Information on the use of applications and information systems at the Health Center

Question	Answer	n (%)
Have you ever attended a training or workshop on the use of technology in the Puskesmas?	Yes	138 (74.60%)
	No	47 (25.40%)
Have you ever used technology or applications for patient services or management?	Yes	160 (86.50%)
	No	25 (13.50%)
Do you use applications for reporting health programs such as ASIK (Indonesian health application for immunization data recording), SITB (Tuberculosis Information System), SIHA (HIV-AIDS and STIs Reporting System), SMILE (Electronic Immunization Logistics Monitoring System), or other applications at the Puskesmas?	Yes	125 (67.60%)
	No	60 (32.40%)

Source(s): Table by author

Information on Health Providers related to the use of technology in Puskesmas is shown in Table 2 above. Most respondents said they had participated in training or workshops on using technology in Puskesmas (74.6%). Most had also used technology or applications for patient services or logistics management in Puskesmas (86.5%).

In addition, most health providers use applications to report health programs such as ASIK (Indonesian Health Application for Immunization Data Recording), SITB (Tuberculosis Information System), SIHA (HIV-AIDS and STIs Reporting System), SMILE (Electronic Immunization Logistics Monitoring System), or other applications at the Puskesmas (67.6%). However, several respondents (32.4%) still have not used these applications, which may reflect the need for further training or broader access to technology in Puskesmas.

Item reliability and validity analysis

In SEM-PLS analysis, the reliability and validity of items were evaluated to ensure that the indicators or items used in the model can measure constructs consistently and accurately. Item reliability is tested using Cronbach's Alpha and Composite Reliability (CR), with a ≥ value of 0.70 considered reliable (38,39). Convergent and discriminatory validity measurements are essential to ensure the quality of the measurement model. Convergent validity is required for indicators in a single construct to depict the same concept, indicated by a high AVE value (≥ 0.50) (40). Meanwhile, the validity of discrimination is necessary to ensure that each construct is unique, does not overlap with each other, and can be tested with the Fornell-Larcker criterion (41). Both of these validities ensure that the constructs in the model are reliable and accurate (42,43).

Reliability and Convergent Validity

The results show that all constructs meet the reliability criteria, characterized by Cronbach's Alpha and Composite Reliability (CR) values that exceed 0.70 for each construct. The Outer Loadings value on the construction indicators ranged from 0.642 to 0.943, indicating that each indicator contributed significantly to the measured construction. In addition, all constructs' Average Variance extract (AVE) values are above 0.50, ensuring good convergence validity. Thus, the constructs in this study are reliable and valid to proceed to the following analysis stage.

Validity of Discrimination (Fornell-Larcker Criteria)

The study results show that the validity of discrimination has been fulfilled according to the Fornell-Larcker criteria. Each construct has a higher correlation value with its indicator than others. The ATT value is 0.922, and the BI is 0.923, higher than the correlation of ATT and BI to other constructs. Likewise, the PEOU construct has a value of 0.906, and the PU with 0.929 shows the highest values in their respective columns. This indicates that the constructs in this study are unique and different from each other, meeting the requirements of discriminatory validity.

