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The Drivers of a Digital Signature System Adoption: Evidence from Finance and Information System Departments

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Abstract

Background: With the massive e-commerce transactions and document transfers, reliable system protection is needed. A digital signature is a tool that consists of encryption and decryption algorithms in a secret key to prevent data theft and online fraud.
Objective: This research proposes an integrated technology-organization-environment (TOE) and the unified theory of acceptance and use of technology (UTAUT) to determine the factors affecting consumer intention to adopt the digital signature system. This research uses finance and information system departments' perspectives in various industries.
Methods: The analytical method is the Structural Equation Modeling (SEM) approach using the Smart Partial Least Square statistical version 3.0 software to examine the hypothesized connections between latent variables.
Results: The results show that support from top management, size of the enterprise, and social influence have significant and positive effects on digital signature adoption. Meanwhile, user involvement and perceived simplicity have a negative effect on the adoption of a digital signature system in finance and information system departments.
Conclusion: The current research suggests that executive levels in the finance and information system departments encourage the adoption of digital signature tools in doing daily tasks to increase efficiency.

Keywords: Digital signature, consumer intention, finance and information system, structural equation modeling, TOE and UTAUT

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I. INTRODUCTION

Data theft and document forgery in online transactions remain issues that affect consumer behaviors. Technological developments and globalization are changing the information and communication technology (ICT) industry's landscape [1]. Many fraud issues have been observed in the ICT industry related to data originality, such as spam and phishing. Message authentication techniques are developing rapidly to respond to the situation. Electronic payment systems and digital currency technology are currently the norms for online transactions [2].

With physical payments decreasing, the nominal value of e-commerce transactions is estimated to reach IDR 266.3 trillion in 2020, increasing 29.6% from 2019 [3]. With the increasing e-commerce transactions, digital payment transactions also quickly increased. The volume of electronic money (EM) in e-commerce transactions in the fourth quarter of 2020 reached 41.71%, exceeding the demand for bank transfers and cash transactions, that only reached around 20.23% and 19.01%, respectively [3]. From the first quarter of 2019 until the third quarter of 2020, the use of EM in e-commerce transactions continuously increased.

System protection is needed to prevent online fraud. According to Iskandar and Istaningsih [4], security protection is essential to prevent cybercrimes, such as fraud, credit card hijacking (carding), illegal transfer of funds, and many others. Indonesian Internet users have grown to more than 202.6 million, or 74.7% of the total population. However, the security is low, with the occurrence of cybercrimes reaching approximately 495.3 million in 2020 (41.4% increase from 2019) [5], ranking the first globally. Nugroho et al. [6] stated that electronic transactions need document confidentiality and legality. The Government of the Republic of Indonesia issued Law No. 11 of 2008, which regulates electronic information systems and the legalization of electronic transactions, including digital signature implementation.

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A digital signature system is an electronic form of cryptography used to authenticate an originated digital document, integrate a document, and ensure the signer's identity through encryption and decryption algorithms to protect the document [7]. According to Kaur and Kaur [8], a digital signature is an authentication mechanism created by encrypting the hash in a message with the user's private key. Zhang et al. [9] claimed that a digital signature has a few advantages, (1) increasing transaction speed, (2) reducing operational costs, (3) increasing security, (4) protection by official laws, (5) non-repudiation, (6) preventing document forgery, and (7) accurate time stamp. However, a digital signature also has disadvantages, such as the legalization of digital signature adoption because some countries may not have the law that regulates it yet. The needs for high technological compatibility, regular training, and security systems are other concerns. The digital signature applications in the finance department include the use in a contract, customer credit, and Automatic Teller Machine (ATM) verification [10]. The applications of digital signatures in the information system department include password authentication, opening new online bank accounts, and mobile banking applications for transactions [10].

The use of digital signatures can integrate the information system and finance departments, especially in business transactions [11], where a hand-written signature can be replaced with an 'online' one [11]. Fang et al. [12] stated that the digital signature system serves as a technical basis for all digital transactions and extends the system developments and applications in finance and trade. Therefore, adopting the digital signature in the finance and information system departments is vital in increasing security systems and achieving sustainable business.

