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Business Information Systems Adoption: Evaluating E-Invoice Implementation in Vietnamese SMEs During Digital Transformation

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Abstract. This study investigates the factors influencing e-invoice adoption intention among small and medium enterprises (SMEs) in Vietnam, where e-invoicing has been mandated since July 2022. Despite government support and regulatory requirements, adoption rates remain suboptimal among SMEs. Drawing on an integrated theoretical framework combining the Technology Acceptance Model (TAM) and Task-Technology Fit (TTF) theory, this research examines how perceived usefulness, perceived ease of use, task-technology fit, and attitude influence SME intentions to adopt e-invoices. Survey data from 152 SME managers and owners were analyzed using partial least squares structural equation modeling (PLS-SEM). Results demonstrate strong empirical support for all eight hypothesized relationships. The integrated model explains 62.5% of variance in e-invoice adoption intention and 69.3% of variance in attitude. Task-technology fit emerged as the strongest predictor, with significant direct effects on perceived ease of use, perceived usefulness, and attitude (β=0.225). Attitude and perceived usefulness also significantly influenced adoption intention. These findings validate the TAM-TTF integration in the context of mandatory digital tax compliance and highlight the critical importance of ensuring alignment between e-invoice technology capabilities and SMEs' invoicing task requirements. The study contributes to technology adoption literature by demonstrating that task-technology fit considerations become particularly salient when resource-constrained organizations face mandatory technology adoption. Practical implications for policymakers, technology providers, and SME managers are discussed.

Keywords: E-invoice adoption, Technology Acceptance Model, Task-Technology Fit, Small and Medium Enterprises, Digital transformation, Vietnam, PLS-SEM

1. Introduction

Digital transformation has become a strategic imperative for businesses worldwide, fundamentally reshaping how organizations operate, compete, and create value in the modern economy (Khanh *et al.*, 2025). Electronic invoicing (e-invoicing) represents a critical component of this digital transformation, enabling real-time transaction monitoring, enhancing tax compliance, reducing operational costs, and improving overall business efficiency. As governments globally recognize these benefits, many have implemented mandatory e-invoice systems to modernize tax administration and combat tax evasion. Vietnam joined this global movement by mandating e-invoice adoption for all businesses effective, marking a significant milestone in the country's digital economy development strategy.

Despite the mandatory nature of Vietnam's e-invoice policy and substantial government investment in supporting infrastructure, adoption rates have remained concerning. According to government reports, by the end of 2024, only approximately 50% of eligible retail and household businesses adopted e-invoicing systems, with some regions reporting even slower implementation rates (Taxation, 2025). These adoption challenges are particularly pronounced among small and medium enterprises (SMEs), which form the backbone of Vietnam's economy. SMEs account for over 97% of all enterprises in Vietnam, contribute approximately 40% to GDP, and employ more than 50% of the labor force (Office, 2024). However, these enterprises often face unique constraints including limited financial resources, insufficient digital literacy, inadequate technological infrastructure, and resistance to organizational change that impede their ability to adopt new digital technologies.

The significance of understanding e-invoice adoption among Vietnamese SMEs extends beyond mere compliance with regulatory requirements. Successful e-invoice implementation can fundamentally transform SME operations by automating invoicing processes, reducing manual errors, improving cash flow management, enhancing transparency with stakeholders, and facilitating better integration with accounting and enterprise resource planning systems (Anh Viet Tran & Bui Thanh Khoa, 2025c). Moreover, e-invoice adoption serves as a gateway technology that can catalyze broader digital transformation within SMEs, building digital capabilities and confidence that extend to other technological innovations. However, the factors that drive or inhibit SME leaders' intention to adopt e-invoices remain inadequately understood, creating a critical knowledge gap that hinders effective policy formulation and implementation support.

While previous research has examined technology adoption in various contexts, several gaps persist in understanding e-invoice adoption specifically among SMEs in emerging economies (Martynas & Algita, 2024). First, most existing studies on e-invoice adoption have focused on developed economies with different technological infrastructures, institutional environments, and business cultures, limiting their applicability to developing country contexts like Vietnam. Second, studies examining technology adoption in SMEs have predominantly employed single theoretical frameworks, most commonly the Technology Acceptance Model (TAM), which may not fully capture the multidimensional factors influencing adoption decisions. Third, the mandatory nature of Vietnam's e-invoice policy creates a unique adoption context that differs from voluntary technology adoption scenarios typically studied in the literature. Finally, there is limited empirical evidence on how task-technology compatibility specifically influences e-invoice adoption among resource-constrained SMEs, despite theoretical arguments suggesting its importance.

To address these gaps, this study integrates two complementary theoretical frameworks, the Technology Acceptance Model (TAM) and Task-Technology Fit (TTF) theory, to provide a comprehensive understanding of e-invoice adoption intention among Vietnamese SMEs. TAM, developed by (Fred D Davis, 1989), posits that perceived usefulness and perceived ease of use are primary determinants of technology acceptance and has been extensively validated across various contexts and technologies. TTF theory, proposed by Goodhue and Thompson (1995), emphasizes that technology adoption and performance impacts depend on the degree of fit between task requirements

and technology capabilities. By integrating these frameworks, we address calls in the literature for more comprehensive models that consider both user perceptions (TAM) and task-technology alignment (TTF) in explaining technology adoption behavior.

The primary objective of this study is to examine the factors influencing e-invoice adoption intention among Vietnamese SMEs through an integrated TAM-TTF framework. Specifically, the study aims to: (1) investigate how task-technology fit influences perceived usefulness, perceived ease of use, and attitude toward e-invoice adoption; (2) examine the relationships among perceived usefulness, perceived ease of use, attitude, and adoption intention; (3) assess the relative importance of different factors in determining adoption intention; and (4) provide empirical evidence to inform policy interventions and managerial strategies for facilitating successful e-invoice implementation among SMEs in emerging economies.