Hypothesis Test

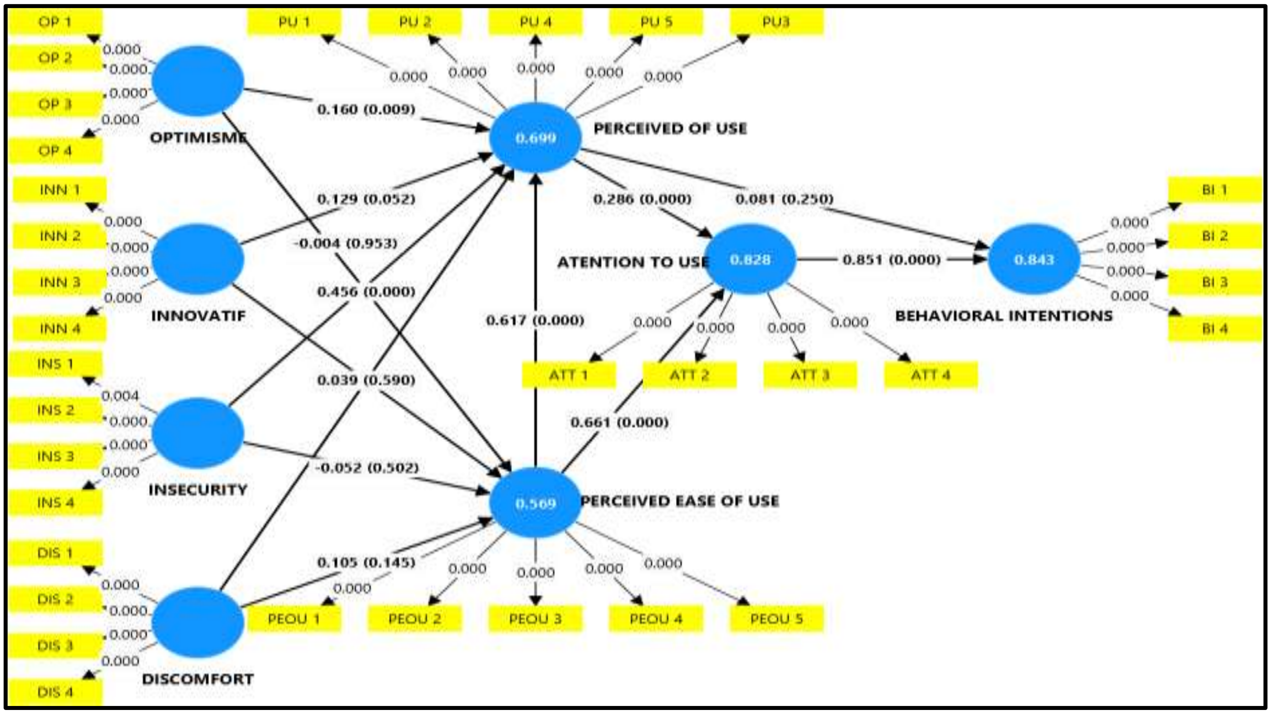
After ensuring that the measurement model is appropriate, the structural model's results are analyzed. Table 3 shows the results of hypothesis testing. The structural model analyzed using SmartPLS supports the proposed hypothesis, as seen in Figure 1, with standard coefficients and levels of significance for each path tested.

Table 3. Hypothesis Testing

Code	Hypothesis	Path Coefficient (β)	t-values	p-values < 0.05	95%Confidence Interval Path Coefficient		f > 0.02	Hypothesis Accepted/Rejected
					Lower Bound	Upper Bound		
H1	OPT >> PEOU (Optimisme -> Perceived Ease of Use)	0.456	7.459	0.000	0.329	0.568	0.334	Accepted
H2	OPT >> PU (Optimisme -> Perceived Usefulne)	0.160	2.595	0.009	0.033	0.279	0.044	Accepted
H3	INN >> PEOU (Inovatif -> Perceived Ease of Use)	0.377	5.128	0.000	0.238	0.520	0.215	Accepted
H4	INN >> PU (Inovatif -> Perceived Usefulne)	0.129	1.941	0.052	0.008	0.272	0.030	Rejected
H5	DIS >> PEOU (Discomfort -> Perceived Ease of Use)	0.105	1.456	0.145	-0.038	0.243	0.013	Rejected
H6	DIS >> PU (Discomfort -> Perceived Usefulnes)	0.039	0.539	0.590	-0.104	0.180	0.003	Rejected
H7	INS >> PEOU (Insecurity -> Perceived Ease of Use)	-0.052	0.672	0.502	-0.186	0.121	0.003	Rejected
H8	INS >> PU (Insecurity -> Perceived Usefulness)	-0.004	0.058	0.953	-0.143	0.147	0.000	Rejected
H9	PU >> ATT (Perceived Usefulness -> Attitude)	0.286	3.811	0.000	0.144	0.442	0.158	Accepted
H10	PU >> BI (Perceived Usefulness -> Behavioral Intention)	0.081	1.149	0.250	-0.062	0.215	0.013	Rejected
H11	PEOU >> PU (Perceived Ease of Use -> Perceived Usefulne)	0.617	8.702	0.000	0.474	0.750	0.545	Accepted
H12	PEOU >> ATT (Perceived Ease of Use -> Attitude)	0.661	9.131	0.000	0.510	0.797	0.844	Accepted
H13	ATT >> BI (Attitude -> Behavioral Intention)	0.851	14.515	0.000	0.733	0.963	1.459	Accepted

Source(s): Table by author

The table of hypothesis test results presents several important indicators in SEM-PLS analysis. The path coefficient (β) indicates the strength of the relationship between variables in the model, while the t-values (>1.96) and p-values (<0.05) determine the statistical significance of the relationship. In addition, effect size (f^2) measures how much a variable influences other variables, with small (0.02), medium (0.15), and large (0.35) categories. The 95% confidence interval (lower and upper bound) provides an acceptable value range for the path coefficient. Based on these results, the hypothesis is declared accepted or rejected according to its significance level.