According to Chang et al. [13], in their study using TOE as a model, the e-signature adoption barrier among executives at a hospital information department in Taiwan was the gap in the hospital technology. As many as 70% of research hospitals in Taiwan are delaying their adoption of e-signature due to delays in computerized medical records development. According to Aydin et al. [14], a factor affecting the adoption in Turkey was the perceived usefulness. Using the technology acceptance model (TAM) revealed that perceived usefulness has a significant positive effect on attitude while perceived ease of use does not significantly affect attitudes. In South Korea, Chong et al. [15], showed that the significant adoption driver was the cloud-based technology. Using TAM and TOE, the researchers concluded that consumers' expectations for service preparation would decline if the organization is not supported by a cloud-based service.

In this study, we propose a model by integrating the TOE and UTAUT models, adopting from [16], [17], which claims that the TOE framework is not sufficient to analyze the consumer intention to adopt technology and needs to be integrated with other theories to obtain more accurate results. The proposed model captures four main drivers of decision-making. UTAUT captures the individual adopters' characteristics [18], so its integration with TOE is expected to capture performance expectancy and social influence [19].

The remainder discussion is organized as follows. Section 2 explains the conceptual framework. Section 3 presents the methodology, questionnaire design, and respondent demographic characteristics. Section 4 analyzes the survey results. Section 5 discusses the results, implications, limitations, and future suggestions. Section 6 concludes the paper.

II. Literature Review

A. Hypotheses Development and the Proposed Model

The research framework with the latent variables that influence consumers' decision in adopting digital signatures and the correlation is shown in Fig. 1.

In the proposed model, technology characteristics consist of security protection (SP), perceived compatibility (PC), perceived simplicity (PS), and performance expectancy (PE). Organization characteristics consist of user involvement (UI), top management support (TMS), and size of the enterprise (SE). Environment characteristics include vendor support (VS) and government support (GS). Individual characteristics consist of social influence (SI).

1. Security Protection

The initial determinant of digital signature adoption is security protection. Indonesia is ranked first as a cyber-attack destination with 495.3 million cyber-attacks from other countries, an increase of 41.4% from 2019 [5]. According to Chernyi et al. [20], signature forgery is common for document falsifications. Weak hashing algorithms in the digital signature systems may allow hacking and hijacking. Bellare and Miner [21] stated that encryption and decryption algorithms could protect digital signature security against exposure risks. The first hypothesis is as follows.

Hypothesis 1a (H1a): Security protection has a positive effect on influencing digital signature adoption in finance and information system departments.