This study makes several important contributions to both theory and practice. Theoretically, it extends technology adoption research by validating the integration of TAM and TTF in the context of mandatory digital tax compliance systems in an emerging economy. The findings demonstrate how task-technology fit serves as a crucial antecedent to traditional TAM constructs, providing insights into the mechanisms through which technological compatibility influences adoption decisions. Practically, the study offers actionable recommendations for policymakers seeking to enhance e-invoice adoption rates and for SME managers navigating digital transformation challenges. By identifying specific factors that facilitate or impede adoption intention, the findings can inform targeted interventions, support program design, and technology development strategies tailored to SME needs and constraints.

The remainder of this paper is organized as follows. The next section reviews relevant literature on digital transformation, TAM, TTF, and e-invoice adoption, culminating in the presentation of our integrated conceptual model and research hypotheses. The methodology section describes the research design, sampling procedures, measurement instruments, and analytical techniques employed. The results section presents findings from the measurement model assessment and structural model evaluation, including hypothesis testing outcomes. The discussion section interprets these findings in relation to existing literature. Finally, the conclusion explores theoretical, practical implications, and provides actionable recommendations, and suggests directions for future research.

2. Literature Review

2.1. Digital Transformation and E-Invoice Adoption

Digital transformation represents a fundamental organizational change driven by the integration of digital technologies into all aspects of business operations, fundamentally altering how organizations deliver value to customers, employees, and stakeholders (Giedrius & Jolanta, 2024). This transformation extends beyond mere technology adoption to encompass changes in organizational culture, business models, and strategic orientation. For SMEs, digital transformation presents both unprecedented opportunities and significant challenges. While digital technologies can enable SMEs to compete more effectively, access new markets, and improve operational efficiency, resource constraints and organizational inertia often impede successful digital initiatives.

Electronic invoicing represents a critical enabler of digital transformation, particularly in the domain of financial processes and tax compliance. E-invoicing systems replace traditional paper-based invoicing with structured electronic formats that enable automated processing, real-time data exchange, and seamless integration with accounting systems (Taxation, 2025). Research demonstrates that e-invoicing adoption yields multiple benefits including reduced processing costs, faster payment cycles, fewer errors, enhanced transparency, and improved compliance with tax regulations. Moreover, e-invoicing serves as a foundation for broader digitalization of financial processes, creating capabilities that extend to procurement, supply chain management, and financial planning.

The implementation of mandatory e-invoicing systems has gained momentum globally, with countries in Latin America, Europe, and Asia adopting various models to enhance tax compliance and reduce revenue losses. Vietnam's e-invoicing mandate, implemented through Decree 123/2020/ND-CP and subsequent regulations, requires all businesses to issue electronic invoices to buyers and digitally report transactions to the General Department of Taxation in real-time. The system employs XML as the primary data format and includes digital signature requirements to ensure authenticity and non-repudiation. By the end of 2024, over 92,000 businesses had registered for e-invoices generated from cash registers, with more than 1.3 billion e-invoices issued, representing a 13-fold increase from 2023. However, adoption rates vary significantly across business sizes and sectors, with SMEs facing particular challenges in implementation.

Research on e-invoice adoption has identified multiple factors influencing implementation success. Studies from Peru, Brazil, and European countries demonstrate that e-invoicing enhances tax compliance, particularly among smaller firms and sectors with historically lower compliance rates. The deterrent effect operates through increased audit probability and improved third-party information reporting. However, adoption barriers persist, particularly for SMEs, including implementation costs, technical complexity, lack of digital skills, inadequate IT infrastructure, and organizational resistance to change. These barriers are often more pronounced in developing economies where digital infrastructure and capabilities lag behind developed countries.

2.2. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Fred D Davis (1989) and grounded in the Theory of Reasoned Action, has emerged as the dominant theoretical framework for understanding individual technology adoption decisions. TAM posits that two primary beliefs, perceived usefulness and perceived ease of use, determine an individual's attitude toward using a technology, which subsequently influences behavioral intention to use the technology. Perceived usefulness refers to the degree to which an individual believes that using a particular technology will enhance their job performance or achieve desired outcomes. Perceived ease of use represents the extent to which an individual believes that using the technology will be free of effort.

TAM's theoretical foundation rests on the premise that individuals form rational evaluations of technologies based on their beliefs about the technology's usefulness and ease of use (Khoa, 2025). These cognitive evaluations subsequently shape affective responses (attitude) and behavioral intentions. A key proposition of TAM is that perceived ease of use influences perceived usefulness, suggesting that when a technology is easier to use, individuals are more likely to perceive it as useful for improving their performance. Extensive empirical research across diverse technologies, user populations, and organizational contexts has validated TAM's predictive power, with meta-analyses reporting substantial variance explained in behavioral intention (typically 30-40%) and actual usage behavior.

In the context of e-invoice adoption, TAM's constructs are particularly relevant. Perceived usefulness captures SME leaders' beliefs about whether e-invoices will improve business operations, enhance efficiency, reduce costs, and facilitate compliance (Cuong *et al.*, 2025; Anh Viet Tran & Bui Thanh Khoa, 2025b). Perceived ease of use addresses concerns about the complexity of e-invoice systems, the learning curve required for implementation, and the effort needed to integrate the technology with existing processes. Studies applying TAM to tax technology adoption have consistently found that both perceived usefulness and perceived ease of use significantly influence adoption intention, with perceived usefulness typically showing stronger effects in organizational settings where performance improvement is paramount.

Despite its widespread application and robust empirical support, TAM has faced criticism for its narrow focus on individual perceptions while neglecting contextual, organizational, and task-related factors that influence technology adoption (Hongli *et al.*, 2022). Critics argue that TAM's parsimony,

while facilitating widespread application, comes at the cost of overlooking important variables that may be crucial in specific adoption contexts. This criticism has led to numerous extensions of TAM incorporating additional constructs such as subjective norms, facilitating conditions, trust, and system quality. The need for a more comprehensive framework that considers task-technology alignment has motivated the integration of TAM with Task-Technology Fit theory.

