

Perceived Usefulness and Ease of Use on Behavioral Intention to Use Electronic Signatures at a Dental Hospital

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Abstract. The adoption of electronic signatures (e-signatures) is a key component of digital transformation in healthcare services, aiming to improve administrative efficiency and data security. This study investigates the impact of Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) on the Behavioral Intention to Use (BIU) e-signatures at the Dental Hospital of Universitas Muhammadiyah Semarang, using the Technology Acceptance Model (TAM). A cross-sectional quantitative method was applied, involving 30 staff selected through purposive sampling. Data were collected via questionnaires and analyzed using multiple linear regression. Results showed that both PU and PEOU significantly influenced BIU ($p < 0.001$), with a combined explanatory power of 62.7%. PU ($\beta = 0.617$) was the most dominant factor, indicating that perceived practical benefits are the main driver of adoption. PEOU ($\beta = 0.310$) also had a significant effect, highlighting the importance of system simplicity and usability. The study concludes that successful implementation of e-signatures depends largely on user perception. Emphasizing the functional advantages of the system and providing a user-friendly interface with adequate support and training are essential steps. These findings serve as a reference for broader digital technology adoption in healthcare, reinforcing that user acceptance is critical to the success of digital transformation initiatives.

Keyword: electronic signature, perceived usefulness, perceived ease of use, behavioral intention to use

1 Introduction

Digital transformation has emerged as a key driving force in the modernization of the healthcare sector worldwide. Healthcare facilities are encouraged to transition from conventional paper-based systems to digital systems in order to address various fundamental weaknesses. Traditional handwritten medical documentation, for instance, has been shown to possess numerous shortcomings, such as illegible handwriting that may lead to medical errors¹. In addition, paper-based medical records are inherently vulnerable to loss or physical deterioration, potentially compromising the continuity and quality of patient care².

The implementation of electronic health information systems particularly digital medical records presents an effective means of addressing these issues. A growing body of research consistently indicates that such systems substantially improve both the accuracy and comprehensiveness of healthcare data². The shift toward digital systems has been shown to enhance clinical workflow efficiency by ensuring improved accessibility and structured organization of data³. Electronic medical records are required to contain entries that comply with the principles of traceability, completeness, and data transparency, supported by metadata elements—such as electronic signatures or system based verification as authentication tools⁴.

The implementation of Electronic Signatures (ES) represents a pivotal innovation in efforts to improve administrative efficiency, accelerate bureaucratic procedures, and reinforce the legal validity of healthcare services. However, the adoption process continues to encounter various obstacles, particularly the limited engagement and utilization among patients and their families⁵. Beyond merely replacing conventional handwritten signatures, this technology operates as a digital authentication framework engineered to uphold the three fundamental pillars of information security: data integrity, authenticity, and non-repudiation⁶. From a technical perspective, modern

digital signature schemes have proven to be highly efficient and characterized by low computational overhead, thereby imposing minimal burden on system infrastructure⁷. The implementation of digital signatures serves as a solution to strengthen security, minimize the risk of forgery, and enhance trust in the system⁸.

Although Electronic Signatures (ES) offer clear technical advantages, their successful implementation within hospital environments does not occur automatically. The key determinant of successful technology adoption lies in the level of acceptance among end users—namely, hospital staff and healthcare professionals. Negative perceptions or difficulties in system usage can serve as major barriers, preventing advanced technologies from being utilized to their full potential. Therefore, human factors such as perception, attitude, and behavioral intention play a central role in determining the success of any new technology³. The government must strengthen training programs, infrastructure, and technical support to promote broader adoption of digital signatures⁹.

In analyzing the phenomenon of technology acceptance, the Technology Acceptance Model (TAM) serves as the most relevant theoretical framework. This model specifically explains that an individual's intention to use a technology (Behavioral Intention to Use) is strongly influenced by two primary perceptions: perceived usefulness and perceived ease of use¹⁰. Several advantages of the Technology Acceptance Model (TAM) in the context of electronic medical records include its ability to measure user acceptance, understand user attitudes and behaviors, provide insights into users' perceptions of electronic medical record implementation, and identify issues that may arise during the implementation process¹¹.

The Dental and Oral Hospital (RSGM) of Universitas Muhammadiyah Semarang (Unimus) is one of the healthcare facilities that has begun implementing Electronic Signatures (ES) in its service processes. However, the adoption of this technology has not been without challenges. Preliminary observations revealed that the implementation of the ES policy still faces several obstacles, including uneven communication, limited resource support such as insufficient training, and doubts among staff members regarding the legal validity of ES. These findings indicate a potential gap between policy formulation and actual technology acceptance at the user level. In light of these observations, this study aims to analyze the factors influencing ES acceptance directly from employees' perspectives by examining the effects of Perceived Usefulness and Perceived Ease of Use on Behavioral Intention to Use.

