

Influencing of Perceived Usefulness and Perceived Ease of Use on User Satisfaction : Evidence from E-invoice Users

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Abstract

Electronic invoices are a part of the process of digitally transforming the national management system. User satisfaction is essential in assessing e-invoice and e-tax for tax authorities and government in the digital transformation context. This research investigates the effect of perceived ease of use and usefulness of e-invoices on user satisfaction. The research surveyed and collected 252 responses and used descriptive and the test of measurement quality and hypotheses. The research findings indicate that the perceived ease of use and perceived usefulness positively influence user satisfaction with the e-invoice system. The perceived ease of use is the most important factor in firms' satisfaction with e-invoice implementation. Based on the findings, the study proposes some recommendations for firms and state agencies to improve e-invoice implementation.

Keywords: *E-invoice, perceived usefulness, perceived ease of use, user satisfaction.*

1. Introduction

In this digital era, when information and communication systems are becoming widespread, cloud computing technology has become a significant milestone (Lian & Yen, 2014). In Southeast Asia, Vietnam recorded the strongest growth in cloud computing in 2022 (Nhat, 2023). Moreover, the application of technology is of great importance in achieving sustainable development for Vietnamese businesses (Tuan, Thanh, & Loc, 2018). Originating in Scandinavia, the e-invoice system is an example of a cloud-based e-government service (Lian, 2015).

In Vietnam, tax administration law 38/2019/QH14, effective from 1/7/2022, mandated electronic invoices for Vietnamese enterprises. E-invoice is useful for taxation authorities to gain effective administration since real-time information is transferred through the e-invoicing system, which enables tax authorities to enhance and automate compliance monitoring (Bellon, Dabla-Norris, Khalid, & Lima, 2022). E-invoicing offers substantial benefits for firms, including decreased cost, reduced delays, environmental protection, and greater transparency and reliability (Tiwari, Marak, Paul, & Deshpande, 2023).

Previous studies show different results regarding behavioral intention towards the e-invoicing system. Lian (2015), Bahari, Mus, and Mursalim (2020), Rachmi, Asta, and Kartiko (2023) found that the perception of system quality and information quality has direct significant impacts on e-invoicing user satisfaction. Meanwhile, an empirical study by Amalina and Suryani (2022) assessed the success of e-invoice, and the results showed that service quality, which is determined by ease of use, ease of learning, system features, and response time, is not related to user satisfaction and intention to use. Previous research in Vietnam, among others, focuses on investigating the determinants of e-invoice adoption; however, limited attention is paid to the factors affecting the effectiveness of the e-invoicing system.

2. Objectives

This study aims to address the correlation between perceived usefulness, perceived ease of use, and e-invoice user satisfaction based on the case of Vietnam. Regarding the roadmap of implementing e-invoices, all firms transferred from paper invoices to e-invoices in July 2022, and tax authorities need more evidence to enhance the quality of the e-invoice system. Thus, this research reinforces the effect of factors on user satisfaction under the combination of the Technical Acceptance Model (TAM) and the information system model. The remainder of the paper is organized as follows to address the research purpose. Section 2 reviews the existing literature and illustrates hypothesis development. Section 3 indicates the research

methodology/materials, and section 4 displays the results and discussion. Based on research findings, section 5 shows concluding remarks and recommendations.

3. Materials and Methods

3.1. Electronic invoice

The electronic invoicing (e-invoicing) concept is considered an effective, useful, and reliable tool to process and transfer invoices. E-invoice is an information system service that collects and transfers business transaction information via a network (Grozniak & Manfreda, 2015; Hernandez-Ortega, 2012; Lian, 2015). In Vietnam, Decree No.119/2018/ND-CP by the Vietnamese Government (2018) and Circular No.32/2011/TT-BTC by the Ministry of Finance (2011) state that e-invoice is a collection of electronic data about the sales of goods and services and is created, sent, received, stored and managed digitally.