2.3. Task-Technology Fit (TTF) Theory

Task-Technology Fit theory, developed by Goodhue and Thompson (1995), offers a complementary perspective to TAM by emphasizing the importance of alignment between task requirements and technology capabilities. TTF is defined as the degree to which a technology assists an individual in performing their tasks. The theory posits that individuals are more likely to adopt and effectively utilize a technology when there is a strong fit between task characteristics, individual abilities, and technology functionality. Unlike TAM's focus on user perceptions of usefulness and ease of use, TTF explicitly considers how well technology attributes match the demands of specific work tasks.

The theoretical foundation of TTF rests on the premise that technology must be appropriate for the tasks it is intended to support to deliver performance benefits. Goodhue and Thompson (1995) identified several dimensions of TTF including quality, locatability, authorization, compatibility, ease of use, production timeliness, systems reliability, and relationship with users. These dimensions collectively assess how well a technology's features and capabilities align with users' task requirements. Research has demonstrated that higher task-technology fit leads to improved individual performance and increased technology utilization across various information systems including decision support systems, knowledge management systems, and enterprise applications.

In the context of e-invoice adoption among SMEs, task-technology fit addresses whether e-invoice systems adequately support the invoicing tasks that SMEs perform. SME invoicing tasks typically involve generating invoices for diverse transaction types, managing customer information, tracking payment status, reconciling accounts, and ensuring compliance with tax regulations. An e-invoice system demonstrates good task-technology fit when it efficiently handles these varied tasks, accommodates different business models and transaction patterns, integrates seamlessly with existing accounting processes, and provides necessary functionality without excessive complexity. For resource-constrained SMEs, task-technology fit is particularly critical because misalignment between system capabilities and actual business needs can result in wasted resources, operational disruptions, and ultimately, rejection of the technology.

Research has shown that TTF influences technology adoption through multiple mechanisms. Strong task-technology fit enhances the perceived utility of a system by demonstrating clear relevance to users' work tasks. It reduces the cognitive effort required to use the system by aligning system functionality with familiar work processes. Furthermore, good fit minimizes the need for workarounds and adaptations, thereby reducing implementation costs and disruption. Studies integrating TTF with other adoption models have consistently found that task-technology fit serves as an important antecedent to user attitudes and behavioral intentions, explaining variance in technology adoption beyond that accounted for by traditional adoption models.

2.4. Integration of TAM and TTF

The integration of TAM and TTF addresses limitations inherent in each individual model while leveraging their complementary strengths. Dishaw and Strong (1999) pioneered this integration, arguing that combining TAM's focus on user perceptions with TTF's emphasis on task-technology alignment provides a more complete explanation of technology utilization. Their integrated model demonstrated that TTF constructs directly affect technology utilization and indirectly influence utilization through TAM's perceived usefulness and perceived ease of use. This integration has been

validated across numerous contexts including enterprise systems, mobile technologies, knowledge management systems, and e-learning platforms (Phuong *et al.*, 2025).

The theoretical rationale for integrating TAM and TTF rests on the recognition that individual perceptions (TAM constructs) are shaped by objective technological and task characteristics (TTF constructs) (A. V. Tran & B. T. Khoa, 2025). Task-technology fit influences perceived usefulness by determining whether a technology demonstrably improves task performance, when the fit is strong, users more readily perceive the technology as useful. Similarly, task-technology fit affects perceived ease of use because well-fitted technologies align with existing work practices, reducing the learning curve and cognitive effort required for adoption. Furthermore, direct effects of task-technology fit on attitude and behavioral intention reflect the importance of objective system appropriateness beyond subjective user perceptions.

Empirical research on the TAM-TTF integration has consistently demonstrated superior explanatory power compared to either model alone (Anh Viet Tran & Bui Thanh Khoa, 2025a, 2025c). Meta-analyses and systematic reviews indicate that integrated models explain 10-20% more variance in behavioral intention and technology use than standalone TAM or TTF models. Recent extensions have further enriched the integration by incorporating constructs from the Unified Theory of Acceptance and Use of Technology (UTAUT), creating TTF-UTAUT models that explain over 50% of variance in technology adoption. These findings underscore the value of multi-theoretical frameworks in capturing the complex, multidimensional nature of technology adoption decisions.

Applying the integrated TAM-TTF framework to e-invoice adoption among SMEs is particularly appropriate for several reasons. First, e-invoicing represents a task-oriented technology specifically designed to improve invoicing processes, making task-technology alignment highly relevant. Second, SMEs' resource constraints and diverse operational contexts necessitate careful consideration of how well e-invoice systems match their specific business needs. Third, the mandatory nature of e-invoice adoption in Vietnam means that traditional TAM variables alone may not fully explain adoption behavior, task appropriateness becomes critical when adoption is compulsory. Finally, the integration allows us to identify multiple leverage points for intervention, including improving technology design (TTF), enhancing user perceptions (TAM), and fostering positive attitudes.

2.5. Research Model and Hypotheses Development

Building on the integrated TAM-TTF framework and drawing from relevant literature on technology adoption and e-invoicing, we developed a comprehensive research model examining the determinants of e-invoice adoption intention among Vietnamese SMEs. The model proposes eight hypothesized relationships that capture both the traditional TAM pathways and the influence of task-technology fit as a critical antecedent. Figure 1 presents the conceptual model, which posits that task-technology fit influences perceived ease of use, perceived usefulness, and attitude toward e-invoices. These constructs, in turn, shape attitude and ultimately determine adoption intention.