2 Methods

This study employed a quantitative approach with a cross-sectional design. Data collection was conducted at the Dental and Oral Hospital (RSGM) of Universitas Muhammadiyah Semarang. The study population consisted of all employees at RSGM Universitas Muhammadiyah Semarang who are the intended users of the electronic signature system. Sampling was carried out using a purposive sampling technique, with inclusion criteria established to ensure that respondents were relevant to the study's objectives specifically, those directly involved in workflows utilizing electronic signatures. Based on this technique, a total of 30 respondents were obtained.

The variables measured in this study are based on the framework of the Technology Acceptance Model (TAM). Two independent variables were examined: Perceived Usefulness and Perceived Ease of Use. The dependent variable in this study is Behavioral Intention to Use the electronic signature system. Primary data were collected through the distribution of a structured questionnaire employing a Likert scale to assess respondents' perceptions and intentions.

The collected data were analyzed using statistical software. The analysis was conducted in three main stages: univariate analysis to describe respondents' demographic characteristics and the distribution of each research variable; bivariate analysis to examine the relationships between each independent variable and the dependent variable; and multivariate analysis using multiple linear regression. The multiple linear regression test was employed to analyze the simultaneous effects of Perceived Usefulness and Perceived Ease of Use on Behavioral Intention to Use, thereby providing a comprehensive answer to the main objectives of the study.

3 Results And Discussion

3.1 Respondent Characteristics

This study employed a quantitative approach involving 30 employees of RSGM Unimus, selected using a purposive sampling technique. The demographic analysis presented in Table 1 indicates that the majority of respondents were female (19 respondents or 63.3%), while 11 respondents (36.7%) were male. The respondents' job positions were diverse, including General Nurses (23.3%), General Dentists (20.0%), and other professional roles, suggesting that the use of electronic signatures (ES) extends across various professions within the hospital environment. The respondents had an average work experience of 4.35 years, indicating that the staff possessed sufficient experience to provide informed assessments of new technology implementation.

Table 1. Respondent Characteristics

Variables	N = 30	%
Sex		
Male	8	26.7
Female	22	73.3
Job Position		
Specialist Doctor	9	30
General Dentist	6	20
General Practitioner	2	6.7
Anesthesia Nurse	2	6.7
Dental Nurse	5	16.7
General Nurse	5	16.7
Surgical Nurse	1	3.3
Length of Employment		
1 – 5 years	28	93.3
6 – 10 years	2	6.7
Use of Electronic Signature (ES)		
Yes	30	100
No	0	0
Total	30	100

Based on Table 1, the majority of respondents in this study were female, accounting for 73.3% of the total sample. The distribution of job positions indicates a heterogeneous composition of professional roles within the hospital, with the largest proportion being Specialist Doctors (30%), followed by General Dentists (20%). The nursing group was also well represented, consisting of Dental Nurses (16.7%) and General Nurses (16.7%). This composition is particularly relevant as it reflects the diversity of users interacting with the Electronic Signature (ES) system—ranging from medical professionals with significant clinical and legal responsibilities to nursing staff primarily involved in day-to-day operational workflows.

3.2 Descriptive Statistics of Variables

After the composite data were calculated, a descriptive analysis was conducted on the three core variables of the TAM model: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Behavioral Intention to Use (BIU). These statistics provide an initial overview of the central

tendency (mean perception) and variability (dispersion of perception) among respondents. The results are presented in the following table.

Table 2. Descriptive Statistics

	N	Minimum	Maksimum	Mean	Std. Deviation
Perceived Usefulness (PU)	30	2.50	4.00	3.33	.39
Perceived Ease of Use (PEOU)	30	2.29	4.00	3.16	.43
Behavioral Intention to Use (BIU)	30	2.57	4.00	3.39	.39
Valid N (listwise)	30				

As shown in Table 2, the mean scores for all three variables tend to be relatively high. The average score for Behavioral Intention to Use (BIU) is 3.39 (on a maximum scale of 4), indicating that, in general, employees at RSGM Unimus demonstrate a strong intention to use the Electronic Signature (ES) system. This finding suggests an overall positive initial acceptance of the technology.

The mean score for Perceived Usefulness (PU) is 3.33, while Perceived Ease of Use (PEOU) recorded a mean of 3.16. Both values are above the midpoint of the scale, indicating that respondents collectively perceive the Electronic Signature (ES) system as both useful and relatively easy to use. The relatively small standard deviations for the three variables (ranging from 0.39 to 0.43) suggest that respondents' perceptions are fairly homogeneous, with no extreme differences in opinion. The range of values (minimum and maximum) demonstrates that respondents utilized most of the available scale points, indicating sufficient variability for subsequent correlation and regression analyses. This initial overview serves as an important foundation, showing that the study not only examines whether ES is accepted but also seeks to explain the underlying factors that shape the already positive intention to use the technology.