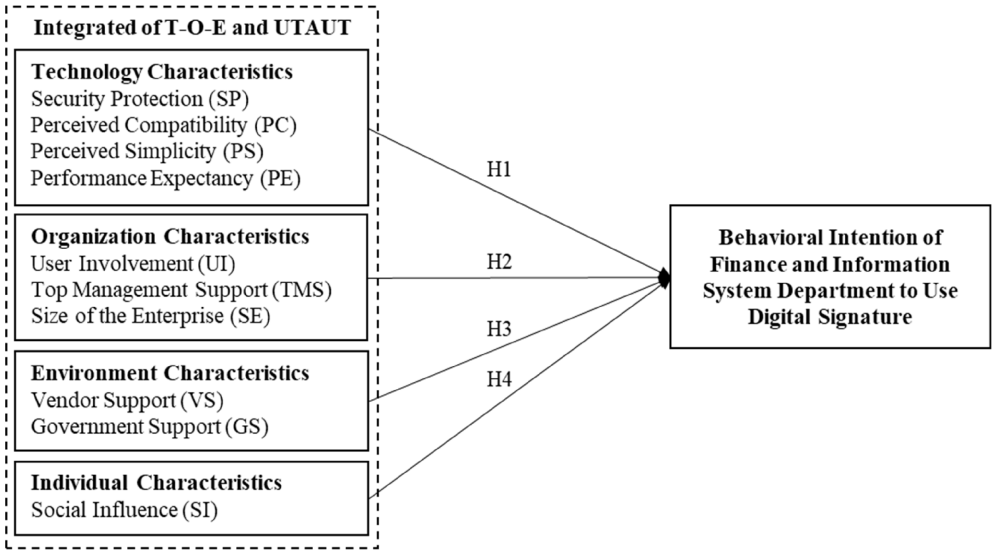

Fig. 1. The Conceptual Model

2. Perceived Compatibility

The second determinant is perceived compatibility. According to Landsbergen and Wolken [22], software, hardware, and telecommunication networks can be incompatible due to a lack of organizational experience, with information sharing in the inter-organization. Hossain and Quaddus [23] claimed that compatibility is a significant factor in technology adoption, such as EDI and ERP since these technologies are Internet-based development. Similarly, a digital signature system is also developed by Internet-based and cloud-based systems requiring integration with the existing systems. Awa et al. [24] stated that perceived compatibility with existing technology, infrastructures, work procedures, cultures, and norms within the organizations' systems can measure the adoption of digital signature tools. Fuller et al. [25] reported that the fit and integration between the existing and incoming technologies are significant drivers in technology adoption. The second hypothesis is as follows.

Hypothesis 1b (H1b): Perceived compatibility positively affects digital signature adoption in the finance and information system departments.

3. Perceived Simplicity

The third determinant is perceived simplicity. Simplicity is defined as a user-friendly product that has previously been designed, leading to usability [26]. Simplicity is expected to have a positive effect on perceived ease of use. According to Premkumar and Roberts [27], perceived simplicity could reduce risks and uncertainties. Lee et al. [26] stated that perceived simplicity is essential in technological service adoption. It reduces unnecessary functionality and complexity, especially the systems' structures, interfaces, and layout designs. Likewise, Khemthong and Roberts [28], stated that perceived simplicity is a critical factor in measuring the organizations' interest in adopting technology. The third hypothesis is as follows.

Hypothesis 1c (H1c): Perceived simplicity has a positive effect on digital signature adoption in finance and information system departments.

4. Performance Expectancy

The fourth determinant is performance expectancy—advantages that consumers gain when using technology systems or services [29]. According to Zhang et al. [9], digital signature adoption provides several advantages: increased transaction speeds, reduced operational costs, increased transaction security, legal protection, non-repudiation, forgery prevention, and accurate time stamping. These advantages can affect consumers' intention to adopt a digital signature. Therefore, the fourth hypothesis is as follows.

Hypothesis 1d (H1d): Performance expectancy has a positive effect on digital signature adoption in the finance and information system departments.

5. User Involvement

The fifth determinant is user involvement. According to Olson and Ives [30], user involvement is defined as users' direct or indirect involvement in technology development. Grudin [31] found that interface and user involvement are often overlooked drivers in the decision-making process, and that direct user involvement in product development can bring a positive impact. The fifth hypothesis is as follows.

Hypothesis 2a (H2a): User involvement has a positive effect on digital signature adoption in finance and information system departments.

6. Top Management Support

The sixth determinant is top management support. Top managers guide and direct the organizational decisions, behaviors, and strategies for adopting technologies [32], so their support is a strong determinant of technology adoption [33]. Using the TOE framework, Chuang et al. [34] found that top management, enterprise expectation, and associated supports are critical factors technology adoption. The sixth hypothesis is as follows.

Hypothesis 2b (H2b): Top management support has a positive effect on digital signature adoption in finance and information system departments.

7. Size of the Enterprise

The seventh determinant is the enterprise's size. Large enterprises are more interested in adopting advanced technologies [35]. Jeyaraj et al. [33] claimed that the enterprises' size is a critical determinant because the bigger the size of the enterprise, the work, and the coordination between departments, the users' intention to adopt modern technologies increases. Meanwhile, Spinellis and Giannikas [36] claimed that smaller enterprises might not have enough resources or costs to invest in technology, such as a digital signature system. The seventh hypothesis is as follows.

Hypothesis 2c (H2c): Size of the enterprise has a positive effect on digital signature adoption in finance and information system departments.

8. Vendor Support

The eighth determinant is vendor support. According to Premkumar and Roberts [27], vendor support (i.e., non-profit organizations) is a significant predictor of ICT success and brings a positive effect on ICT adoption. Awa et al. [37] stated that most ICT platforms go beyond individual enterprises, especially in the business domain. It needs to integrate with e-trading systems linked to enterprises and their trading partners to provide enabled services for users. The eighth hypothesis is as follows.