Path Diagram Coefficients and p values
OPT = optimism; INN = innovation; DIS = discomfort; INS = insecurity; PU = perceived usefulness; PEOU = perceived ease of use; ATT=attitude; BI = behavioral intention
Figure 1. Structural Equation Model (SEM) of TRAM
Source(s): Table by author

The SEM-PLS path diagram above illustrates the relationship between latent variables in the research model. The blue circle indicates the primary latent variable, while the yellow box represents the indicator used to measure each latent variable. The number on the path indicates the path coefficient (β), which indicates the strength of the relationship between the variables. The value in parentheses is the p-value, which indicates the statistical significance of the relationship, where $p < 0.05$ signifies a significant relationship. In addition, the number in the blue circle represents the value of R^2, which indicates the proportion of variance of the dependent variable described by the independent variable in the model. The higher the R^2 value, the greater the model's ability to explain the observed variables.

DISCUSSION

The implementation of the Clinical Decision Support System (CDSS) in Primary Healthcare Centres services, such as health centers, offers great potential to support more effective clinical decisions, especially in the administration of antibiotics (21). The results of this study support that optimism has a positive impact on perceived ease of use (PEOU) ($\beta = 0.456$, $p < 0.001$), thus supporting H1. Healthcare providers who are optimistic about new technologies such as CDSS feel the ease of using them. In addition, optimism also positively affects perceived usefulness (PU) ($\beta = 0.160$, $p < 0.01$), which supports H2. The optimism of health providers towards CDSS increases their perception of the benefits of this technology in health services.

Innovation is proving to be a significant predictor for PEOUs. The results showed that CDSS-related innovations positively impacted PEOU ($\beta = 0.377$, $p < 0.001$), supporting H3. Innovative healthcare professionals are more receptive to technologies like CDSS and feel the ease of using them (44,45). However, in contrast to H3, the results showed that innovation did not significantly influence PU ($\beta = 0.129$, $p = 0.052$), so H4 was not supported. The study also found that discomfort with CDSS had a negative effect on PEOU ($\beta = 0.105$, $p = 0.145$), but this association was not significant, so H5 was not supported. This shows that when healthcare providers are uncomfortable with CDSS, they are less likely to find it easy to use (22,46). Therefore, to increase the acceptance of CDSS, it is necessary to carry out adequate training and provide technical support so that Health Providers can use this technology more confidently and comfortably in daily services (47,48).

In addition, discomfort with CDSS also did not significantly affect PU ($\beta = 0.039$, $p = 0.590$), which makes H6 unsupported. These findings show that although there is discomfort with the technology, it does not directly affect the perception of Health Providers toward the usefulness of CDSS (49,50).

The results of this study showed that insecurity in the Clinical Decision Support System (CDSS) did not have a significant effect on perceived ease of use (PEOU) ($\beta = -0.052$, $p > 0.05$), so H7 was not supported. No significant association was found between insecurity and PEOU. In addition, this study also does not help that insecurity about CDSS has an effect on perceived usefulness (PU) ($\beta = -0.004$, $p > 0.05$), which means that H8 is also not supported.

On the contrary, this study supports the Technology Acceptance Model (TAM) theory that PU has a significant effect on the attitude of Health Providers in using CDSS ($\beta = 0.286$, $p < 0.001$), which supports H9. These results show that CDSS is considered helpful in improving the quality of health services, thus influencing the positive attitude of Health Providers towards its use.). This means that if healthcare providers find CDSS easy to use and helpful in clinical decision-making, then their attitudes toward CDSS tend to be more positive (47,48). In addition, the study also supported that PU had a significant effect on behavioral intention (BI) to use CDSS ($\beta = 0.081$, $p < 0.001$), supporting H10. This confirms that the perception of the benefits of CDSS is a strong predictor that drives healthcare providers to use or continue using CDSS in their clinical practice. The higher the benefits felt from CDSS, the stronger the intention of Health Providers to adopt this technology. These findings are consistent with previous literature that suggests that the perception of the benefits of technology plays an important role in driving the adoption of new technologies (51,52).