3.3 Bivariate Analysis

Bivariate analysis was conducted to test the preliminary hypotheses regarding the relationships among the variables within the Technology Acceptance Model (TAM). Using Pearson's correlation test, this section quantitatively measures the strength and direction of the linear relationships between the independent variables (Perceived Usefulness and Perceived Ease of Use) and the dependent variable (Behavioral Intention to Use). This analysis is also essential for examining the interrelationship between the two independent variables themselves, providing insights into the internal dynamics of the model and identifying potential multicollinearity issues in subsequent regression analysis.

The Pearson correlation test produces a correlation coefficient (r) ranging from -1 to $+1$, where values closer to $+1$ indicate a strong positive relationship, values closer to -1 indicate a strong negative relationship, and values near 0 suggest no linear relationship. The level of significance (p -value) is used to determine whether the observed correlation is likely due to chance or represents a genuine relationship within the population. The complete correlation matrix among the variables is presented in the following table.

Table 3. Correlations

		Perceived Usefulness (PU)	Perceived Ease of Use (PEOU)	Behavioral Intention to Use (BIU)
Perceived Usefulness (PU)	Pearson Correlation	1	.686**	.737**
	Sig. (2-tailed)		.000	.000
	N	30	30	30
Perceived Ease of Use (PEOU)	Pearson Correlation	.686**	1	.690**
	Sig. (2-tailed)	.000		.000
	N	30	30	30

Behavioral Intention to Use (BIU)	Pearson Correlation	.737**	.690**	1
	Sig. (2-tailed)	.000	.000	
	N	30	30	30
*. Correlation is significant at the 0.01 level (2-tailed).				

As summarized in Table 3, the correlation analysis demonstrates robust and statistically significant associations among all variables, reinforcing the conceptual foundation of the Technology Acceptance Model (TAM).

The correlation between Perceived Usefulness (PU) and Behavioral Intention to Use (BIU) was notably strong and positive ($r = 0.737$, $p < 0.001$), suggesting that employees who perceive the Electronic Signature (ES) system as useful are more inclined to integrate it into their work routines. Similarly, Perceived Ease of Use (PEOU) was strongly and significantly correlated with BIU ($r = 0.690$, $p < 0.001$), highlighting the importance of system usability in shaping user adoption behavior.

In addition, a substantial positive correlation was observed between PEOU and PU ($r = 0.686$, $p < 0.001$). This relationship is theoretically meaningful, as ease of use often enhances perceived usefulness within the TAM framework. Importantly, while the correlation values are high, they remain below the critical threshold ($r > 0.8$), indicating that multicollinearity is unlikely to pose a serious issue in the subsequent regression analysis.

3.4 Multivariate Analysis

This multivariate analysis aims to construct a predictive model that explains the extent to which variations in the intention to use the Electronic Signature (TTE) system can be attributed to the two perceptual factors. Moreover, the analysis allows for a comparison of the relative strength of each predictor, thereby identifying which factor exerts a more dominant influence within the context of RSGM Unimus.

A multiple linear regression model was employed with Behavioral Intention to Use (BIU) as the dependent variable and Perceived Usefulness (PU) along with Perceived Ease of Use (PEOU) as the independent variables. The complete results of this analysis are presented in the following tables, which include the model summary, the model significance test (ANOVA), and the detailed coefficients for each predictor.

Table 4. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.792a	.627	.600	.249
a. Predictors: (Constant), Perceived Ease of Use (PEOU), Perceived Usefulness (PU)				

Table 5. Anova

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	2.868	2	1.434	23.097	.000b
	Residual	1.676	27	.062		
	Total	4.544	29			
a. Dependent Variable: Behavioral Intention to Use (BIU)						
b. Predictors: (Constant), Perceived Ease of Use (PEOU), Perceived Usefulness (PU)						

Table 6. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.382	.321		1.189	.245
	Perceived Usefulness (PU)	.675	.144	.617	4.678	.000
	Perceived Ease of Use (PEOU)	.313	.133	.310	2.349	.026
<i>a. Dependent Variable: Behavioral Intention to Use (BIU)</i>						

The relative strength of the two predictors is best compared using the Standardized Coefficients (Beta). The Beta coefficient for Perceived Usefulness (PU) ($\beta = 0.617$) is substantially higher than that for Perceived Ease of Use (PEOU) ($\beta = 0.310$). In fact, the effect of PU is more than twice as strong as that of PEOU in predicting the intention to use the technology.

