RESEARCH ARTICLE

The Effect of Service Quality and System Quality on Online Registration Application on User Satisfaction with Usage Frequency as an Intervening Variable

Erlan Anugrah Pratama[1], Eko Ganis Sukoharsono[2] & Harun Al Rasyid[3]

[1&3]Hospital Management Study Program in the Medical Faculty of Universitas Brawijaya, Malang.
[2]Faculty of Economics and Business, Universitas Brawijaya, Malang.

A B S T R A C T

This research aims to incestigate the impact of sysment quality and service quality on user satisfaction, specifically examining the mediating role of usage frequency in an online registration information system for hospital queues. This research used an analystic observational design with a cross-sectional approach. Data were collected from 96 patients attending a private hospital in Malang City from May to July 2022. The data were analyzed using multiple linear regression and path analysis, including the Sobel test and causal step. The results of this research indicate that neither service quality (t-teststatistic = -1.458, t-stat < 1.96) nor system quality (t-test statistic = 0.448, t-stat < 1.96) directly affected user satisfaction through usage frequency between service quality, system quality and user satisfaction. This research highlights the importance of service quality and system quality in online registration application services. Improving these aspects could enhance user satisfaction, even though usage frequency may not directly mediate this relationship. This research contributes to the understanding of factors influencing user satisafaction in online registration systems for healthcare services. The findings suggest that service providers should focus on improving system quality and service quality to enhance user satisfaction, independent of usage frequency.

Keywords: Online Registration, System Quality, Service Quality, User Satisfaction, Usage Frequency, Healthcare.

1.   Introduction

An important aspect in achieving user satisfaction through service quality is by providing rapid and timely medical assistance (Masrulloh, 2020). Wasted time and energy while potential patients were queuing in order to obtain public service had become a serious problem, such that a new 'queuing system model' is required so that to-be users could queue relatively more comfortably (Alam, 2018). An online registration system could aid potential patients to obtain 'queue numbers' without having to directly visit the hospital (Masniah, 2015). Lengthy queues at the start of working hours has become one of the factors of overcrowding within the Specialist Polyclinic unit (Ranjbar et al., 2014).

Patient overcrowding is an important issue in relation to outpatient [rawat- jalan] services within health facilities due to imbalances owing to the increase of medical services with the limited and expensive resources, as well as developments with more emphasis to outpatients than inpatients [rawat inap] (Aeenparast et al., 2019; Bahadori et al., 2017). These would bring about such impacts as poor access to service, difficulties in making appointments, lengthy waiting-time, and the resulting dissatisfaction both of patients and employees (Bahadori et al., 2017).

Tests by Web-based Appointment System (WAS) or a network-based appointment has been used to increase service qualities in numerous tertiary hospitals (Cao et al., 2011). Good comprehension with regards to organizational characteristics is needed to understand the information systems within an organization (Sukoharsono, 2008).

Measurements of information systems are a vital aspect to be performed in order to gauge the effectivity of said information system. One of such models is the "DeLone & McLean Information System Success Model". This model is basically created to measure impacts of information systems towards an organization's day-to-day business (Alferi et al., 2020). The theoretical framework of this model is that the system quality, comprising of the system quality itself, information quality and

service quality, would in turn affect user satisfaction and consequently said system's 'reusability' (Koh and Kan, 2020).

Patient satisfaction is pursued in relation to the mission of Private Hospital "X" in the city of Malang, since they put special emphasis on quality increase and patients' safety. During the second tri-month of 2020 it was discovered that patient satisfaction within the 'outpatient clinic' [poli rawat jalan] of Hospital "X" was still below acceptable standards of 90%; namely, from April to June 2020, the rates were 85%, 87% and 87% respectively. Factors contributing to this phenomenon include the existing registration systems, lengthy queues, as well as BPJS policies often changing without prior notice.