Hypothesis 3a (H3a): Vendor support has a positive effect on digital signature adoption in finance and information system departments.

9. Government Support

The ninth determinant is government support. According to Lin and Ho [38], technology adoption could be encouraged or discouraged by government regulations. Government can support the technology adoption with provides financial incentives and training manpower with IT skills for more effective digital signature implementation in various industries. According to Ramanathan et al. [39], a higher level of government support can help firms increase technology adoption. Awa et al. [24] stated that the relevant government agencies should disseminate the policies or procedures that support small businesses (i.e., incentives, tax exemptions, subsidies, training, and seminar programs the government). This can encourage the investment in necessary technologies. The ninth hypothesis is as follows.

Hypothesis 3b (H3b): Government support has a positive effect on digital signature adoption in finance and information system departments.

10. Social Influence

The tenth determinant is social influence—the psychological motivation of behaviors through other peoples' opinions, peer groups' opinions, and superiors' effects [40]. People may to the group norms, even in opposition to their feelings. Innovative individuals have a high level of social participation and social mobility to obtain positive attitudes toward adopting technology [41]. The tenth and final hypothesis is as follows.

Hypothesis 4a (H4a): Social influence has a positive effect on digital signature adoption in finance and information system departments.

III. METHODS

A. Determine Measurement Items

This research includes the assessment of latent variables, namely security protection (SP), perceived compatibility (PC), perceived simplicity (PS), performance expectancy (PE), user involvement (UI), top management support (TMS), size of the enterprise (SE), vendor support (VS), government support (GS), social influence (SI), and behavioral intention in using a digital signature in finance and information system departments. These latent variables cannot be measured directly, thus, the measurement was from the measurement result of each variable.

B. Instrument Development

The questionnaire in this study consists of three sections. The first section consists of brief descriptions of the study objective and a digital signature system. The second section consists of six questions to determine the demographic of respondents' characteristics, including the industry sector, the company's year of establishment, work area, employee number, occupation, and frequency of using digital signatures. The third section of the questionnaire consists of 43 questions that examine the factors involved in integrating the TOE and UTAUT models. The measurement scale in this online questionnaire uses a five-point Likert scale. Based on the guidelines provided in the first part, the respondents were directed to answer each question by utilizing a five-point rating scale. The scale of 1 represents 'strongly disagree,' and the scale of 5 represents 'strongly agree'.

A five-point scale was based on the midpoint as a dumping ground when respondents answered the survey items. The midpoint is used when the respondents do not know the answer or the ambiguous survey questions. Moreover, Chyung et al. [42] stated that a 4-point or 6-point rating scale with 'undecided' as a separate option from the scale could make the research results less accurate. The five-point Likert scale is a perfect measurement scale to measure individuals' attitudes. Placing the third point in the median value represents neutrality and is appropriate in parametric techniques [42].

TABLE 1
DESCRIPTIVE STATISTIC OF RESPONDENTS

Characteristics	Category	Frequency (n=100)	Proportion (%)
Industry Sector	Banking/Finance	26	26%
	Manufacturing	22	22%
	Marketing/Sales	14	14%
	Education	10	10%
	Healthcare	8	8%
	Others	20	20%
Company Established Year	Before 1960	5	5%
	1960 - 1980	16	16%
	1981 - 2000	40	40%
	2001 - 2010	25	25%
	After 2010	14	14%
Work Area	Finance division	52	52%
	IT division	43	43%
	Others	5	5%
Employee Number	Less than 20	19	19%
	21 - 50	22	22%
	51 - 100	17	17%
	101 - 200	18	18%
	More than 200	24	24%
Occupation	Director	12	12%
	Senior Manager	27	27%
	Manager	51	51%
	Others	10	10%
Frequency in Using Digital Signatures	Not Use Digital Signature	7	7%
	1 - 10 times per day	32	32%
	11 - 20 times per day	23	23%
	21 - 50 times per day	20	20%
	More than 50 times per day	18	18%

C. Demographics of Respondents

The online survey reveals the respondents' demographic characteristics. The descriptive statistics are presented in Table 1. Most respondents came from the banking/finance sector (26%), while the remainder came from different sectors, such as manufacturing (22%), marketing/sales (14%), education (10%), and healthcare (8%). Also, 20% of the respondents came from other sector industries, such as wholesalers, logistics, software, hardware development, consultant, construction, telecommunication, restaurant, and others.