On the one hand, previous studies exploring the benefits of e-invoice show that it makes processes cheaper and faster as well as improves operational efficiency (Legner & Wende, 2006; Lian, 2015). By using e-invoices, firms may achieve accuracy and transparency in handling and processing transactions (Yusup, Hardiyana, & Sidharta, 2015). Moreover, compared to traditional paper invoices, an electronic invoice system is useful for organizations to reduce energy consumption and protect the environment (Kim & Rohmer, 2012; Lian, 2015). On the other hand, e-invoice has many advantages, but drawbacks include operational, technological, and information security concerns (Gunaratne & Pappel, 2020).

3.2. User satisfaction

Previous studies on user satisfaction show different definitions of satisfaction. Oliver (2000) indicates that user satisfaction is the response that brings a feeling of enjoyment, or in other words, the user finds that using the product/service meets some of their needs, desires, and goals, making them feel excited and satisfied. Meanwhile, Kotler and Keller (2006) define satisfaction as a “*person’s feelings of pleasure or disappointment*” resulting from comparing a product’s perceived performance (or outcome) in relation to their expectations. According to Zeithaml and Bitner (2000), customer satisfaction is the customer’s assessment of whether a product or service has met their needs and expectations. Different concepts of user satisfaction have common features: (1) user satisfaction is a response (emotional or cognitive) with different intensity, (2) reaction based on benefit assessment, evaluation based on product expectations, consumption experience, and (3) reaction that occurs at a specific time (post-use, post-choice, based on accumulated experience) (Giese & Cote, 2000).

3.3. Hypotheses development

Davis’s technology acceptance model (1989) and information system (IS) success model (Delone & McLean, 2003) are used as the primary theoretical background for analysis. The technology acceptance model (TAM) model aims to predict the adoption of a technology and identify modifications that must be introduced into the system to make it acceptable to users. This model shows that two cognitive factors, perceived ease of use and perceived usefulness, are fundamental in the acceptance of a system. While IS success model reveal the explanation of user satisfaction by the cognitive factor like perceived usefulness.

Perceived ease of use (PEU) is defined as the degree to which a person believes that using a particular system would be free of effort (Davis, Bagozzi, & Warshaw, 1989). In other words, if users feel that a technological system is easy to use, they are likelier to use it. Adopting TAM, Hernandez-Ortega (2012), Rahi, Ghani, Alnaser, and Ngah (2018), and Yuen, Cai, Qi, and Wang (2021) found that PEU is positively related to the intention to use a specific technology. These findings are consistent with the studies of Baber (2021) and Giang, Binh, and Nga (2022), who found that PEU positively influences student satisfaction in e-learning and the effectiveness of e-invoice implementation, respectively. Therefore, the following hypothesis is formulated:

H₁: Perceived ease of use will help users be more satisfied when using e-invoices.

In the technology acceptance model (TAM), perceived usefulness (PU) reflects the belief of a person that their productivity will be enhanced when adopting a specific information technology (Davis, 1989). The higher the usefulness of a system, such as facilities, website, and functions, the more positive the user’s attitude toward the system will be (Sun, Lin, & Yu, 2008). Lean, Zailani, Ramayah, and Fernando (2009) find that perceived usefulness has a direct positive impact on users’ intention toward e-government. Regarding the e-invoice, perceived usefulness has a positive effect on user behavior (Nguyen, Nguyen, & Dang, 2020) and the

implementation effectiveness (Giang et al., 2022). Similar results are highlighted in studies by Guritno and Siringoringo (2013), Lian (2015), Yuen et al. (2021). Thus, the following hypothesis is inferred:

H₂: Perceived usefulness will help users be more satisfied when using e-invoices.

3.4. Methodology

Measuring variables: The variables in the research model were adopted from previous studies. Malhotra, Kim, and Patil (2006) and Chang, Van Witteloostuijn, and Eden (2010) state that the use of diverse measures from preceding studies can help to reduce the common method variance. User satisfaction was adopted and validated from the study of Amalina and Suryani (2022), including three 03 items: “*E-invoices helps me be more satisfied with the information quality*”, “*E-invoices helps me be more satisfied with the quality of transactions processing system*”, and “*In general, implementing e-invoices makes me more satisfied*”. The measures of perceived ease of use and perceived usefulness were collected from the study of Lian (2015). Lian (2015) developed and adjusted his measures from the studies of Davis (1989) and Venkatesh, Morris, Davis, and Davis (2003). In particular, the measure of PEU and PU includes six items. (see Table 1). The study used a 7-point scale for user satisfaction and a 5-point scale for PEU and PU.