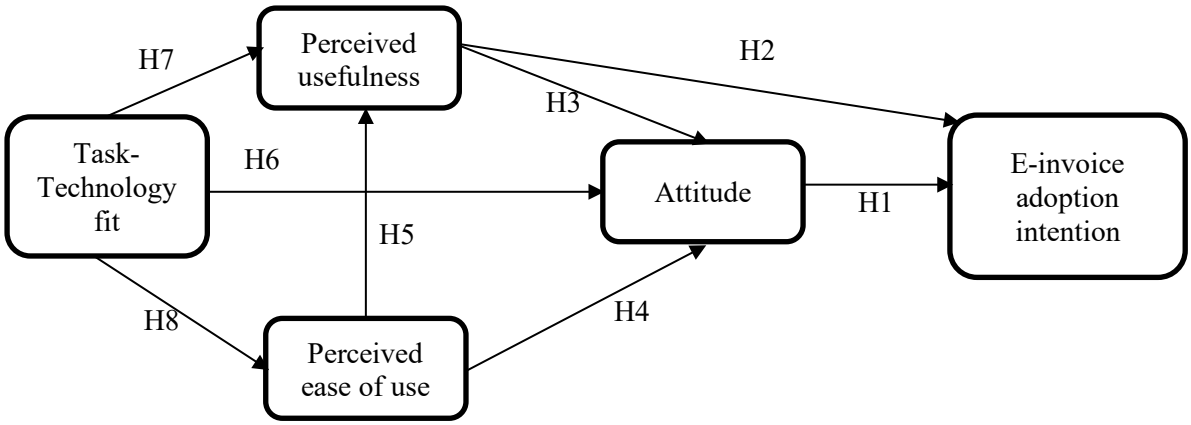

Fig. 1: Research Model

According to the Theory of Reasoned Action and TAM, attitude represents an individual's overall affective evaluation of performing a behavior and serves as a proximal determinant of behavioral intention (Ajzen, 1991). Attitude toward e-invoice adoption reflects SME leaders' positive or negative feelings about using e-invoices in their business operations (Huynh & Khoa, 2025b). When leaders develop favorable attitudes, viewing e-invoices as beneficial, desirable, and appropriate for their business, they are more likely to form intentions to adopt. Extensive research across various technology contexts confirms the strong positive relationship between attitude and behavioral intention (Kusumawardani & Soegihono, 2024). In the e-invoice context, positive attitudes may stem from recognition of benefits such as improved efficiency, enhanced compliance, and modernized business processes. Therefore, we hypothesize:

H1: Attitude toward e-invoices positively influences e-invoice adoption intention.

Perceived usefulness, defined as the extent to which SME leaders believe that e-invoices will enhance their business performance, is theorized to have both direct and indirect (through attitude) effects on adoption intention (Alyoussef, 2023). The direct effect reflects instrumentality, when leaders perceive e-invoices as useful for achieving business objectives (reducing costs, improving cash flow, enhancing compliance), they develop stronger intentions to adopt regardless of their emotional responses. Research consistently identifies perceived usefulness as the strongest predictor of technology adoption intention in organizational contexts where performance outcomes are salient(Zhanyou *et al.*, 2020). For SMEs facing competitive pressures and operational challenges, perceived usefulness addresses fundamental concerns about return on investment and business value.

TAM posits that perceived usefulness influences attitude through cognitive-affective processes. When individuals believe a technology will help them achieve important outcomes, they develop positive affective evaluations of that technology (Fred D. Davis, 1989). For SME leaders evaluating e-invoice adoption, beliefs about the technology's usefulness in improving invoicing efficiency, reducing errors, and enhancing compliance translate into positive or negative feelings about using e-invoices (V. Venkatesh *et al.*, 2003). The usefulness-attitude relationship is well-established in technology adoption research, with meta-analyses confirming medium to large effect sizes across diverse technologies and contexts.

H2: Perceived usefulness positively influences e-invoice adoption intention.

H3: Perceived usefulness positively influences attitude toward e-invoices.

Perceived ease of use refers to the degree to which SME leaders believe that using e-invoices will be free of effort. Technologies that are perceived as easy to use generate more favorable attitudes because they reduce anxiety, enhance self-efficacy, and minimize anticipated implementation burden. For SMEs with limited technical expertise and IT support, ease of use is particularly important in shaping attitudes.

Complex systems that require extensive training, significant changes to existing processes, or ongoing technical support generate negative attitudes regardless of their potential benefits. Conversely, systems perceived as intuitive and straightforward foster positive affective responses that support adoption.

H4: Perceived ease of use positively influences attitude toward e-invoices.

TAM theorizes that perceived ease of use influences perceived usefulness through both direct and self-efficacy mechanisms (Fred D. Davis, 1989). When a technology is easier to use, individuals can deploy it more effectively to accomplish tasks, thereby increasing its utility. Additionally, ease of use enhances computer self-efficacy, which amplifies perceptions of the technology's usefulness. In the e-invoice context, systems that are easy to implement and operate are more likely to be perceived as useful because SMEs can realize benefits more quickly and with less resource investment (Pham *et al.*, 2025). Technical complexity that impedes effective use diminishes perceived usefulness even when the technology has strong potential capabilities.

H5: Perceived ease of use positively influences perceived usefulness.

Task-technology fit represents the alignment between e-invoice system capabilities and SME invoicing task requirements (Khoa, 2023). Drawing from the TAM-TTF integration literature, we propose that task-technology fit serves as a critical antecedent to TAM constructs through multiple pathways (Alyoussef, 2023). First, strong fit directly influences attitude (H6) by demonstrating system appropriateness and relevance to business needs. When e-invoice systems accommodate diverse transaction types, integrate smoothly with existing processes, and provide necessary functionality, SME leaders develop more favorable attitudes. Second, task-technology fit influences perceived usefulness (H7) by establishing clear connections between system capabilities and performance improvements. Systems that fit well with invoicing tasks demonstrably enhance efficiency and effectiveness, strengthening usefulness perceptions. Third, fit influences perceived ease of use (H8) because well-fitted systems align with familiar work processes and require less adaptation, reducing perceived implementation effort.

H6: Task-technology fit positively influences attitude toward e-invoices.

H7: Task-technology fit positively influences perceived usefulness.

H8: Task-technology fit positively influences perceived ease of use.

3. Methodology

3.1. Measurement Scales

This study employs established measurement scales to investigate e-invoice adoption intention among Vietnamese SMEs. All constructs were measured using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), which is consistent with previous technology adoption studies. The research constructs and their respective measurement items were adapted from relevant literature to ensure content validity and reliability.

Perceived Usefulness was measured using a four-item scale adapted from Fred D Davis (1989)’s Technology Acceptance Model and further refined by Viswanath Venkatesh and Bala (2008). This construct assesses the degree to which SME leaders believe that using e-invoices would enhance their business performance. Previous studies have confirmed the reliability and validity of this scale in various technology adoption contexts, including e-taxation systems. Sample items include: "Using e-invoices would improve my business's performance" and "Using e-invoices would increase my business's productivity."