Based on Table 1, most respondents reported that the daily frequency of using digital signatures during the COVID-19 pandemic is 1-10 times per day (32%). The remaining reported daily frequency of using digital signatures during COVID-19 was between 11 and 20 times (23%), between 21 and 50 times (20%), and more than 15 times (18%). Of the 100 participants who answered the questionnaire, 7% did not use a digital signature.

IV. RESULTS

A. Measurement Model Analysis

Before evaluating the outer model, confirmatory factor analysis was conducted through Cronbach's alpha, composite reliability (CR), and the average variance extracted (AVE). This confirms that the construct items in this study fit the research purpose. Cronbach's alpha should be more than 0.7 [43], composite reliability (CR) should exceed 0.8 [44], and the average variance extracted (AVE) should be at least 0.50 [45]. The results are shown in Table 2.

TABLE 2
CONFIRMATORY FACTOR ANALYSIS RESULTS

Construct	Cronbach's Alpha	Composite Reliability (CR)	AVE
SP	0.765	0.864	0.679
PC	0.835	0.901	0.752
PS	0.799	0.909	0.833
PE	0.792	0.878	0.707
UI	0.830	0.887	0.662
TMS	0.832	0.888	0.664
SE	0.739	0.834	0.657
VS	0.811	0.876	0.638
GS	0.798	0.856	0.598
SI	0.753	0.858	0.668
BI	0.860	0.905	0.704

B. Validity and Reliability Test

The discriminant validity results were satisfied when the correlation value between variables is greater than the correlation value of the latent variable, and other latent variables are shown in Table 3. The convergent validity was subsequently analyzed to obtain the valid indicators when the discriminant validity was secured.

TABLE 3
THE RESULTS OF DISCRIMINANT VALIDITY (FORNELL AND LARCKER CRITERION)

Construct	SP	PC	PS	PE	UI	TMS	SE	VS	GS	SI	BI
SP	0.839										
PC	0.571	0.773									
PS	0.696	0.511	0.867								
PE	0.552	0.482	0.748	0.912							
UI	0.611	0.525	0.590	0.519	0.841						
TMS	0.651	0.599	0.721	0.652	0.639	0.824					
SE	0.757	0.664	0.723	0.657	0.643	0.713	0.746				
VS	0.691	0.488	0.639	0.582	0.529	0.581	0.672	0.817			
GS	0.696	0.643	0.727	0.607	0.523	0.630	0.708	0.582	0.815		
SI	0.660	0.706	0.799	0.639	0.501	0.673	0.717	0.669	0.789	0.814	
BI	0.677	0.645	0.676	0.626	0.587	0.690	0.722	0.634	0.723	0.746	0.799

The convergent validity analyzes the factor loading values on each latent variable. All factor loading values should be at least 0.7 [46]. Each indicator tested in the structural model is a valid measuring tool. The initial 43 research indicators using the SmartPLS version 3.0 software showed that the 38 indicators are valid with factor loading values greater than 0.7, as shown in Table 4.