Results of preliminary studies showed that 34,3% of patients performed early arrivals in the Outpatient [Rawat Jalan] Unit. Earlier patient arrivals than stated in appointments would congest expected patient rescheduling. Moreover, 72,7% of services within the Specialist Outpatient Clinic still had the average waiting time of more than 60 minutes based on data about patient waiting time through SIMRS. In order to overcome this, Hospital "X" had started the trial of mobile-based platforms since mid-2020.

In order to increase the service quality of patients as well as maintain said hospital's decent image, an analysis is required with regards to impacts of service quality and system quality of online registration systems towards user satisfaction in relation with online registration systems through usage frequency in the Outpatient Clinic of Hospital "X".

2. Methods

This research is of the "observational analytic" type, with cross sectional approach. This research aims to analyze the impacts of service quality and system quality of online registration platforms with regards to user satisfaction through the usage frequency aspect. The sampling technique used is purposive sampling utilizing questionnaires as data samples. Validity checks had revealed that the entire item in question was valid (riT > 0.355) and reliable via reliability checks with Cronbach's Alpha value of (0.858) with regards to System Quality, (0.927) for Service Quality, dan (0.889) for User Satisfaction. This research had also obtained ethical feasibility from the Ethics Commission of Medical Research of the Magister of Hospital Management, under the auspices of the Medical Faculty of the University of Brawijaya. The identity of those who had consented to fill out the questionnaire(s) shall be professionally preserved. The data is then analyzed with double linear regression and path analysis as well as with Sobel Test to find out the indirect impacts between variables of system quality and service quality towards the user satisfaction as reflected in the usage frequency.

3. Results
Respondent Characteristics

Respondent characteristics revealed that the majority of respondents were female (65.6%) with the age range of between 20 - 30 years (30.2%). This research was performed in one of the Private Hospitals in the City of Malang. Characteristics of the research location is shown in Table 1

Table 1 Research Location Characteristics

No.	Characteristi cs	Classification (in Years)	N	%
1	Age	20 – 30	29	30.2
		31 – 40	21	21.8
		41 – 50	15	15.6
		50 – 60	14	14.6
		> 60	17	17.7
		Male Female	33	34.4
2	Sex		63	65.6

Variable Descriptive Analysis

Results of description and dimension variables are shown in Table 2. The data shows that, overall, the aspects of service quality, system quality, and the user satisfaction of online registration platforms is within the "decent" category.

Table 2. Descriptives of Service quality, System quality, and UserSatisfaction

No	Variable(s)	Average
1	Service Quality	4.09
	Responsiveness	3.95
	Tangible	4.26
	Empathy	4.21
	Assurance	3.99
	Reliable	4.05
2	System Quality	4.13
	Timeliness	4.26
	Response Time	4.29
	Ease of use	4.20
	Ease of learning	4.09
	Accessibility	4.23
	Reliability	3.70
3	User Satisfaction	4.16
	Re-use	4.19
	Enjoyment	4.20
	Informational Satisfaction	4.05
	Overall Satisfaction	4.21

Assessment Criteria
Very Poor (1 – 1.8), Poor (1.81 – 2.6), Adequate
(2.61 – 3.4), Decent (3.41 – 4.2), Outstanding (4.21
– 5)

Linearity Test

Linearity tests show that there were linear connections of exogenic variables towards the endogenic variables ($p < 0.05$). Test results are shown in the following table.

Table 3. Linearity Test Results

Exogenic	Endogenic	F count	P Values
Service Quality	Usage Frequency	19.704	0.000
System Quality	Usage Frequency	13.113	0.000
Service Quality	User Satisfaction	207.789	0.000
System Quality	User Satisfaction	177.200	0.000
Usage Frequency	User Satisfaction	7.759	0.006

Classical Assumption Tests Multicolinearity Assumption

Multicolinearity testing was performed by looking at the value of Variance Inflation Factor (VIF) or tolerance in each of the exogenic variables. Testing criteria stated that if the VIF value is smaller than 10 or the tolerance value greater than 0.1, then there would be no multicolinear phenomenon and it could be concluded that there are no correlations between exogenic variables prerequisite to path analysis.