Data and data collection: This research used a linear regression model, and sample size was considered based on some rule of thumb and threshold. Tabachnick and Fidell (2007), the sample size for multiple regression is calculated as follows:

$$\text{Minimum sample} > 50 + 8 * \text{number of independent variables},$$

Accordingly, the minimum samples in this research = $50 + 8 * 2 = 66$ observations.

Hair, Black, Babin, and Anderson (2014) suggest that the minimum sample for the exploratory factor analysis (EFA) follows the ratio 5:1. It means that the ratio between the number of observations to the number of items is 5:1. According to this formula, with 15 items, the minimum sample was 75 observations (calculating by 5x15 items).

Thus, combining the two methods of determining the sample size of Hair et al. (2014) and Tabachnick and Fidell (2007), the minimum sample was 75 observations. The study collected 252 respondents, who were accounting staff, chief accountants, and managers of different sectors.

Data analysis: After collecting and eliminating invalid data, the data will be coded and analyzed using SPSS 22 software. The research employed descriptive statistics, measurement quality tests, and hypotheses tests.

4. Results and Discussion

The study evaluated the quality of the measurement using the test of scale reliability and the exploratory factor analysis. Statistical results of the average value and testing scale reliability through Cronbach's alpha coefficient are presented in Table 1.

Table 1 Summary of results of scale reliability analysis

	Variables	Source	Mean	Cronbach α
Perceived usefulness				
PU1	The e-invoice makes transactions happen more quickly.	Lian (2015)	4.51	0.911
PU2	The e-invoice improves employee performance.		4.52	
PU3	The e-invoice makes transactions more productive.		4.50	
PU4	The e-invoice makes transactions more efficient.		4.49	
PU5	The e-invoice makes transactions more convenient.		4.55	
PU6	Overall, the e-invoice is useful.		4.49	
Perceived ease of use				
PEU1	Learning to use the e-invoice is easy.	Lian (2015)	4.39	0.911
PEU2	Using the e-invoice is easy.		4.36	
PEU3	The process for using the e-invoice is clear.		4.39	
PEU4	Using the e-invoice is not a burden during the transaction.		4.43	
PEU5	Remembering how to use the e-invoice is easy.		4.48	
PEU6	Overall, the e-invoice is easy to use.		4.42	

	Variables	Source	Mean	Cronbach α
User satisfaction				
SAT1	E-invoices help me be more satisfied with the information quality	Amalina and Suryani (2022)	6.20	0.867
SAT2	E-invoices help me be more satisfied with the quality of the transactions processing system.		6.15	
SAT3	In general, implementing e-invoices makes me more satisfied.		6.21	

The results in Table 1 show that the Cronbach's alpha values of perceived usefulness, perceived ease of use, and user satisfaction are 0.911, 0.911, and 0.867, respectively. Overall, the above scales all have a high Cronbach's Alpha reliability coefficient (greater than 0.6), proving that the scales have good reliability. All corrected item-total correlation values are greater than 0.3, so the observed variables ensure reliability and are retained for the next analysis steps.

For exploratory analysis, the study uses principal components analysis with Varimax rotation and is performed separately for the independent and dependent variables. The results are summarized in Table 2. The analysis results show that the KMO coefficients of the dependent variable and independent variable are 0.707 and 0.929, respectively, both greater than 0.5, reflecting that factor analysis is appropriate. Bartlett test results with coefficient sig. = 0.000 < 0.05, showing that the obtained data are consistent with the research model. The dependent variable in the model only loads on one group, while the independent variables load on two groups of factors.

Table 2 Summary of exploratory factor analysis of research variables

	Dependent variable	Independent variables
KMO	.706	.929
Bartlett's test: - Chi-square	391.100	2186.592
- Sig.	.000	0.000
Cummulative (%)	79.014	69.715
Factors loading when the threshold of Eigenvalue =1	1	2

From the results of exploratory factor analysis, the study performed calculations representing the research variables, including user satisfaction (SAT: from SAT1 to SAT3), perceived usefulness (PU: from PU1 to PU6), and perceived ease of use (PEU: from PEU1 to PEU6). Figure 1 describes the variables, revealing a normal distribution of user satisfaction.