TABLE 4
THE RESULTS OF CONVERGENT VALIDITY

Code	Factor Loadings	Description
SP2 ← Security Protection	0.786	Valid
SP3 ← Security Protection	0.836	Valid
SP4 ← Security Protection	0.849	Valid
PC1 ← Perceived Compatibility	0.876	Valid
PC2 ← Perceived Compatibility	0.873	Valid
PC3 ← Perceived Compatibility	0.853	Valid
PS2 ← Perceived Simplicity	0.922	Valid
PS3 ← Perceived Simplicity	0.903	Valid
PE1 ← Performance Expectancy	0.843	Valid
PE2 ← Performance Expectancy	0.817	Valid
PE3 ← Performance Expectancy	0.861	Valid
UI1 ← User Involvement	0.780	Valid
UI2 ← User Involvement	0.849	Valid
UI3 ← User Involvement	0.817	Valid
UI4 ← User Involvement	0.808	Valid
TMS1 ← Top Management Support	0.795	Valid
TMS2 ← Top Management Support	0.836	Valid
TMS3 ← Top Management Support	0.837	Valid
TMS4 ← Top Management Support	0.790	Valid
SE1 ← Size of the Enterprise	0.704	Valid
SE2 ← Size of the Enterprise	0.813	Valid
SE3 ← Size of the Enterprise	0.705	Valid
SE4 ← Size of the Enterprise	0.759	Valid
VS1 ← Vendor Support	0.808	Valid
VS2 ← Vendor Support	0.835	Valid
VS3 ← Vendor Support	0.786	Valid
VS4 ← Vendor Support	0.766	Valid
GS1 ← Government Support	0.803	Valid
GS2 ← Government Support	0.753	Valid
GS3 ← Government Support	0.782	Valid
GS4 ← Government Support	0.755	Valid
SI2 ← Social Influence	0.844	Valid
SI3 ← Social Influence	0.778	Valid
SI4 ← Social Influence	0.829	Valid
BI1 ← Behavioral Intention	0.831	Valid
BI2 ← Behavioral Intention	0.827	Valid
BI3 ← Behavioral Intention	0.880	Valid
BI4 ← Behavioral Intention	0.818	Valid

C. Evaluation of Structural Model Analysis

The results of the R-squared and adjusted R-squared of the structural model are shown in Table 5. The effects of SP, PC, PS, PE, UI, TMS, SE, VS, GS, and SI on departments' behavioral intention in adopting a digital signature system in finance and information departments are 0.694 or 69%. This means that other variables not used in this study have a 31% effect on the adoption intention.

TABLE 5
THE RESULT OF R-SQUARED AND ADJUSTED R-SQUARED

Construct	R-Squared	Adjusted R-Squared
Behavioral Intention (BI)	0.694	0.660

The Partial Least Square (PLS) model uses a non-parametric test simulated with a bootstrapping method to confirm the path coefficients' significance in the structural model [45]. In this study, all hypotheses were tested based on the t-value (1.960) with a 5% level of significance ($p < 0.05$), and the path coefficients were tested through a bootstrapping method with a two-tailed test. The results of path analysis are shown in Table 6.

TABLE 6
THE RESULTS OF INNER MODEL TEST (PATH COEFFICIENT)

Research Hypothesis	Path	Original Sample (O)	Sample Mean (M)	Standard Deviation	T-Statistic	P-Value	Interpretation
H1a	SP → BI	0.052	0.051	0.126	0.411	0.681	Rejected
H1b	PC → BI	0.222	0.212	0.134	1.657	0.098	Rejected
H1c	PS → BI	-0.144	-0.154	0.107	1.347	0.179	Rejected
H1d	PE → BI	0.089	0.106	0.101	0.883	0.378	Rejected
H2a	UI → BI	-0.147	-0.142	0.129	1.138	0.255	Rejected
H2b	TMS → BI	0.217	0.215	0.121	2.218	0.047	Accepted
H2c	SE → BI	0.284	0.270	0.109	2.609	0.009	Accepted
H3a	VS → BI	0.081	0.092	0.131	0.616	0.538	Rejected
H3b	GS → BI	0.044	0.045	0.110	0.401	0.689	Rejected
H4a	SI → BI	0.264	0.265	0.103	2.571	0.010	Accepted

Table 6 shows that, in terms of organizational characteristics, top management support (TMS) has a significant impact, with a p-value of 0.047. The size of the enterprise (SE) has a significant impact, with a p-value of 0.009. On an individual level, social influence (SI) has a significant impact, with a p-value of 0.010. Therefore, top management support, size of the enterprise, and social influence are considered significant determinants of digital signature adoption in finance and information departments.