Table 4. Multicolinearity Test Results

Variable(s)	Usage Frequency		User Satisfaction	
		VIF	Tolerance	VIF

	Tolerance			
Service Quality	0.434	2.303	0.407	2.454
System Quality	0.434	2.303	0.433	2.312
Usage Frequency	-	-	0.824	1.214

Normality Assumptions

Residual normality assumption testings to the effects of service quality and system quality towards the usage frequency results in the Kolmogorov Smirnov statistics of 0.058 with the probability rate of 0.200. Next the testing of residual normality assumptions to the effects of service quality, system quality, and usage frequency towards user satisfaction results in the Kolmogorov-Smirnov statistics of 0.071 with the probability rate of 0.200. These results shows that the probabilities of both models > level of significant (α=5%). This means that the residual produced by both models are considered to be 'normally distributed'. This means that the normality assumptions of both models are considered eligible for path analysis.

Table 5. Kolmogorov – Smirnov Test Results (Normality Assumptions)

	Usage Frequency	User Satisfaction
Kolmogorov-Smirnov Z	0.058	0.071
p values	0.200	0.200

Heteroskedasticity Assumptions

In the path analysis to determine whether the residual variable(s) are homogenic in nature, the Glejser atau or 'heteroskedasticity assumption' tests are performed. uji asumsi heteroskedastisitas. The testing of heteroscedasticity assumptions with regards to effects of service quality and system quality in relation to usage frequency has resulted in the probability greater than the level of significant (α=5%), while the heteroscedasticity assumption tests towards the effects of service quality, system quality, and usage frequency towards the user satisfaction has resulted in a probability value greater than the level of significant (α=5%). Such results showed that residual of both models are considered to have a homogenic type, therefore the heteroscedasticity assumptions are considered to have been fultilled.

Table 6. Heteroskedasticity Assumption Test Results

Usage Frequency			User Satisfaction	
Variable(s)	t statistics	p values	t statistics	p values
Service Quality	0.108	0.914	0.045	0.965
System Quality	0.263	0.793	-1.522	0.132
Usage Frequency	-	-	-0.414	0.680

Hypothetical Testing
Direct Effect(s) Hypothetical Testing

The testing criteria states that if the coefficient value is positive and the |t statistics| $\geq$ |t table| or that the probability $\leq$ level of significance (a = 5%) it shall be stated that there is a positive and significant of exogenic variables to endogenic ones. The result of Direct Effect(s) Hypothetical Testing is stated in Table 7.

Data show that there is a positive and significant impact with regards to service quality towards usage frequency ($p < 0.05$; P = 0.353), between service quality and user satisfaction ($p < 0.05$; P = 0.547), and between system quality and user satisfaction ($p < 0.05$; P = 0.433). Research results also shows that there is a positive and not-so-significant between system quality and usage frequency ($p > 0.05$; P = 0.085), and that there is a negative and not-so-significant impact between usage frequency and user satisfaction ($p > 0.05$; P =-0.103).

Table 7. Direct Effect(s) Hypothetical Testing Results

Exogenic	Endogenic	Direct Coefficient	T Statistics	P Values
Service Quality	Usage Frequency	0.353	2.469	0.015
System Quality	Usage Frequency	0.085	0.593	0.555
Service Quality	User satisfaction	0.547	7.068	0.000
System Quality	User satisfaction	0.433	5.762	0.000
Usage Frequency	User satisfaction	-0.103	-1.893	0.062

The testing criteria with the Sobel Test stated that if the | t statistics | > | t table | (1.96) then it will be considered that there is a significant influence of exogenic variables toward endogenic ones through intervening variables. Results of indirect effect(s) hypothetical testing is summarized in the following table:

Table 8. Indirect Effect(s) Hypothetical Testing Results

Exogenic	Intervening	Endogenic	Indirect Coefficien t	SE	T statistic s
Service Quality	Usage Frequency	User satisfaction	-0.036	0.025	-1.458
System Quality	Usage Frequency	User satisfaction	-0.009	0.020	-0.448

Statistical tests reveal that usage frequency does not mediate service quality with regards to user satisfaction (t-stat < 1.96) nor does it mediate system quality towards user satisfaction (t-stat < 1.96).

