Original Article

Analysis Of Acceptance Model Technology Theory On Satisfaction And Loyalty In Online Registration Of Outpatient Patients

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ABSTRACT

Background: *The on-site registration system often causes various problems, such as long queues and long waiting times in the queue room, the possibility of data input errors due to being done manually, patient discomfort, and access difficulties for long-distance patients. If these aspects of TAM meet patient expectations, it will create patient satisfaction, ultimately resulting in loyal patients. This research aims to determine the influence of perceived ease of use and perceived usefulness on online registration and its impact on patient satisfaction and loyalty*

Methods: *This study employed an explanatory research design with a quantitative approach. The population consisted of all outpatients at Mataram City Regional Hospital, and the sample included 188 respondents. Data were collected using a closed-ended questionnaire with a Likert scale. For data analysis, the study applied covariance-based Structural Equation Modeling (SEM), specifically Partial Least Squares (PLS), using SmartPLS version 3.0.*

Results: *The research findings revealed that perceived ease of use significantly and positively influences the use of the online registration system (t-stat: 4.603 > 1.96); perceived usefulness significantly and positively affects the use of the online registration system (t-stat: 3.697 > 1.96); user attitude significantly and positively impacts the use of the online registration system (t-stat: 4.952 > 1.96); the use of the online registration system significantly and positively affects patient satisfaction (t-stat: 6.503 > 1.96); the use of the online registration system significantly and positively influences patient loyalty (t-stat: 3.730 > 1.96); and satisfaction significantly and positively impacts patient loyalty (t-stat: 4.840 > 1.96)*

Conclusion: *The online registration system, influenced by perceived ease of use, usefulness, and user attitude, significantly enhances patient satisfaction and loyalty. Mataram City Regional Hospital should continue improving the online registration system and evaluating patient satisfaction to boost loyalty.*

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Introduction

The ongoing trends of globalization deeply influence health services. The advancements driven by globalization have transformed lifestyles and introduced competitive pressures, including the necessity to adapt to technological developments. Organizations that fail to

embrace these changes risk becoming irrelevant. In this context, many organizations, including healthcare providers, are driven to innovate in their service offerings. Innovative services that deliver tangible benefits to the community are more likely to attract the public's demand. (Rohayatin, 2023; Ulum, 2023)

In the face of competition in the era of globalization, health facility managers are required to improve the quality of services to the community. Improving the quality of health services requires improving the management of all health resources, including facilities, infrastructure, and health equipment. The online registration system is one of the health facilities used to improve the quality of health facility services. Implementing the online registration system is one of the forms of implementing services in accordance with the law's mandate by utilizing the sophistication of information technology. (Mustofa, Roekminiati , & Sustainable, 2019)

The e-reservation system can be more suitable for the needs of outpatients because it focuses more on preventive care and treatment of minor illnesses than inpatients who require intensive care. The e-reservation system or online registration is a health facility or tool for managing and facilitating reservations or appointments in the context of health services. This system utilizes information and communication technology to make it easier for patients to make reservations or register appointments with health workers or certain health facilities, including hospitals.

The on-site *registration system* often causes problems such as long queues and long waiting times in the queue room, input errors due to manual processing, patient inconvenience, and difficulty accessing remote patients(Titarmare & Yerlekar, 2018). Therefore, by utilizing the development of information technology, the online registration system is designed to overcome these various problems. New and existing patients can register online through the *website* or mobile phone-based application (Kariema , 2020).

One of the hospitals that implements a unique online registration system for outpatients is the Mataram City Regional General Hospital (RSUD). This hospital uses an Android-based online registration system application. The Mataram City Hospital presents this online e-reservation to make it easier and faster for patients to access outpatient poly services. This innovation is concrete proof that Mataram City Hospital is always committed to improving service quality by cutting response *time* that was previously long and complex to faster and easier.

The online registration system is used to improve time efficiency for patients and health workers, improve patient accessibility, improve queue management appointment reminders, and integrate patient data with electronic medical record systems. Therefore, the online registration system has several benefits. First, the registration process becomes more manageable, safer, and orderly. Second, patients do not need to wait too long when registering for treatment at the hospital. Third, public order and trust in the online registration process, which was originally manual to electronic by machines, should be improved to avoid misappropriation. Fourth, the service process should be speeded up compared to registering manually.(Rumana, 2021)

Outpatients at the Mataram City Hospital have increased during 2019-2021 and continue to grow; in 2019, the average monthly outpatient was around 16,126 patients. In 2020, as many as 16,469 patients, and in 2021 as many as 17,157 patients. The increase in outpatients requires the hospital to implement

innovative solutions such as the e-reservation system. By implementing this system, the hospital can increase satisfaction by reducing patient waiting time. The e-reservation system allows patients to book appointments online, avoiding long queues and providing a better service experience. In addition, using an e-reservation system can help hospitals better manage capacity and resources. With information on the number of patients scheduled daily, hospitals can plan medical staff, treatment rooms, and other facilities more effectively. This can reduce the workload of medical staff and improve the quality of service to patients. In addition to internal benefits, the e-reservation system can also benefit patients. They can easily choose a suitable time for their visit, access information about available services, and even receive notifications regarding schedule changes. This all contributes to improving the patient experience and their satisfaction with the services provided by the Mataram City Hospital.(Xie et al., 2019)

The implementation of the online registration system at the Mataram City Hospital is one of the efforts made to meet service standards according to the Regulation of the Minister of State Apparatus Empowerment and Bureaucratic Reform of the Republic of Indonesia Number 15 of 2014 concerning Service Standard Guidelines, which prioritizes the principles of simplicity, sustainability, transparency, and fairness. The online registration system at the Mataram City Hospital has been launched and implemented since November 2021. Online registration through the e-reservation system began to be enforced based on the Decree of the Director of the Mataram City Hospital No. 800/3201/RSUD/XI/2021 concerning the Establishment of the Implementation of Standard Operating Procedures (SPO) at the Mataram City Hospital.