V. DISCUSSION

In this study, technology characteristics such as security protection (SP) have a positive relationship but no significant effect on consumers' behavioral intention (H1a: β=0.052, p=0.681). This result is the opposite of the study conducted by Khalilzadeh et al. [47], stating that security protection has a significant effect on consumers' adoption intention. Perceived compatibility (PC) has a positive relationship but no significant effect on consumers' adoption intention (H1b: β=0.222, p=0.098). This result contradicts the study conducted by Awa et al. [24], stating that compatibility has a positive relationship and a significant effect on technology adoption. Perceived simplicity (PS) has a negative relationship but no significant effect on consumers' behavioral intention (H1c: β=-0.144, p=0.179), which is the opposite of the study conducted by Awa et al. [24]. However, Ozgul [48] showed that simplicity has a negative influence on consumers' adoption intention because they think that it could be misused. As for performance expectancy (PE), it has a positive relationship but no significant effect on consumers behavioral intention (H1d: β=0.089, p=0.378), which is the opposite of a study by Awa et al. [24] and Indrawati and Putri [49]. Highly performing digital technology indicates usefulness in assisting customers in accomplishing efficiency [49].

One of the organization characteristics, user involvement (UI), has a negative relationship and no significant effect on consumers' behavioral intention (H2a: β=-0.147, p=0.255). This result aligns with Chang et al. [13], stating that user involvement has a negative impact but no significant effect on consumers' adoption intention. Tang et al. [50] stated that user involvement is more suitable for informing a new system design. Top management support (TMS) has a significant and positive relationship with adoption intention (H2b: β=0.217, p=0.047), in line with the study by Hsu et al. [51]. Therefore, managers can integrate the adoption agenda into their corporate strategy. Size of the enterprise (SE) has the largest positive relationship (H2c: β=0.284, p=0.009) and a significant effect on consumers' adoption intention, in line with Pan et al. [52] and Spinellis and Giannikas [36]. Large-scale enterprises are more inclined to adopt new technology, whereas small enterprises may not have enough resources to adopt a new system.

Environment characteristics such as vendor support (VS) have a positive relationship but no significant effect on influencing the adoption intention (H3a: β=0.081, p=0.538). This is the opposite of the study by Chang et al. [13], stating that vendor support is needed to solve any potential problems and integrate the digital signature system with the existing systems. Government support (GS) has a positive relationship but no significant effect (H3b: β=0.044, p=0.689), unlike the study by Chang et al. [13], stating that government supports such as financial aid and infrastructure supports digital signature adoption.

Individual characteristics such as social influence (SI) has a significant and positive impact on behavioral intention (H4a: β=0.264, p=0.010). This result is in line with a study by Park et al. [53], stating that social influence can influence the perceived benefit of technology adoption. Beldad and Hegner [54] also stated that social interaction could also enhance consumers' perceptions of the value-added of digital signature adoption.

A. Implications for Theory and Practice

The theoretical contribution of this study is the integration of two conceptual models: the TOE and UTAUT. The TOE approach was adopted by Awa et al. [19], and the UTAUT approach was developed by Venkatesh et al. [55]. Integrating two theories have captured the important aspects of the digital signature system's adoption in finance and technology departments. The significant positive impacts of TMS, SE, and SI in influencing the departments' intention to adopt a digital signature system had an important implication for the finance and information system departments. The integration of a digital technology, such as a digital signature, with existing systems in the finance and information system departments will continue to be adopted after the post-COVID-19 pandemic [56]. In this condition, top managers can guide the departments' decisions and behaviors as they can provide supportive climates and encourage the adoption by making it part of their corporate strategies [33].

B. Limitations and Future Research Directions

This study also has a few limitations. First, the outcomes are only applicable in Indonesia's finance and information system departments. They cannot be generalized to other departments, companies, or countries due to differences in political, social, environmental, technological, legal, and economic backgrounds. Therefore, future studies should conduct a correlation analysis of consumers' intention in adopting digital signatures in other departments (e.g., legal department, human resource department, logistic department, and others). Second, future research can see the adoption of digital signatures in other industries through sustainable business theories.

VI. CONCLUSIONS

The shift from conventional signatures to digital signatures can be accelerated to prevent document forgery in finance and information departments and reduce direct contact with other parties during a pandemic like COVID-19. Moreover, digital signatures can increase work productivity during work from home (WFH) implementation. Through integration of the TOE and UTAUT model, this study observes an acceptance of a digital signature system in the finance and information departments. The expanded model provides a more complete picture of the factors affecting digital signature adoption in finance and information system departments. Top management support (TMS), size of the enterprise (SE), and social influence (SI) are the drivers of digital signature adoption, with SE showing the highest significant effect and a positive relationship.

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