A three-item scale measuring Perceived Ease of Use was adapted from Fred D Davis (1989); Viswanath Venkatesh and Davis (2000). This construct evaluates the extent to which SME leaders believe that using e-invoices would be free of effort. The scale has demonstrated strong psychometric properties across various technology adoption studies. Representative items include: "Learning to operate e-invoices would be easy for me" and "I would find e-invoices easy to use."

Task-Technology Fit was measured using a three-item scale adapted from Goodhue and Thompson (1995). This construct assesses the degree to which e-invoice technology assists SMEs in performing their invoicing tasks. The TTF model has been widely applied in information systems research to predict actual system use and performance impacts. Example items include: "E-invoice systems fit well with the way my business handles invoicing" and "E-invoice systems are compatible with all aspects of my invoicing tasks."

Attitude toward e-invoice adoption was measured using a three-item scale adapted from Huynh and Khoa (2025a). This construct evaluates the overall affective reaction of SME leaders toward using e-invoices. Attitude has been consistently identified as a key determinant of behavioral intention in technology adoption studies (Ajzen, 1991). Sample items include: "Using e-invoices is a good idea for my business" and "Using e-invoices would be pleasant for my business operations."

A three-item scale adapted from Viswanath Venkatesh and Davis (2000) was used to measure E-invoice Adoption Intention. This construct assesses the behavioral intention of SME leaders to adopt e-invoices in their operations. Representative items include: "I intend to use e-invoices in the next 12 months" and "I predict that I will use e-invoices in my business."

3.2. Sample and Data Collection

This study employed a purposive sampling technique to select 152 leaders of SMEs operating in Vietnam. The purposive sampling approach was chosen due to its effectiveness in targeting specific populations with particular characteristics relevant to the research objectives (Saunders *et al.*, 2016). SMEs were identified according to Vietnam's official classification criteria based on total capital and number of employees (Decree No. 39/2018/ND-CP), which aligns with previous studies on SMEs in Vietnam.

The sample size of 152 respondents was determined based on statistical power considerations for structural equation modeling (SEM). According to (Hair *et al.*, 2019), a minimum sample size of 100 is recommended for models with five or fewer constructs, each with more than three items. Moreover, Kline (2015) suggests a ratio of 10 observations per parameter as a general rule of thumb for SEM analysis. With 16 observed variables (items) in our model, the sample size of 152 satisfies these requirements, ensuring adequate statistical power for hypothesis testing.

The final questionnaire was administered using a mixed-mode approach, combining online and paper-based formats to maximize response rates. The data collection process was conducted over a three-month period from January to March 2025. Online questionnaires were distributed via email and professional networks such as the Vietnam Chamber of Commerce and Industry (VCCI) and local business associations. Paper-based questionnaires were distributed during business networking events and through direct visits to SMEs in major economic centers including Hanoi, Ho Chi Minh City, and Da Nang.

To mitigate potential non-response bias, follow-up reminders were sent two weeks after the initial distribution. Additionally, respondents were assured of the confidentiality and anonymity of their responses to encourage honest and accurate reporting. A total of 183 responses were received, yielding a response rate of 61% based on the 300 questionnaires distributed. After screening for completeness and validity, 152 usable responses were retained for analysis, representing an effective response rate of 50.7%.

3.3. Respondent Statistics

The final sample of 152 SME leaders represented a diverse range of industries and firm characteristics. Table 1 presents the demographic profile of the respondents based on firm size, industry, and years of operation.

In terms of firm size, small enterprises (10-49 employees) constituted the largest proportion of the

sample (45.39%), followed by medium enterprises (50-249 employees) at 39.47% and micro enterprises (fewer than 10 employees) at 15.13%. This distribution is representative of the overall SME landscape in Vietnam, where small enterprises form the backbone of the economy.

Regarding industry sectors, manufacturing accounted for 28.29% of the sample, followed by retail and wholesale trade (24.34%), services (19.74%), construction (14.47%), and other sectors (13.16%). This sectoral distribution aligns with previous studies on digital transformation among Vietnamese SMEs.

In terms of years in operation, the majority of firms (42.11%) had been operating for 5-10 years, followed by firms with less than 5 years (30.26%) and those with more than 10 years of operation (27.63%). This distribution reflects the dynamic nature of Vietnam's business environment, characterized by a significant number of young and emerging enterprises.

Table 1: Demographic Profile of Respondents

Characteristic	Category	Frequency	Percentage (%)
Firm Size			
	Micro enterprises (<10 employees)	23	15.13
	Small enterprises (10-49 employees)	69	45.39
	Medium enterprises (50-249 employees)	60	39.47
Industry			
	Manufacturing	43	28.29
	Retail and wholesale trade	37	24.34
	Services	30	19.74
	Construction	22	14.47
	Others	20	13.16
Years of Operation			
	Less than 5 years	46	30.26
	5-10 years	64	42.11
	More than 10 years	42	27.64
Total		152	100

4. Results

This study employs established measurement scales to investigate e-invoice adoption intention among Vietnamese SMEs. All constructs were measured using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), which is consistent with previous technology adoption studies. The research constructs and their respective measurement items were adapted from relevant literature to ensure content validity and reliability.

4.1. Measurement Scales

The measurement model evaluation focuses on examining the reliability and validity of the constructs. This involves assessing indicator reliability, internal consistency reliability, convergent validity, and discriminant validity (Hair *et al.*, 2016; Henseler *et al.*, 2015). Convergent validity is established when items that are indicators of a specific construct converge or share a high proportion of variance. Table 2 presents the results of the convergent validity assessment, which includes outer loadings, Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE).