On the way, outpatients do not carry out the e-reservation system at the Mataram City Hospital. Based on data from the Mataram City Hospital in the last three months (July – October 2023), outpatients who register online through e-reservation are still lower than patients who register onsite (manually), with an average percentage ratio of 40% (9,251 patients) compared to 60% (11,785).

One theoretical framework that can be applied to evaluate the implementation or usage of systems like online registration through e-reservation is the Technology Acceptance Model (TAM). This model was developed to assess user experience (UX) and user perceptions of an information system. According to TAM, the adoption of information systems is influenced by users' perceptions and attitudes. These perceptions encompass both ease of use and perceived usefulness or benefits. If users believe that a system simplifies their tasks and offers valuable benefits, they are likelier to continue using it to support their work. User attitude is also an essential aspect of the successful implementation of an information system. Attitude is related to users' emotional responses (likes or dislikes, willingness or dislike) to the presence or presence of information systems. Therefore, TAM is a theoretical framework widely used to understand user behavior towards technology, including health systems, by focusing on aspects such as perceived usefulness and perceived ease of use, and (Al-Emran & Shaalan, 2021)*attitude*. TAM helps understand how users (in this case, patients) respond to and accept new technologies such as online registration. Patient satisfaction is an essential indicator of the quality of health services. Effective online registration can improve the patient experience by

providing an easier and more convenient option to access healthcare services. Satisfied patients tend to be more likely to return to the same service in the future and recommend it to others, which directly contributes to patient loyalty.

If these aspects of TAM meet patient expectations, it will create patient satisfaction, ultimately resulting in loyal patients. Patient satisfaction or dissatisfaction is the effect of the experience of using the online registration system. If the patient finds the system easy to use and helpful and meets the users' expectations, then the user satisfaction level tends to be high. In addition, patient satisfaction can be related to loyalty(Kurniawan & Pratiwi, 2023; Sihombing, 2022). High satisfaction tends to motivate patients to stick with online registration services in the future and can even increase the likelihood that users will recommend this system to others. The patient's loyalty in this context can be measured by his desire to continue using the online registration service and the possibility of recommending this system to friends, family, or others in need.(Kotler & Keller, 2021)

Methods

This study employs an explanatory research design with a quantitative approach. Descriptive research is a method aimed at clarifying the relationships and positions of the variables being examined and the influence between them. The primary objective of explanatory research is to offer a more comprehensive explanation of the factors contributing to a phenomenon, providing a deeper understanding and a richer context related to the research topic.

The population for this study consists of all outpatients at Mataram City Hospital who have utilized the e-reservation system for online registration. Based on data from the hospital from July to September 2023, an average of 9,256 patients were registered through the e-registration system. As a result, the sample size is expected to represent this population. The Krajcie-Morgan formula was used to determine the appropriate sample size. With a margin of error of 10%, the minimum required sample size is 94 respondents for both users and non-users of the system, bringing the total sample size to 188 respondents.

This research data is in the form of primary data, namely data obtained directly by researchers from the first or original source without going through an intermediary. Primary data is usually obtained in the context of ongoing (*real-time*) or recently conducted research, so the data is still *up-to-date*(Mukhadith , 2021). Research data collection uses questionnaires, where data collection is carried out by giving a set of questions to respondents to answer based on their views, perceptions, assessments, or perceptions. The questionnaires used are closed-ended, with answer options available so that respondents or research participants only need to choose one of these answers. The questionnaire answer options use a Likert scale of 1 to 5.(Yusuf, 2016)

To prevent bias in understanding the research variables, it is essential to clarify the types of variables used in Structural Equation Modeling (SEM) analysis, including latent and manifest variables. Latent variables, which cannot be directly measured, are represented by indicators or manifest variables. In this study, two types of latent variables are used: exogenous and endogenous latent variables. Exogenous latent variables are independent variables that influence or explain the variation between endogenous and dependent variables in the model. The study

incorporates exogenous latent variables such as the implementation of online registration, patient satisfaction, and patient loyalty. According to the conceptual framework, the implementation of online registration is influenced by perceptions of convenience, perceived usability, and attitudes.

On the other hand, satisfaction and loyalty are influenced by the actual use of the online registration system. Thus, in this model, online registration implementation is an endogenous latent variable influenced by exogenous latent variables like perceptions of convenience, perceived usability, and attitudes. Similarly, satisfaction and loyalty are endogenous latent variables influenced by the exogenous latent variable of online registration implementation. (J. F. Hair et al., 2019, 2021)

Data analysis in this study employs Structural Equation Modeling (SEM) based on covariance, specifically using Partial Least Squares (PLS) through SmartPLS version 3.0. PLS is a robust analysis method as it does not require data to be measured on a specific scale and applies to small and large datasets. Additionally, PLS can be used for theory validation. The PLS model consists of two key components: the structural model (the inner model) and the measurement model (the outer model). The structural model outlines the relationships between latent variables, while the measurement model defines how latent variables relate to their respective indicators. PLS can handle both reflective and formative indicators for latent variables. SEM-PLS is particularly useful for structural analysis when the sample size is between 100 and 200, making it suitable for the current study. (J. F. Hair et al., 2021; J. Hair, Sarstedt, Hopkins, & G. Kuppelwieser , 2014)

The steps involved in conducting PLS analysis are as follows: (1) Developing the design of the inner model, (2) The inner model illustrates the relationships between latent variables in PLS, which are derived from the research problem, hypotheses, and conceptual framework (Wong, 2019), (3) Developing the design of the outer model, and (4) The measurement model, or outer model, explains the relationship between the indicators and their corresponding latent variables.