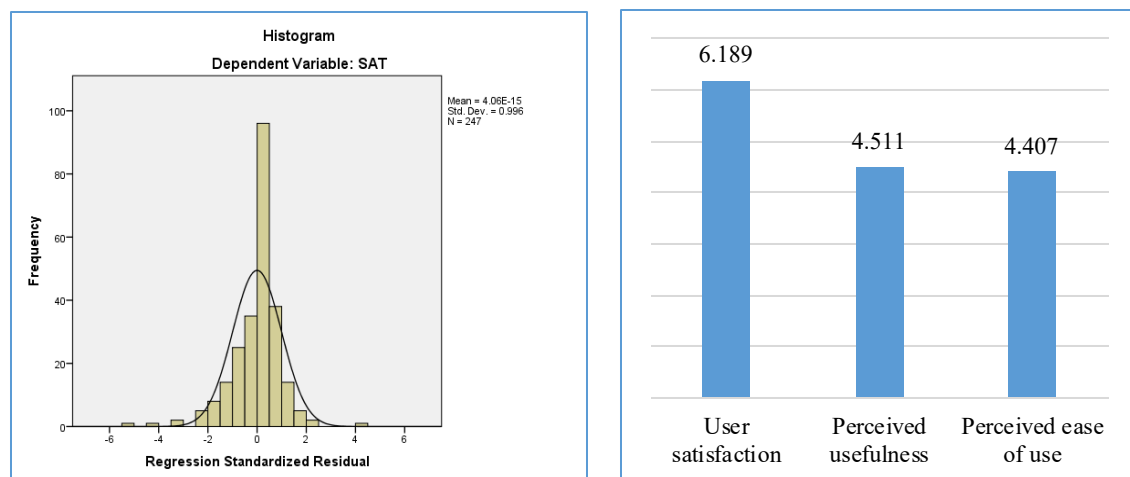


Figure 1 Description of variables in the research model

The study carries out correlation analysis. The Pearson correlation coefficient is calculated to quantify the tightness of the linear relationship between the two independent variables and dependent variable and to highlight the problem of multicollinearity. The result is in Table 3.

Table 3 The result of correlation analysis

		PU	PEU	SAT
PU	Pearson Correlation	1	.758**	.694**
	Sig. (2-tailed)		.000	.000
	N	252	252	252
PEU	Pearson Correlation	.758**	1	.697**
	Sig. (2-tailed)	.000		.000
	N	252	252	252
SAT	Pearson Correlation	.694**	.697**	1
	Sig. (2-tailed)	.000	.000	
	N	252	252	252

The results of correlation analysis are in Table 3 with a significance level of 5%, showing that the independent variables are strongly correlated with the dependent variable (see Table 3). Two independent variables are strongly correlated with each other. Thus, the study will use the test of variance magnification to verify the multicollinearity phenomenon. The results of multivariate regression analysis are presented in Table 4.

Table 4 The multivariate regression results

	Results
Model evaluation results	
- R-square	.550
- Adjusted R-square	.547
F test	
F value	152.289
Sig.	.000

Model	Coefficients ^a						
	Unstandardized		Standardize			Collinearity	
	Coefficients	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	.895	.307		2.913	.004		
PU	.593	.100	.388	5.952	.000	.425	2.354
PEU	.595	.096	.403	6.179	.000	.425	2.354

Evaluating the fit of the model: The results show that the R²-square value is larger than the adjusted R² value, but using the adjusted R²-square to evaluate the model fit will be more accurate than the R² value because it does not inflate the model fit. The R²-square value is 0.550, meaning that two independent variables (perceived ease of use and perceived usefulness) explain 55% of the variance of user satisfaction in the e-invoice system. The results of the regression model adjusted R²-square value is 0.545, and this coefficient shows that the change in independent variables will explain 54.7% of the variation of the dependent variable. This is a good level of explanation, so it can be concluded that the model is suitable.