As shown in Table 2, the outer loadings of all measurement items range from 0.803 to 0.918, exceeding the recommended threshold of 0.708. This confirms that the indicator reliability for all constructs is established. Regarding internal consistency reliability, both Cronbach's Alpha and

Composite Reliability values for all constructs exceed 0.80, well above the recommended threshold of 0.70 (Bernstein & Nunnally, 1994; Fornell & Larcker, 1981). Specifically, Cronbach's Alpha ranges from 0.824 to 0.875, while CR values range from 0.895 to 0.923, indicating high internal consistency among the items measuring each construct.

The Average Variance Extracted (AVE) values for all constructs range from 0.707 to 0.798, substantially exceeding the threshold value of 0.50 suggested by Fornell and Larcker (1981). This indicates that each construct captures more than 70% of the variance in its indicators, demonstrating strong convergent validity. The high AVE values also suggest that the variance captured by each construct is substantially greater than the variance attributable to measurement error.

Table 2: Convergent Validity Assessment Results

Construct	Outer Loadings (Min-Max)	Cronbach's Alpha	CR	AVE
ATT	0.845-0.902	0.846	0.907	0.767
OPI	0.867-0.918	0.875	0.923	0.798
PEOU	0.832-0.889	0.824	0.895	0.736
PU	0.803-0.876	0.853	0.901	0.707
TTF	0.843-0.885	0.835	0.901	0.748

Note: ATT = Attitude; OPI = E-invoice Adoption Intention; PEOU = Perceived Ease of Use; PU = Perceived Usefulness; TTF = Task-Technology Fit.

Discriminant validity assesses whether constructs are empirically distinct from each other. Table 3 presents the discriminant validity results using the Fornell-Larcker criterion, which compares the square root of the AVE values with the inter-construct correlations. The Fornell-Larcker criterion analysis in Table 3 demonstrates that the square root of each construct's AVE (shown on the diagonal) is greater than its correlation with other constructs (off-diagonal elements). This provides strong evidence of discriminant validity (Fornell & Larcker, 1981). For instance, the square root of AVE for ATT (0.876) is greater than its correlations with OPI (0.712), PEOU (0.695), PU (0.748), and TTF (0.681).

Table 3: Discriminant Validity Assessment (Fornell-Larcker Criterion)

	ATT	OPI	PEOU	PU	TTF
ATT	**0.876**				
OPI	0.712	**0.893**			
PEOU	0.695	0.624	**0.858**		
PU	0.748	0.692	0.673	**0.841**	
TTF	0.681	0.643	0.658	0.712	**0.865**

Note: The diagonal values (in bold) represent the square root of AVE for each construct. Off-diagonal elements are the correlations between constructs.

4.2. Structural Model

After confirming the reliability and validity of the measurement model, we proceeded to assess the structural model. This evaluation examines the model's predictive capabilities and the relationships between constructs. The assessment includes examining collinearity (VIF), path coefficients, coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2).

Before evaluating the structural relationships, we assessed potential collinearity issues among predictor constructs using Variance Inflation Factor (VIF) values. As shown in Table 4, all VIF values range from 1.000 to 2.624, well below the recommended threshold of 5.0 (Hair *et al.*, 2016), indicating that multicollinearity is not a concern in our model.

The f^2 effect sizes presented in Table 4 indicate the impact of a specific exogenous construct on an endogenous construct when the exogenous construct is omitted from the model (Cohen, 1988). According to Cohen (1988) guidelines, f^2 values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively. Our results reveal that TTF has a large effect on PEOU ($f^2 = 0.763$) and PU

($f^2 = 0.316$), suggesting the critical role of task-technology fit in determining both perceived ease of use and perceived usefulness. Similarly, ATT has a large effect on OPI ($f^2 = 0.342$), confirming that attitude plays a crucial role in shaping e-invoice adoption intention. Other relationships display medium effect sizes, except for TTF → ATT, which shows a small-to-medium effect ($f^2 = 0.123$).

Table 4: VIF and f^2 Effect Sizes

Relationship	VIF	f^2	Effect Size
ATT → OPI	2.483	0.342	Large
PU → ATT	2.365	0.289	Medium
PU → OPI	2.624	0.147	Medium
PEOU → ATT	2.174	0.186	Medium
PEOU → PU	2.016	0.279	Medium
TTF → ATT	2.297	0.123	Small-Medium
TTF → PU	2.103	0.316	Large
TTF → PEOU	1.000	0.763	Large

Table 5 presents the R^2 and Q^2 values for the endogenous constructs in our model. The R^2 values measure the proportion of variance in an endogenous construct that is explained by its predictor constructs (Hair *et al.*, 2019). According to Chin (1998), R^2 values of 0.67, 0.33, and 0.19 are considered substantial, moderate, and weak, respectively. The results in Table 5 demonstrate that our model explains 69.3% of the variance in ATT, 62.5% in OPI, 43.3% in PEOU, and 64.2% in PU. These values suggest that the model has substantial explanatory power for ATT and PU, and moderate to substantial explanatory power for OPI and PEOU. The adjusted R^2 values, which account for model complexity, closely mirror the R^2 values, confirming that the model is well-specified without redundant constructs.

The Q^2 values were obtained through a blindfolding procedure with an omission distance of 7, as recommended by (Hair *et al.*, 2016). Q^2 values greater than zero indicate that the model has predictive relevance for a specific endogenous construct (Geisser, 1974; Stone, 1974). Our results show that all Q^2 values are substantially above zero, ranging from 0.317 to 0.527, demonstrating strong predictive relevance for all endogenous constructs in the model. Specifically, the model exhibits particularly strong predictive relevance for ATT ($Q^2 = 0.527$) and OPI ($Q^2 = 0.496$), suggesting that our model is highly capable of predicting attitude toward e-invoices and adoption intention among Vietnamese SMEs.

Table 5: R^2 and Q^2 Values

Construct	R^2	R^2 Adjusted	Q^2
ATT	0.693	0.686	0.527
OPI	0.625	0.619	0.496
PEOU	0.433	0.429	0.317
PU	0.642	0.636	0.452

The structural model results and hypothesis testing outcomes are presented in Table 6. The bootstrap procedure with 5,000 resamples was used to test the statistical significance of the path coefficients (Hair *et al.*, 2016). The results in Table 6 reveal that all hypothesized relationships are statistically significant ($p < 0.01$), providing strong support for all eight hypotheses.