The results of this study support that perceived ease of use (PEOU) is one of the main predictors that positively affect perceived usefulness (PU) to the CDSS ($\beta = 0.617$, $p < 0.001$), so H11 is supported. These findings suggest that when healthcare providers find CDSS easy to use, they are also more likely to see its usefulness increase (53,54). In addition, this study supports that PEOU positively impacts Health Providers' attitudes toward using CDSS ($\beta = 0.661$, $p < 0.001$), which supports H12. Healthcare providers report the ease of using CDSS, which in turn influences their positive attitudes toward the technology (53).

Furthermore, this study also supports the hypothesis that attitudes towards CDSS significantly influence behavioral intentions (BI) to use the technology ($\beta = 0.851$, $p < 0.001$), so H13 is supported. The positive attitude of healthcare providers towards CDSS has proven to be a strong predictor of their intention to continue using CDSS in their daily practice (55,56).

The integration of Technology Readiness (TRI) with the Technology Acceptance Model (TAM) has proven to be very useful in predicting the acceptance of Health Providers to CDSS because this model combines technology readiness with factors that affect technology acceptance (57,58).

The snowball sampling method was used in this study to reach health providers who have experience or interest in the implementation of the CDSS. However, this method has potential limitations regarding population representation, as early responders tend to recommend individuals in their network who share similar characteristics. This can lead to selection bias and limitations in generalizing research results (59,60). To reduce this bias, this study expanded the selection of respondents by distributing questionnaires through various networks of health professionals, including doctors, pharmacists, nurses, and pharmacy technicians in health centers in multiple regions. In addition, the involvement of professional organizations and discussion groups of health providers was used to increase the diversity of respondent characteristics. This effort aims to obtain more representative data and improve the external validity of research findings(61,62).

In this study, there are institutional barriers that can affect the adoption of CDSS in health centers, including the limitations of technological infrastructure that are still varied and organizational resistance to changes in digital systems (63). This obstacle can impact health providers' readiness to integrate CDSS into daily clinical practice. Therefore, an adaptation strategy is needed that includes increased technical support, ongoing training, and policies that encourage the adoption of technology in the primary care environment (64,65).

CONCLUSION

This study concluded that Health Providers at the Probolinggo Primary Healthcare Centers showed readiness and positive acceptance of CDSS. Based on the survey results, most respondents were optimistic about the benefits of CDSS technology in improving clinical decisions and antibiotic management. The results of this study also show that perceived ease of use (PEOU) and perceived usefulness (PU) play an essential role in influencing the attitudes and behavioral intentions of Health Providers to use CDSS. However, there are several inhibiting factors, such as discomfort and insecurity, which, despite their existence, do not significantly influence the acceptance of this technology. The study emphasizes the importance of training and technical support to increase healthcare providers' confidence in using CDSS and ensure seamless integration with existing digital systems, such as SIMPUS. Overall, this study highlights that with the proper adjustments and support, CDSS has the potential to be an essential tool in improving the quality of primary health care and assisting in more rational antibiotic management.

The study highlights the importance of providing training and technical support to enhance healthcare providers' confidence in using CDSS and ensure their smooth integration with existing digital systems, such as SIMPUS. Furthermore, strong leadership and commitment from institutions are crucial for fostering a culture that embraces the adoption of innovative technologies. Collaborative efforts among policymakers, software developers, and healthcare practitioners are vital for refining CDSS features to meet user needs and align with local health service priorities. Overall, this study indicates that with the proper adjustments and support, CDSS can be an essential tool for improving the quality of primary healthcare and promoting more rational antibiotic management.

AUTHOR'S CONTRIBUTION STATEMENT

All authors contributed significantly to this study. Rokayah plays a role in study design, data collection, and initial analysis. Riza Alfian supports data analysis using the SEM-PLS method and interpretation of results. Yunita Nita and Hanni Prihhastuti Puspitasari played a study design and literature review, as well as the final editing, to ensure the feasibility of publication. All authors have read and approved the final version of this manuscript.

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DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

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CONFLICTS OF INTEREST

This research has no conflict of interest from anywhere.

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