Path Analysis

Path analysis in Illustration 1 shows impacts of variables service quality and system quality towards user satisfaction, and also service quality with regards to usage frequency. Traffic results show that system quality is unrelated to usage frequency, as well as usage frequency towards user satisfaction.
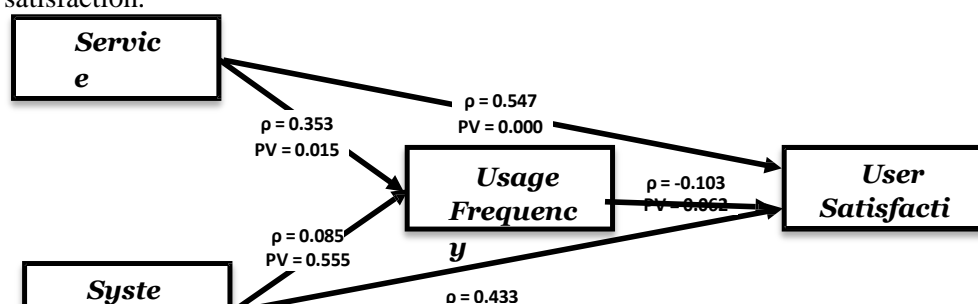
Gambar 1. Path Analysis

4.   **Discussion**

Service Quality Dimension Analysis

The Responsiveness value is below the average of service quality because the service provider(s) could only deliver online registration platforms to android users, whereas potential users with no android devices have yet to use said platform. Responsiveness affects the rate of user revisit as well as satisfaction (Hamid et al., 2020; Andrayani and Solekah, 2021). In the Assurance dimension, about 20.8% users doubt the capability of online registration platforms to help shorten their waiting time. The study had revealed that the increase in waiting time had resulted in negative impacts toward customer satisfaction (Oche and Adamu, 2013).

System Quality Dimension Analysis

There are two dimensions with the average value below that of system quality, these being the 'ease-to- learn' dimension with the value of 4.09 and the reliability dimension with the value of 3.7. Easy-to-learn systems information generates comfort towards its users (Astuti et al., 2022). This

comfort is needed to increase user retention and engagement towards the digital product (Wiwesa, 2021). Failure during the login process to the platform is the common problem faced by users, resulting in low feedback in the reliability dimension in the aspect of system quality. Dissatisfaction might ensue if a product has lower performance levels than customer expectations (Maulana, 2016).

User Satisfaction Dimension Analysis

The platform in its present state is not yet capable of providing information to patients in realtime when there were reschedulings of doctors. At the moment, that rescheduling alert is performed manually via WhatsApp messaging. A research performed at a private clinic expresses patient disappointment for the lack of notice with regards to cancellations or delay of their doctors' schedules (Nurhadi and Sartana, 2019).

Effects of System Quality towards Usage Frequency

Analysis results show that system quality has no particular effects toward usage frequency. A user could be expected to use an information system because he/she realizes the benefits reaped, without consideration to the satisfaction aspect from using said information system (Hong et al., 2011). Online registration system could aid a potential patient to obtain a queueing number without having to arrive to the hospital (Masniah, 2015). This could be one of the motivations of patients continuing to use online registration platforms; namely, because they shall not need to come to the hospital, regardless of the system's quality.

Effects of Service Quality towards Usage Frequency

Analysis results show that service quality has positive and significant effects to usage frequency. More users accessing the platform suited to their needs and interactively communicating with them, in whatever time or place, would correspondingly increase their usage frequency. Moreover, said users would then start encouraging others to use the platform (Ameen et al., 2019).

Effects of Service Quality towards User Satisfaction

Analysis results show that service quality has positively-significant impacts on user satisfaction. A positive result indicates that the better the service quality is, so would user satisfaction correspondingly increase.