Table 6: Path Coefficients and Hypothesis Testing Results

Hypothesis	Path	Path Coefficient	t-value	p-value	Result
H1	ATT → OPI	0.468	5.786	0	Supported
H2	PU → OPI	0.312	3.954	0	Supported
H3	PU → ATT	0.387	4.723	0	Supported
H4	PEOU → ATT	0.294	3.846	0	Supported
H5	PEOU → PU	0.382	4.897	0	Supported
H6	TTF → ATT	0.225	2.987	0.003	Supported
H7	TTF → PU	0.461	5.962	0	Supported
H8	TTF → PEOU	0.658	11.243	0	Supported

5. Discussion

5.1. Interpretation of Hypothesis Testing Results

The structural model results provide strong empirical support for all eight hypothesized relationships, validating the integrated TAM-TTF framework in the context of e-invoice adoption among Vietnamese SMEs. The findings reveal a complex network of relationships where task-technology fit serves as a crucial antecedent to traditional TAM constructs, which in turn shape attitude and adoption intention. The model's substantial explanatory power (R^2 = 62.5% for adoption intention) and strong predictive relevance (Q^2 = 0.496) demonstrate the value of integrating task-technology considerations with user perception constructs in understanding technology adoption behavior.

H1, which posited that attitude toward e-invoices positively influences e-invoice adoption intention, is strongly supported ($\beta = 0.468$, $t = 5.786$, $p < 0.001$). This finding aligns with the Theory of Reasoned Action and previous technology adoption studies, confirming that affective evaluations play a critical role in shaping behavioral intentions. The substantial path coefficient indicates that attitude is the strongest direct predictor of adoption intention in our model, explaining approximately 22% of unique variance. This finding is consistent with TAM literature showing that when individuals develop positive feelings about a technology, viewing it as good, beneficial, and desirable, they are significantly more likely to intend to adopt it. For Vietnamese SME leaders, positive attitudes toward e-invoices likely reflect recognition that the technology represents a progressive step toward business modernization rather than merely a compliance burden.

H2 and H3 proposed that perceived usefulness positively influences both e-invoice adoption intention and attitude. Both hypotheses are supported, with path coefficients of 0.312 ($t = 3.954$, $p < 0.001$) for PU → OPI and 0.387 ($t = 4.723$, $p < 0.001$) for PU → ATT. These findings corroborate the central tenet of TAM that perceived usefulness is a key determinant of both attitude and behavioral intention. The results suggest that Vietnamese SME leaders who perceive e-invoices as useful for enhancing business performance, improving operational efficiency, and facilitating tax compliance are more likely to develop positive attitudes and stronger adoption intentions. Notably, perceived usefulness influences adoption intention through both direct and indirect (via attitude) pathways, with the total effect being substantial. This dual pathway underscores that usefulness perceptions operate through both cognitive-instrumental and affective-evaluative mechanisms.

H4 and H5 suggested that perceived ease of use positively influences attitude and perceived usefulness, respectively. Both hypotheses are supported with significant path coefficients of 0.294 ($t = 3.846$, $p < 0.001$) for PEOU → ATT and 0.382 ($t = 4.897$, $p < 0.001$) for PEOU → PU. These findings confirm TAM's postulation that perceived ease of use affects attitude both directly and indirectly through perceived usefulness. The stronger effect of ease of use on usefulness ($\beta = 0.382$) compared to its direct effect on attitude ($\beta = 0.294$) suggests that ease of use primarily influences attitude through its

impact on usefulness perceptions. For Vietnamese SMEs with limited technical expertise and IT resources, the perception that e-invoices are easy to implement and use enhances both the technology's perceived utility and the overall positive evaluation of adopting the system.

H6, H7, and H8 related to the influence of task-technology fit on attitude, perceived usefulness, and perceived ease of use, respectively. All three hypotheses are supported, with path coefficients of 0.225 ($t = 2.987$, $p < 0.01$) for TTF → ATT, 0.461 ($t = 5.962$, $p < 0.001$) for TTF → PU, and 0.658 ($t = 11.243$, $p < 0.001$) for TTF → PEOU. These results validate the integration of TTF with TAM, as proposed by Dishaw and Strong (1999) and supported by subsequent research. Notably, TTF has the strongest direct effect on perceived ease of use ($\beta = 0.658$), indicating that when Vietnamese SME leaders perceive e-invoices as compatible with their invoicing tasks, they are significantly more likely to find the system easy to use. This finding suggests that task-technology alignment reduces the cognitive complexity and implementation effort associated with technology adoption.

5.2. Comparison with Existing Literature

Our findings align with and extend previous research on technology adoption in several important ways. First, the strong positive relationship between attitude and behavioral intention ($\beta = 0.468$) is consistent with meta-analytic findings showing attitude as a key proximal determinant of intentions across diverse technology contexts. Our effect size is comparable to or slightly higher than typical TAM studies, possibly reflecting the heightened importance of affective evaluations when adoption involves significant organizational change and resource commitment, as is the case with e-invoice implementation among resource-constrained SMEs.

Second, the significant effects of perceived usefulness on both adoption intention ($\beta = 0.312$) and attitude ($\beta = 0.387$) corroborate extensive TAM literature identifying perceived usefulness as a primary driver of technology acceptance. Our findings are particularly consistent with studies of organizational technology adoption where performance improvements are paramount. The relative strength of the usefulness-attitude relationship compared to the usefulness-intention relationship suggests that for Vietnamese SMEs, usefulness beliefs primarily shape adoption decisions through their impact on affective evaluations, which then drive behavioral intentions. This pattern differs somewhat from Western organizational contexts where perceived usefulness often shows stronger direct effects on intention, possibly reflecting cultural differences in decision-making styles or the mandatory nature of e-invoice adoption in Vietnam.