In this study, the relationship between the indicators of each latent variable is reflective, meaning that the indicators have a positive association with the latent variable (Wong, 2019). The steps involved are as follows: (1) Constructing the path diagram, (2) The path diagram is developed based on the designs of both the outer and inner models, (3) Translating the path diagram into equations for the outer and inner models, and (4) Determining the appropriate estimation method.

PLS estimation involves two methods, the algorithm method and the bootstrap method. The algorithm estimation method in SmartPLS provides values for factor or outer loading, cross-loadings of each indicator, and metrics such as AVE (Average Variance Extracted), composite reliability, Cronbach's alpha, path coefficients, and R^2. The bootstrap method, on the other hand, generates path coefficient values and t-test results.

(1) Evaluation of *the outer model. (a)* Convergent validity refers to how an indicator correlates strongly with other indicators measuring the same reflective construct. Indicators should demonstrate convergence, which is assessed through the outer loading and Average Variance Extracted (AVE) values (Solihin and Ratmono, 2020: 44). The decision-making process for evaluating convergence validity follows a rule of thumb: if the AVE value is

more significant than 0.5, it is considered acceptable. After checking the AVE, the next step is to assess the outer loading. The indicator meets the convergence validity criteria if the outer loading value exceeds 0.7. However, it is advised that the outer loading should not exceed 0.95, as this may suggest that respondents' answers exhibit an unusually high level of similarity, which is undesirable. (b) Validity of discrimination: Discriminatory validity indicates how much the size of an indicator or construct differs from other constructs. The construct must be unique and capture phenomena not represented by other constructs in the model. The validity of discrimination is assessed through the value of (Cheung et al., 2023; Solihin and Ratmono , 2013)(J. F. Hair et al., 2021),*the cross-loading* value, and the root of the AVE. The indicator is declared eligible for the discrimination's validity if the item's cross-loading value in one variable is greater than that of the item of the other variable and the root of the AVE > the correlation between the latent variables. As a better alternative, assessing the validity of discrimination is recommended using the (Abdillah and Jogiyanto , 2015; Wong, 2019)*heterotrait-monotrait ratio* (HTMT) correlation. HTMT is defined as the mean value of the correlation of indicators between constructs (i.e., heterotrait-heteromethod correlation) relative to the mean (geometric) of the mean correlation for indicators measuring the same construct (i.e., monotrait-heteromethods correlation). The problem of discriminatory validity arises when a high HTMT value proposes a threshold value of 0.90 for a structural model with a conceptually very similar construct/variable or 0.85 for a model with a different construct. (c) Liability: Reliability is a measure of accuracy, consistency, and regularity of a set of indicators used to measure the constructed or variable being measured. The reliability test refers to the Cronbach alpha value and (J. F. Hair et al., 2021)*composite reliability*. The rule *of thumb* used is that if Cronbach alpha and *composite reliability* values > 0.7 (0.6 is still acceptable), then it is declared reliable but not more than 0.95(Abdillah and Jogiyanto , 2015; Hair Jr et al., 2020).

(2) Inner model assessment, *(a)* Evaluation *of goodness of fit* (R2); The *goodness of fit* evaluation aims to assess the predictive *power of* the model based on its exogenous latent variables. The R 2 value ranges from 0 to 1; the closer to 1, the higher *the predictive power*. If $R^2 \leq 0.25$ is categorized as weak, R^2 between 0.26 and 0.74 is categorized as moderate, and $R^2 >$ 0.75 is categori zed as strong (*substantial*). Effect Size (F)(Abdillah and Jogiyanto , 2015; Solihin and Ratmono , 2013)[2]); If *R2* indicates the predictive ability of all exogenous latent against endogenous latent variables (*combined effect*), then *the effect size* (*F2*) indicates the relative predictive ability of one of the exogenous variables when the variable is excluded from the model. In the process, the effect size of an exogenous latent variable is assessed by comparing *the R2 combined effect* with *R2* after the variable is removed from the model. *Effect size* (*F2*) is grouped into three categories, namely weak (0.02-<0.15), moderate (0.15-<0.35), and large (>0.35). (c) (Hair Jr et al., 2020; Wong, 2019)*Predictive relevance* (Q2); *Predictive relevance* (Q2) or the Stone-Geisser index is a predictive assessment outside the sample. Predictive relevance Q2 provides the option to assess the practical relevance of the model. It relies on the (Hair Jr et al., 2020)*blindfolding procedure*, which removes multiple data points in the systematic and technical procedure and uses the remaining data to estimate the path model. The difference between the omitted

value and the prediction data serves to show the relevance of the model's prediction. A Q^2 value must be greater than 0 to indicate the model has predictive relevance. Furthermore, Q^2 above 0.25 to 0.5 indicates medium predictive relevance, and above 0.5 is categorized as significant. (d) Hypothesis testing in SmartPLS is conducted using the bootstrap resampling method to generate t-statistic values (Fauzi, 2022; Hair Jr et al., 2020).*This t-test assesses the significance of the path coefficients between exogenous and endogenous latent variables, individually or in the context of their relationships* (Ghozali, 2014). A t-statistic value less than 1.96 indicates that the hypothesis is rejected, meaning the exogenous latent variable does not significantly affect the endogenous latent variable. Conversely, if the t-statistic value exceeds 1.96, the hypothesis is accepted, indicating that the exogenous latent variable significantly affects the endogenous latent variable. (Wong, 2019)Ethical clearance for this study was obtained from STRADA University Indonesia.