The F test is a hypothesis test about the goodness of fit of the general linear regression model. The research uses the F test to examine hypothesis H₀: *The regression coefficients of the variables are equal and all equal to 0*. If this hypothesis is rejected, it can be concluded that the built model is appropriate. Table 4 shows the F statistical value = 152.289 and the Sig. = 0.000 (< 0.05), so the dependent variable is linearly correlated with the independent variables, meaning the combination of independent variables can explain the change in the dependent variable. Thus, the regression model is suitable for the dataset.

The linear regression results in Table 4 show that the independent variables, PEU and PU, have $\text{Sig.} = 0.000 < 0.05$, indicating a statistical significance. The standardized regression coefficient (β) is greater than 0, meaning PEU and PU have positive effects on the dependent variable, user satisfaction. The regression model is as follows:

$$SAT = 0.593*PU + 0.595*PEU + 0.895$$

The importance of the variables PEU and PU to the variable SAT is determined based on the standardized coefficient, β . The larger the standardized coefficient, the more influential the impact on user satisfaction. Therefore, the most critical effect on user satisfaction with e-invoices of businesses is the perceived ease of use (PEU) with β value = 0.403. The VIF values are 2.354 for two variables, less than 10, indicating that multicollinearity does not occur in the model (De Jongh et al., 2015).

The results show that the research has partly contributed to the theoretical system of improving user satisfaction when using e-invoices. On the other hand, the study has created a premise to help the tax authorities and other state agencies understand the situation of e-invoice implementation in firms. The results in this research reinforce previous studies by Lian (2015), Nguyen et al. (2020), and Giang et al. (2022) about the effect of TAM factors on implementing e-invoice systems.

5. Conclusion and recommendations

In the age of technology 4.0, using e-invoice is not only a solution for the government but also brings many benefits to firms. Converting from paper invoices to e-invoices aligns with the modern trend of the Fourth Industrial Revolution. Since there are regulations in Vietnam, firms are required to use e-invoices from July 1, 2020. Large enterprises have quickly transformed from traditional invoices to e-invoices. Besides, many small and medium enterprises, especially micro-enterprises, have also changed the process of replacing paper invoices. However, there are some difficulties and limitations in the use and usefulness of e-invoice. This study aims to evaluate the perceived ease of use and perceived usefulness influencing user satisfaction with the e-invoices system. The results state that both the perceived ease of use and perceived usefulness positively influence the satisfaction of firms with e-invoice systems. The more users perceive ease of use and usefulness, the higher the satisfaction of firms with e-invoices. The result shows that firms are satisfied with the e-invoice system (mean = 6.189/7), and the research gives some recommendations.

For state agencies: The tax authorities need to maintain good performance of tax management functions, reform the tax system, and closely monitor and regularly inspect the use of electronic invoices by businesses. At the same time, the tax authorities need robust reform solutions on a large scale throughout the industry. Furthermore, the tax authorities need to promote propaganda and give guidance to solve the multiple problems of e-invoice implementation. The state agencies need to propagate the benefits when they apply e-invoices in all transactions with customers, agencies, and business development. The state agencies also need support resolving business difficulties, helping companies to receive the best support to understand responsibilities and obligations clearly. Moreover, the state agencies need to create a psychological consensus to help all types of businesses accept e-invoices.

For the firms, it is an e-invoice with characteristics based on the digital technology platform. The creation and transmission of data are all through the internet, and the data storage is all in soft files without having to print paper. Therefore, the requirements for security systems and data copies need to be enhanced. In addition to building servers, the backup system needs to proactively build additional scenarios to prevent virus and malicious code attacks on the data of e-invoice to improve the efficiency of e-invoice implementation. Compared to large enterprises, small and medium-sized enterprises have many limitations regarding resources, such as financial and human resources. This is why small, medium, and micro enterprises often have problems implementing e-invoices. The implementation of the e-invoice system needs to be built, operated, and managed by a supplier. Therefore, businesses need to coordinate with e-invoice suppliers to solve the problems, helping them to use the e-invoice system conveniently. In addition, firms need to cooperate with tax authorities and comply well.

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