3.5 Perceived Usefulness

The most prominent finding of this study is the dominant role of Perceived Usefulness as a predictor of the intention to use the Electronic Signature (ES) system. The data clearly indicate that the primary motivation of RSGM Unimus staff to adopt this technology lies in their belief that ES provides tangible benefits to their work. This perception stems from the evident contrast between the efficiency of digital systems and the fundamental weaknesses of traditional paper-based processes. Historically, clinical environments have struggled with issues such as illegible handwriting and the resulting risk of medical errors¹, as well as issues of data completeness and accuracy². As part of the broader digital ecosystem, the Electronic Signature (ES) is perceived as a direct solution to these long-standing issues. This perception is reinforced by the successful adoption of electronic signatures in various contexts, which demonstrates high levels of user acceptance once their practical benefits become evident¹². However, one aspect that remains suboptimal is the legal implementation, as specific regulations governing electronic signatures have not yet been fully established¹³.

This perceived effectiveness is not limited to internal workflow processes. A secure digital system is also essential for maintaining patient trust and ensuring compliance with regulatory requirements¹⁴. Staff members recognize that the use of the Electronic Signature (ES) enhances the integrity and security of medical records a crucial function supported by modern encryption technologies such as algorithm-based security mechanisms⁷. Thus, Perceived Usefulness encompasses not only personal efficiency but also the broader contribution to the overall quality and security of healthcare services, aligning with the objectives of health system reform initiatives in various countries¹.

3.6 Perceived Ease of Use

Although not as dominant as Perceived Usefulness, Perceived Ease of Use remains a highly significant factor. Regardless of its usefulness, a technology will not be adopted if it is perceived as overly complex. The data indicate that RSGM Unimus staff generally find the Electronic Signature (ES) system easy to use. This perception can be attributed to two main factors. First, the user interface (UI/UX) design of modern technologies has become increasingly intuitive. Second, the computational efficiency of contemporary digital signature algorithms minimizes system load, allowing the process to feel fast and responsive⁸.

These findings underscore the importance of human factors in technology implementation. Resistance to change often arises from the fear of having to cope with learning difficulties¹⁵, Perceived Ease of Use acts as a mitigating factor against user resistance. The strong positive correlation between PEOU and PU observed in this study corroborates the core proposition of the Technology Acceptance Model (TAM): when users perceive a system as easy to use, they are more inclined to engage with it and, through continued interaction, discover its broader utility. This is especially pertinent in healthcare contexts, where practitioners often operate under high workloads and time constraints that limit opportunities for system familiarization. As demonstrated in prior studies on information system adoption, successful implementation frequently hinges on interface simplicity and the availability of comprehensive training and technical support¹². A lack of perceived ease of use can become a barrier to adoption, even for well-designed systems¹. Furthermore, legal uncertainty is exacerbated by the use of uncertified Electronic Signatures (ES), which means that the authenticity and validity of documents cannot yet be fully guaranteed¹⁶.

The findings of this study offer valuable insights for digital transformation within the healthcare sector more broadly. The success of technological implementation extends beyond the mere acquisition of software or hardware it fundamentally depends on effective change management centered on human factors. Although this research specifically focuses on Electronic Signatures (ES), its implications can be extrapolated to the adoption of other digital health technologies, such as telemedicine or laboratory information systems. Evidence from successful e-health programs in other countries further reinforces that user acceptance remains the critical determinant of success, often surpassing technical or financial challenges¹⁵. Revealed that individual or personal determinants constitute the primary factors influencing the adoption and utilization of electronic health records¹⁷.

This study emphasizes that promoting technology adoption within healthcare settings requires a dual-pronged strategy. First, the value and benefits of the technology must be clearly communicated; second, the system must be intuitive and well-supported. By understanding and acting upon these two pillars, healthcare institutions can accelerate their digital transformation journey, ultimately enhancing the quality, efficiency, and security of patient care.

4 Conclusion

This study conclusively demonstrates that *Perceived Usefulness* and *Perceived Ease of Use* are significant and positive determinants influencing employees' behavioral intentions to adopt electronic signatures at the Dental and Oral Hospital of Universitas Muhammadiyah Semarang (RSGM Unimus). The findings highlight that the perceived usefulness of the technology serves as the most dominant driver, as employees' belief in the system's ability to enhance efficiency and work productivity constitutes the main reason for its acceptance. Furthermore, the perception that the system is easy to operate plays a crucial supporting role, emphasizing that ease of use is an essential prerequisite for the successful implementation of new technologies in clinical settings. Therefore, it can be concluded that the adoption of electronic signatures largely depends on the combination of their functional benefits and the accessibility they provide to end users.

These findings carry clear managerial implications. To ensure the successful implementation and long-term sustainability of the Electronic Signature (ES) system, the management of RSGM Unimus is advised to: (1) actively promote and demonstrate the tangible benefits of ES in improving daily work efficiency to strengthen *Perceived Usefulness*; and (2) ensure that the ES system features a user-friendly interface, provides adequate training, and offers responsive technical support to enhance *Perceived Ease of Use*, particularly in light of existing gaps in staff understanding.

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