Results

Table 1. Distribution of Respondents (n=188 respondents)

Demographics	Criterion	Number of Respondents (people)	Percentage (%)
Age (years)	1. <25	16	8,51
	2. 25-40	50	26,60
	3. 41-55	57	30,32
	4. 56-70	52	27,66
	5. >70	13	6,91
Education Level	1. SD	15	7,98
	2. JUNIOR	48	25,53
	3. SMA	104	55,32
	4. PT	21	11,17
Work	1. Civil Servant/ Soldier/ Police	24	12,77
	2. Private Employees	35	18,62
	3. Self-employed	96	51,06
	4. Students / Students	13	6,91
	5. Other	20	10,64
Tribe	1. Sasak	94	50,00
	2. Sumbawa	30	15,96
	3. Bima	35	18,62
	4. Bali	19	10,11
	5. Other	10	5,32

Most respondents were in the productive age range, with 26.60% aged between 25 and 40 years old and 30.32% aged between 41 and 55. Meanwhile, older

respondents were also significant, with 27.66% aged between 56 and 70 years old and 6.91% over 70 years old. The youngest age group, less than 25 years old, has a lower proportion of 8.51% of the total respondents.

Based on their educational background, more than half, or 55.32%, have a high school education background. This reflects that most respondents have completed high school education or equivalent, followed by junior high school education level with a percentage of 25.53%, and higher education (PT) at 11.17%, showing that there is also a significant proportion of respondents with secondary or higher education. However, 7.98% of respondents also have basic education (SD).

Based on employment, as many as 51.06%, or more than half, came from the self-employed, showing that most online registration users have entrepreneurial jobs. In addition, there is also a significant proportion of private employees, at 18.62%, and civil servants/TNI/Polri, at 12.77%. Respondents from students and other backgrounds accounted for 6.91% and 10.64% of the total respondents, respectively.

Furthermore, the classification by ethnicity, half (50%) of the 180 respondents came from the Sasak tribe, an indigenous tribe that dominates the island of Lombok. This shows that these online registration users have a significant representation of the Sasak tribe. In addition, there is also a sizable proportion of the Sumbawa (15.96%) and Bima (18.62%) tribes, both of which are also tribes that inhabit the West Nusa Tenggara region. Respondents from the Balinese tribe, although smaller than the previous three tribes, still have a proportion of 10.11%. Meanwhile, other tribes, which may include minority or non-local tribes, accounted for about 5.32% of the total respondents.

Table 2. Variable Descriptive Statistics

Latent Variables	Statement	Average	Min	Max	SD
Perception of Convenience	6	3,64	1,83	5,00	0,62
Perception of Usability	6	3,58	1,83	4,83	0,61
Attitude	5	3,60	1,81	4,92	0,58
Usage	6	3,61	1,50	5,00	0,54
Satisfaction	6	3,59	1,50	5,00	0,59
Loyalty	4	3,65	1,50	5,00	0,68

Based on data about the hospital's online registration system, six latent variables are assessed from the users' perspective with a sample of 188 respondents. In the perception of convenience, the users gave an average score of 3.64, which ranged from a minimum of 1.83 to a maximum of 5.00. This shows that users generally find this online registration system relatively easy to use, with a tendency to have a positive perception of its convenience. The average usability perception score was 3.58, ranging from 1.83 to 4.83. This indicates that users find this system helpful in meeting their needs in the hospital registration process. However, there is slight variation in its level of usability from the user's point of view. The average score of users' attitudes towards the online registration system reached 3.60, ranging from 1.81 to 4.92. This positive attitude reflects that users

have a good view of the system, although there is a slight variation in users' attitude level. The use of the system, rated with an average of 3.61 ranging from 1.5 to 5, indicates that users are actively using this system in their daily activities. A value range between 1.50 and 5.00 indicates variation in usage intensity, but overall, users adopt the system well. User satisfaction with the RS's online registration system averaged 3.59, ranging from 1.50 to 5.00. This indicates that most users are satisfied with their experience using the system, although there is a slight variation in user satisfaction levels. User loyalty to this system stands at an average of 3.65, with those between 1.50 and 5.00. This high average indicates that users are more likely to reuse the system for their future registration needs and be willing to recommend it to others.

Table 3. *Latent Variable Outer Loading* Indicator and AVE Values

Latent Variables	Items	Outer Loading	AVE	Latent Variables	Items	Outer Loading	AVE
Press. Ease	Pkm1	0,735	0,564	Usage	Imp1	0,742	0,545
	Pkm2	0,751			Imp2	0,748	
	Pkm3	0,763			Imp3	0,704	
	Pkm4	0,759			Imp4	0,736	
	Pkm5	0,759			Imp5	0,764	
	Pkm6	0,736			Imp6	0,734	
Press. Uses	Pkg1	0,736	0,587	Satisfaction	Kep1	0,768	0,601
	Pkg2	0,767			Kep2	0,771	
	Pkg3	0,778			Kep3	0,803	
	Pkg4	0,731			Kep4	0,825	
	Pkg5	0,795			Kep5	0,739	
	Pkg6	0,786			Kep6	0,742	
Attitude	Skp1	0,806	0,595	Loyalty	Loy1	0,832	0,68
	Skp2	0,724			Loy2	0,833	
	Skp3	0,793			Loy3	0,822	
	Skp4	0,745			Loy4	0,81	
	Skp5	0,787					

The table above demonstrates that all indicators for the latent variables perception of convenience, perception of usability, attitude, use, satisfaction, and loyalty have outer loading values greater than 0.7. This indicates that all indicators meet the requirements for convergent validity. In other words, each indicator effectively represents its corresponding latent variable. Additionally, the Average Variance Extracted (AVE) for each latent variable exceeds 0.5, confirming that the convergent validity of all latent variables is acceptable. This suggests that each latent variable explains more than 50% of the variance in its respective indicators.