Higher service quality levels also help to increase user satisfaction and serves as one of the motivations to continue using the product on more advanced levels (Alzahrani et al., 2017). Conversely, the worse the service quality gets, user satisfaction would get correspondingly lower. A company capable of providing higher service qualities has better chances to be revisited by customers (Desiyanti et al., 2018).

Effects of System Quality towards User Satisfaction

Analysis results show that system quality has positively-significant effects to user satisfaction. Positive results indicate that the better the system quality aspect gets, the better user satisfaction shall get. Another research provides similar results, namely, that the quality of information systems has an impact of user satisfaction (Robo et al., 2018).

A research performed by McGill et al titled User Depploped Aplication (UDA) in Australia stated empirically that system quality is a significant predictor towards customer satisfaction (Susilowati, 2020). The success of any information system is affected by system quality directly felt by users. User satisfaction, therefore, is an important predictor towards the intention to use any platform (Nuryanti et al., 2021).

Effects of Usage Frequency towards User Satisfaction

This research showed that usage frequency does not have any effect towards user satisfaction. This is in direct contrast from a research by Horvat et al. (2015) to students frequently using the LMS (Learning Management System) application that claimed to have found higher satisfaction levels in students with more frequent usage of LMS. This research provided different results due to the users' realization of the benefits of the information system s/he is using; therefore they continue using it without really paying attention to the satisfaction level (Hong et al., 2011). A previous research performed by Masniah (2015) on a different hospital found out that patient registration through online

platforms could aid potential patients in obtaining queue numbers without having to arrive at the hospital.

Effects of Service Quality towards User Satisfaction via Usage Frequency

Data shows that usage frequency is unrelated to user satisfaction ($p > 0.05$) and has a negative one ($P = -0.103$) meaning that, the more a platform gets used, the lower the satisfaction from using it gets. These results differed from Cheok and Wong's theory that the usage frequency, implied or actual, could serve to mediate the quality and user satisfaction (Koh and Kan, 2020). These results, however, are in accordance with the research performed by Bikson and Gutek with the conclusion that there was no significant relation between usage frequency and the level of user satisfaction. Udo also stated that more frequent system usage means lower user satisfaction; meaning that usage frequency has negative effects on user satisfaction (Bukhari, 2005).

Effects of System Quality towards User Satisfaction via Usage Frequency

Research showed that usage frequency does not mediate the influence of system quality in relation to user satisfaction. This is in direct contrast with the results of a previous research stating that Usage frequency could mediate the relations of system quality with user satisfaction (Koh and Kan, 2020). Such results also contradicts an earlier research stating that there is an increase of usage frequency of mobile business intelligence (BI) system in mobile BI with good system quality (Peters, 2016).

Implications of Research Results

Based on the data obtained, the implications that could be applied by "X" Hospital in Malang are as follows:

Developments of non-android systems. A study suggests the development of various new technologies such as telehealth via email, video, and other such technologies could also serve to increase patients' satisfaction and comfort levels (Grube et al, 2016).

Realtime queuing features to help reduce tardiness.

Increasing the comfort level through the introduction of UX (User Experience) (Wiwesa, 2021)

The inclusion of Chatbot features so that users could communicate with software in order to increase engagement levels (Zumstein and Hundertmark, 2017). This is also a measure to anticipate login failures.

Rescheduling of doctors via the formation of electronic customer treatments and management features (E-CRM) to anticipate changes in doctors' schedules (Nurhadi and Sartana 2019).

5.   Conclusions and Feedback

Research showed that there are significantly positive influences between service quality and system quality towards user satisfaction, as well as service quality with regards to usage frequency. Another conclusion is that usage frequency does not mediate the level of service quality and system quality with regards to user satisfaction. Providers of online registration platforms need to take into consideration online queuing services in order to ease and increase the comfort for outpatients of the Specialist Polyclinic. Further research is also needed with regards to other factors capable of affecting satisfaction levels; information quality could be considered as one variable to find out its effects in relation to user satisfaction. Furthermore, the addition
of more samples could be considered.

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