Table 4 Value *Cross Loading* Indicators of Each Latent Variable

Indicators	Latent Variables					
	Press. Ease	Press. Uses	Attitude	Usage	Satisfaction	Loyalty
Imp1	0,456	0,444	0,417	**0,742**	0,243	0,336
Imp2	0,459	0,389	0,411	**0,748**	0,322	0,267
Imp3	0,342	0,384	0,387	**0,704**	0,265	0,255
Imp4	0,369	0,327	0,348	**0,736**	0,294	0,255
Imp5	0,457	0,360	0,522	**0,764**	0,384	0,378
Imp6	0,404	0,346	0,423	**0,734**	0,291	0,247
Kep1	0,269	0,219	0,223	0,344	**0,768**	0,386
Kep2	0,275	0,174	0,191	0,325	**0,771**	0,343
Kep3	0,328	0,261	0,266	0,343	**0,803**	0,417
Kep4	0,322	0,241	0,302	0,341	**0,825**	0,425
Kep5	0,268	0,183	0,172	0,233	**0,739**	0,348
Kep6	0,280	0,196	0,185	0,306	**0,742**	0,373
Loy1	0,288	0,192	0,292	0,297	0,438	**0,832**
Loy2	0,326	0,392	0,272	0,345	0,429	**0,833**
Loy3	0,292	0,259	0,223	0,329	0,356	**0,822**
Loy4	0,360	0,260	0,278	0,342	0,403	**0,810**
Pkg1	0,355	**0,736**	0,289	0,372	0,194	0,254
Pkg2	0,316	**0,767**	0,364	0,368	0,190	0,313
Pkg3	0,345	**0,778**	0,285	0,407	0,163	0,224
Pkg4	0,306	**0,731**	0,233	0,308	0,130	0,167
Pkg5	0,278	**0,795**	0,280	0,389	0,225	0,267
Pkg6	0,276	**0,786**	0,448	0,463	0,333	0,300
Pkm1	**0,735**	0,248	0,264	0,426	0,281	0,304
Pkm2	**0,751**	0,314	0,246	0,432	0,234	0,286
Pkm3	**0,763**	0,284	0,275	0,367	0,245	0,267
Pkm4	**0,759**	0,263	0,270	0,384	0,319	0,294
Pkm5	**0,759**	0,322	0,365	0,471	0,285	0,277
Pkm6	**0,736**	0,385	0,370	0,447	0,325	0,302
Skp1	0,359	0,434	**0,806**	0,464	0,289	0,321
Skp2	0,188	0,283	**0,724**	0,404	0,220	0,199
Skp3	0,360	0,287	**0,793**	0,444	0,151	0,203
Skp4	0,334	0,327	**0,745**	0,420	0,255	0,242
Skp5	0,298	0,290	**0,787**	0,469	0,213	0,277

The table above indicates that all indicators of the latent variables—perception of convenience, perception of usability, attitude, use, satisfaction, and loyalty—have cross-loading values within each variable more significant than the cross-loading values of indicators from other variables. Therefore, it can be concluded that all indicators for these latent variables meet

the criteria for discriminant validity. This demonstrates that each indicator distinctly reflects its corresponding latent variable and does not overlap with indicators from other latent variables.

Table 5 Value *Composite Reliability* and *Cronbach's Alpha* Latent Variables

No	Latent Variables	Cronbach's Alpha	Composite Reliability
1	Press. Ease	0,846	0,886
2	Press. Uses	0,860	0,895
3	Attitude	0,830	0,880
4	Usage	0,833	0,878
5	Satisfaction	0,867	0,900
6	Loyalty	0,843	0,895

The table above shows that the latent variables of convenience perception, usability perception, attitude, use, satisfaction, and loyalty have *Cronbach's Alpha* > 0.6 and *Composite Reliability* > 0.7, respectively. Therefore, all latent variables of the study were declared to meet the reliability requirements.

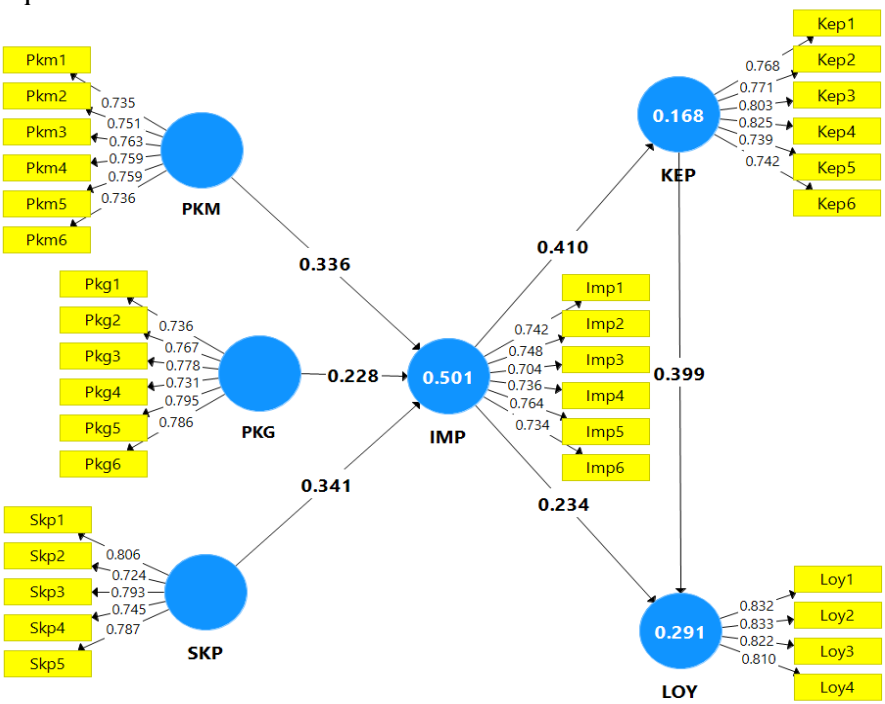

Figure 1. Output Method *Resampling Algorithm* PLS

Table 6 Path Coefficient Value

Exogenous Latent Variables	Endogenous Latent Variables		
	Usage	Satisfaction	Loyalty
Press. Ease	0,336		
Press. Uses	0,228		
Attitude	0,341		
Usage		0,410	0,234
Satisfaction			0,399

The Output resampling algorithm of SmartPLS and the table above show that the perception of convenience affects the variable of the use of the online registration system with an influence weight (path coefficient) of 0.336. This means that increasing the average score of perception of convenience by 1 unit will increase the average score of using the online registration system by 0.336, assuming that the other variables have a constant score (not changing). The perception of usability affects the variable of the use of the online registration system with an influence weight of 0.228. This means that increasing the average score of usability perception by 1 unit will increase the average score of using the online registration system by 0.228, assuming that the other variables have a constant score. User attitudes affect the variables of using the online registration system with an influence weight of 0.341. This means that increasing the average score of user attitude by 1 unit will increase the average score of using the online registration system by 0.341, assuming that the other variables have a constant score.

The use/implementation of the online registration system affects the user satisfaction variable with an influence weight of 0.410. This means that increasing the average score of the use/implementation of the online registration system by 1 unit will increase user satisfaction by 0.410. The use/implementation of the online registration system affects the user loyalty variable with an influence weight of 0.234. This means that increasing the average score of the use/implementation of the online registration system by 1 unit will increase user loyalty by 0.234. User satisfaction affects the user loyalty variable with an influence weight of 0.399. This means that increasing the average user satisfaction score of the online registration system by 1 unit will increase user loyalty by 0.399.

The effect size, represented by the value of F2, reflects the relative predictive power of an exogenous variable in forecasting the model's outcomes when that variable is removed from the model. The table below presents the results of the effect size estimation.

Table 7 *Effect Size* (*F2*) Endogenous Latent Variables Against Models

Line	Exogenous Latent Variables	*F2*	Effect Size *Criteria*
PKM, PKG, & SKP → IMP	Press. Ease	0,175	Moderate
	Press. Uses	0,079	Weak
	Attitude	0,177	Moderate
IMP & KEP → LOY	Usage	0,064	Weak
	Satisfaction	0,187	Moderate

The table above shows that the variables of perception of convenience and user attitude each have *a moderate effect size* on the variables of using the online registration system, with *F2 values of* 0.175 and 0.177, respectively. Meanwhile, the variable of perception of usability has *a weak effect size* on the variable of using the online registration system.

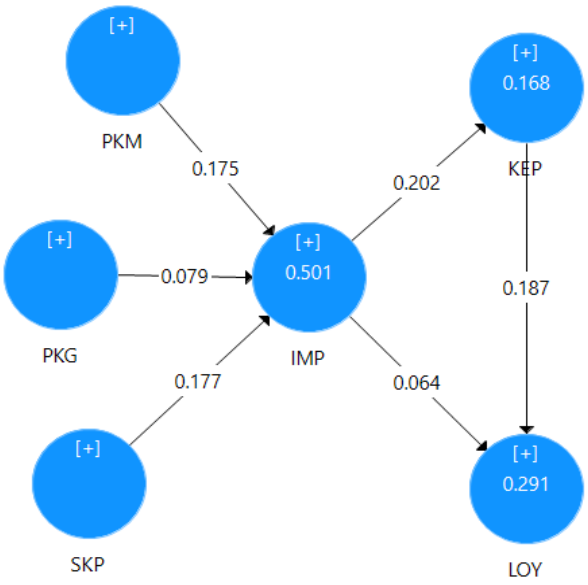

Figure 4. 1 Value *F-Square* (*F2*)

The usage/implementation variable had a weak *effect size* on user loyalty, with *an F2* of 0.064. Meanwhile, the user satisfaction variable moderately affected user loyalty, with *an F2* of 0.187.

Table 8 Summary of Hypothesis Testing Results

Influence	Path Coefficient	T Statistics	P Values	Decision
Press. Ease of Use >	0,336	4,603	0,000	Receive H1
Press. Uses -> Uses	0,228	3,697	0,000	Receive H2
Attitude -> Usage	0,341	4,952	0,000	Receive H3
Usage -> Satisfaction	0,410	6,503	0,000	Receive H4
Usage -> Loyalty	0,234	3,730	0,000	Receive H5
Satisfaction > Loyalty	0,399	4,840	0,000	Receive H6

The t-statistical value for H1 is 4.603, which is greater than 1.96, and the p-value (0.000) is less than 0.05, leading to the acceptance of H1. This indicates that the

perception of convenience has a significant positive effect on using or implementing the online registration system for outpatients at Mataram City Hospital. In other words, as users perceive the online registration system to be easier to use, their intention to utilize it increases.

The t-statistical value for H2 is 3.697, more significant than 1.96, and the p-value (0.000) is less than 0.05, leading to the acceptance of H2. This indicates that the perception of usability has a significant positive effect on using or implementing the online registration system for outpatients at Mataram City Hospital. In other words, as users perceive the online registration system to be more helpful, their intention to use it increases.

The t-statistical value for H3 is 4.952, more significant than 1.96, and the p-value (0.000) is less than 0.05, leading to the acceptance of H3. This indicates that user attitudes significantly positively affect the use or implementation of the online registration system for outpatients at Mataram City Hospital. In other words, the more positive the users' attitudes or perceptions towards the online registration system, the higher their intention to use it.

The t-statistical value for H4 is 6.503, more significant than 1.96, and the p-value (0.000) is less than 0.05, leading to the acceptance of H4. This indicates that the use or implementation of the online registration system has a significant positive effect on user satisfaction among outpatient patients at Mataram City Hospital. In other words, the greater the frequency or intensity with which users engage with the online registration system, the higher the level of satisfaction they experience.

The t-statistical value for H5 is 3.730, more significant than 1.96, and the p-value (0.000) is less than 0.05, leading to the acceptance of H5. This indicates that the use or implementation of the online registration system has a significant positive effect on user loyalty among outpatient patients at Mataram City Hospital. As the frequency of use increases, there is a corresponding increase in user loyalty to the online registration system.

The t-statistical value for H6 is 4.840, more significant than 1.96, and the p-value (0.000) is less than 0.05, resulting in the acceptance of H6. This suggests that user satisfaction has a significant positive effect on users' loyalty to the online registration system for outpatients at Mataram City Hospital. As user satisfaction increases, there is a corresponding increase in users' loyalty to the online registration system.

Discussion

The results of hypothesis testing revealed that the perception of convenience had a significant positive effect on using the online registration system for outpatients at Mataram City Hospital (t-statistic: 4.603 > 1.96), with a path coefficient of 0.336. This indicates that system usage also increases as the perceived ease of use increases. If users find the online registration system easy to use, they tend to be more active in using the system. The results of the literature review by Khalil & Serhier (2023) also revealed that ease of use is one of the determinants of the implementation of a registration. Testing the TAM model through the research of Nurmawati & Muflihatin (2020) also indicates that the convenience felt by users plays a vital role in the implementation of the online registration system.

Users feel the ease of online hospital registration through the application if it has an intuitive and easy-to-understand user interface, simple and responsive design, simple information filling, secure identity verification, and support and guidance. In addition, users feel that the system is easy to use if it is supported by an easy-to-access

ordering feature, clear service information, speed that suits the user's device, good support, and adequate confirmation and notifications. In other words, the patient online registration system provides a positive user experience and meets users' expectations regarding ease of use, information accessibility, and technical support. If an online registration system has these aspects well according to the user's perception, it successfully implements or uses an information system. According to the TAM theory, the intensity of using an information system is determined by its ease of use(Eckerberg, 2017; Weresa et al., 2024; Wiwesa, 2021)

The hypothesis test results indicated that the perception of usability had a significant positive effect on using the online registration system for outpatients at Mataram City Hospital (t-statistic: 3.697 > 1.96), with a path coefficient of 0.228. This suggests that as the system's perceived usefulness increases, its use also increases. The results of the research by Putra, Salisah, & Permana (2018) also revealed that the perception of usability significantly affects the use of the system. The study by Nurmawati & Muflihatin (2020) also empirically proves that the benefits felt by users jeopardize the implementation of the online registration system.

The benefits or usefulness of the online registration system that users feel include being able to provide information precisely and accurately, ease of access anywhere and anytime, improving user experience, saving time and effort, and increasing the effectiveness of the registration process. The benefits perceived by users are a crucial factor that influences the acceptance and success of this system. Theoretically, the *technology acceptance model* (TAM) emphasizes that the user's perception of the new technology's perceived benefits will affect the technology's intention and use. When users feel that an online registration system can optimize the process in these ways, then the presence of the system is considered to be successfully implemented(Marikyan and Papagiannidis , 2023)

The hypothesis test results indicate that user attitudes have a significant positive effect on using the online registration system for outpatients at Mataram City Hospital (t-statistic: 4.952 > 1.96), with a path coefficient of 0.341. This suggests that the more favorable the users' attitudes or perceptions towards the system, the higher the usage level. These findings emphasize the crucial role that user attitudes play in driving the adoption and continued use of the online registration system. According to Rahmawaty (2014), the study's results empirically reveal that user attitudes significantly affect the use of an information system Tyas & Darma (2017)A. Widianto & Aryanto (2018)

A positive attitude is closely linked to successfully implementing the online registration system. When users hold a positive attitude towards the system, they are more likely to use it consistently. A person's attitude towards system usage, whether in acceptance or rejection, significantly influences their decision to incorporate technology into their daily tasks or work activities. User attitudes are manifested by the user's views, confidence in data security, suitability for use, and readiness to adopt it. In the context of online patient registration, users feel that this system saves them time in taking care of administration, accessing medical schedules or information more quickly, or even improving care coordination among various healthcare *providers*. According to TAM, a positive user attitude towards the use of patients' online registration will increase the interest of individuals in adopting and using the system consistently.

Therefore, it can be argued that creating a positive user experience through intuitive interface design, ease of access, and adequate technical support is essential to increase individual interest in adopting an online registration system. If users feel the system simplifies the process and makes it easier for them to interact with hospital services, then they will be more likely to adopt and use the system consistently (Jen et al., 2017)

The results of hypothesis testing revealed that using the online registration system significantly positively affects user satisfaction among outpatients at Mataram City Hospital (t-count: 6.503 > 1.96), with an influence weight of 0.410. This indicates that as the intention and frequency of using the online registration system increase, so does patient satisfaction. Several studies have shown that the quality of online registration services significantly influences patient satisfaction levels. Research at Dr. Soedono Madiun Hospital also indicates that the online registration system positively affects outpatient satisfaction. The study's results also demonstrate that the satisfaction levels of outpatients using the online registration system are higher than those who register manually. This suggests the online registration system provides a more convenient and efficient experience, increasing patient satisfaction (Widianto, Kuswiadji , & Kartika, 2023)Rimba Putri, Ardhi Utama, & Hidayati (2019)

The theory of satisfaction is relevant to explain the effect of online registration use on patient satisfaction. User satisfaction theory states that user satisfaction results from their perception of using a technology or service, compared to previously held expectations. In the context of patient online registration, using this system can affect patient satisfaction in several ways. First, online registration can improve patients' access to healthcare services by reducing waiting times and complicated administrative procedures. This can increase satisfaction as patients find accessing the services they need more straightforward and efficient. Second, effective online registration can improve patients' trust in their healthcare providers, as they feel that the system prioritizes the convenience and security of their personal information. This trust is an essential factor in overall patient satisfaction. This indicates that if users feel that the online registration system provides a satisfying experience and meets their needs, they will be more satisfied with the service. This satisfaction reflects the system's success in meeting user expectations and can also positively influence the continued adoption and usage of the system over time. Therefore, it is crucial for system administrators to continuously monitor user feedback and implement necessary improvements to ensure that the system remains efficient, user-friendly, and responsive to evolving user needs (Yuniarti et al., 2021)

The hypothesis testing results indicated that usage significantly positively affected outpatient loyalty at the Mataram City Hospital (t-count: 3.730 > 1.96), with an influence weight of 0.234. This suggests that increased online registration system usage leads to greater patient loyalty. The application of information technology, such as online registration systems, fosters customer engagement, encouraging users to revisit and continue using the service. These findings demonstrate that the use of information technology significantly impacts consumer loyalty. Empirical research proves that the use of information technology has a significant effect on consumer loyalty F. Yusuf, Taufik, & Hidayat (2021)Rinaldo & Abror (2019)

The online registration system is designed to reduce hospital waiting time by

creating procedures that ensure patients can receive services without waiting in long queues, overcoming the imbalance between service activities and patients' needs to be served immediately. Online registration of hospitals in the context of health services is a form of service facility provided to patients to create patient loyalty. These facilities can improve patient experience, ultimately leading to long-term loyalty and ongoing support for the healthcare provider. An online registration system can facilitate patient registration and increase health service efficiency. This efficiency, in turn, can improve patient satisfaction and loyalty. Online registration allows healthcare providers to manage patient data more efficiently. With well-documented data, service providers can provide more personalized and coordinated care. Patients who feel that their information is handled well and processed efficiently tend to feel more satisfied and more likely to return to the same service provider (Nuriyati et al., 2020; Putri & Akbar, 2019; Triyadi, 2019)

The results of hypothesis testing demonstrated that user satisfaction with the online registration system significantly positively affected outpatient loyalty at Mataram City Hospital (t-count: 4.840 > 1.96), with an influence weight of 0.399. This implies that increased user satisfaction with the online registration system leads to increased patient loyalty. Several studies support these findings. For example, a study involving 2,000 patients from 19 public hospitals across 10 cities in Henan province, China, showed that satisfaction significantly positively impacted patient loyalty. Additionally, the study confirmed that satisfaction is crucial in fostering patient loyalty (Addo et al., 2020; Liu et al., 2021)

Increased user satisfaction with online registration systems in hospitals or healthcare facilities will significantly contribute to increased patient loyalty. When patients feel that the registration and administration process they carry out through the online system is smooth, efficient, and seamless, they will tend to feel more satisfied with their overall experience. With this positive experience, patients will trust the hospital or healthcare provider more. Patients feel that their needs and expectations are well met, which, in turn, increases their loyalty to re-elect the same hospital for future health services. More than just a patient transaction, this relationship creates a strong emotional and psychological bond between the patient and the healthcare provider, reinforcing loyalty. The positive experience that users receive when using the online registration system plays a key role in building their loyalty. When users are satisfied with the system's convenience, reliability, and benefits, they are more likely to stick with it and recommend the system to others. This shows that to build a loyal and committed user base, and online registration system providers need to focus on improving the quality of service and user experience. High satisfaction encourages users to continue using the system. It increases their likelihood of introducing the system to others, which in turn can expand the reach and adoption of the system (Chasanah et al., 2023; Rumana, 2021)

Conclusion

Based on the results and discussion, this study concludes that the perception of convenience, usability, and user attitudes significantly influence the implementation the online registration system for outpatients at Mataram City Hospital. Furthermore, using this system positively impacts patient satisfaction and loyalty, with user satisfaction also playing a crucial role in enhancing patient loyalty. Mataram City Hospital is recommended to

continuously improve the online registration system by enhancing its ease of use and perceived benefits while regularly evaluating patient satisfaction to ensure sustained loyalty.

Authors Contributions

The manuscript reflects the collaborative efforts of the research team. One member focused on study design and data collection, another contributed to data analysis and interpretation, and a third provided critical insights during manuscript preparation. All authors reviewed the manuscript, provided valuable feedback, and approved the final draft for publication.

Conflicts of Interest

There is no conflict of interest.

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