Third, our findings regarding task-technology fit's pervasive influence on TAM constructs strongly support previous research on TAM-TTF integration. The path coefficient from TTF to perceived ease of use ($\beta = 0.658$) is notably stronger than typically reported in TAM-TTF studies, which often find effect sizes in the 0.30-0.50 range. This particularly strong relationship may reflect the critical importance of task alignment for SMEs that lack resources for extensive system customization or process reengineering. When e-invoice systems fit well with existing invoicing tasks, SMEs perceive them as significantly easier to implement and use because less adaptation is required. This finding highlights a key mechanism through which task-technology fit influences adoption in resource-constrained contexts.

Fourth, our model's explanatory power ($R^2 = 62.5\%$ for adoption intention) exceeds that of many standalone TAM or TTF studies and is comparable to extended TAM models and TAM-TTF integrations reported in the literature. This substantial variance explained validates the value of combining task-technology considerations with user perception constructs. The predictive relevance ($Q^2 = 0.496$) further confirms that our model not only explains historical variance but also has strong predictive capability for forecasting adoption intentions among similar SME populations.

Our findings also align with recent research on e-invoice adoption in developing countries. Studies from Peru, Brazil, and Indonesia have found that smaller firms and sectors with lower baseline

compliance respond more strongly to e-invoicing mandates, suggesting that perceived benefits and ease of use are particularly salient for these enterprises. Our results extend this literature by identifying the psychological mechanisms through which these factors influence adoption, demonstrating how task-technology fit, usefulness perceptions, ease of use beliefs, and attitudes interact to shape adoption intentions among Vietnamese SMEs.

However, our study also reveals some interesting departures from prior research. The significant direct effect of task-technology fit on attitude ($\beta = 0.225$), while theoretically consistent with TTF-TAM integration, is stronger than reported in some previous studies where this relationship was non-significant or weak. This finding may reflect the specific characteristics of the e-invoice adoption context, where task appropriateness is particularly salient due to the diversity of SME business models and invoicing requirements. The mandatory nature of e-invoice adoption in Vietnam may also heighten attention to task-technology fit, as SMEs cannot simply reject the technology but must carefully evaluate how well it fits their specific needs.

6. Conclusion

6.1. Theoretical Implications

This study makes several important theoretical contributions to technology adoption research. First, it validates the integrated TAM-TTF framework in a novel context, mandatory digital tax compliance in an emerging economy. While TAM-TTF integration has been tested in various voluntary technology adoption settings, its applicability to mandatory adoption contexts with diverse organizational characteristics has received limited attention. Our findings demonstrate that even in mandatory adoption scenarios, user perceptions and task-technology fit remain critical determinants of adoption intention. This suggests that compliance mandates alone are insufficient to drive successful adoption; attention to user beliefs, attitudes, and task alignment remains essential.

Second, the study illuminates the mechanisms through which task-technology fit influences adoption decisions. The strong effects of TTF on perceived ease of use and perceived usefulness, combined with the direct effect on attitude, reveal that task alignment shapes adoption through multiple pathways: reducing perceived implementation complexity, enhancing perceptions of utility, and directly influencing affective evaluations. This multi-pathway influence suggests that task-technology fit operates as a foundational determinant that cascades through the adoption process, ultimately manifesting in behavioral intentions. Future research should explore additional mediating mechanisms and boundary conditions that may amplify or attenuate these effects.

Third, our findings contribute to understanding technology adoption in resource-constrained organizational contexts. The particularly strong influence of task-technology fit on perceived ease of use ($\beta = 0.658$) highlights that when organizations lack resources for extensive customization and support, the inherent fit between technology and tasks becomes critically important. This finding extends technology adoption theory by identifying a boundary condition where task-technology fit may be more influential than in resource-rich contexts. It suggests that theoretical models of technology adoption should incorporate organizational resource constraints as moderating variables that shape the relative importance of different adoption determinants.

Fourth, the study advances understanding of the attitude construct in technology adoption. While attitude has been somewhat marginalized in later technology adoption models (e.g., UTAUT), our findings demonstrate its continued importance as a proximal determinant of behavioral intention. The substantial variance that attitude explains in adoption intention (unique contribution of approximately 22%), combined with its strong relationships with perceived usefulness and ease of use, confirms that affective evaluations remain central to adoption decisions. This finding suggests that researchers should not prematurely exclude attitude from technology adoption models, particularly in contexts involving significant change and uncertainty.

6.2. Practical Implications

The findings of this study offer several actionable implications for policymakers, technology providers, and SME managers involved in e-invoice adoption initiatives. First, the critical importance of task-technology fit suggests that e-invoice system designers and policymakers should prioritize developing flexible, adaptable solutions that accommodate the diverse invoicing requirements of different SME sectors and business models. One-size-fits-all approaches are likely to encounter resistance and implementation challenges. Instead, systems should offer configurable features, multiple integration options, and support for various transaction types to ensure good fit with heterogeneous SME tasks.

Second, given the strong influence of perceived ease of use on both perceived usefulness and attitude, simplifying the user experience should be a top priority. This implies designing intuitive interfaces, streamlining registration and setup processes, providing clear documentation and tutorials, and offering responsive technical support. For Vietnamese SMEs with limited IT expertise, reducing technical complexity can significantly lower adoption barriers. Government agencies and technology providers should invest in user experience design and conduct extensive usability testing with actual SME users before large-scale deployment.

Third, the significant effects of perceived usefulness on both attitude and adoption intention underscore the importance of clearly communicating tangible benefits. Policymakers and technology providers should develop targeted communication strategies that highlight concrete ways e-invoices improve business operations: reducing processing time, minimizing errors, improving cash flow visibility, facilitating audits, and enabling better financial management. Case studies and testimonials from successful SME adopters can make benefits more credible and relatable. Demonstrating return on investment through quantitative metrics (e.g., time savings, error reduction rates) may be particularly persuasive for resource-conscious SME leaders.

Fourth, recognizing attitude's critical role as the strongest proximal determinant of adoption intention suggests that interventions should address not only cognitive beliefs but also affective responses. This might involve reframing e-invoice adoption from a compliance burden to a modernization opportunity, showcasing how early adopters have used e-invoicing as a foundation for broader digital transformation, and creating positive social norms around adoption through industry associations and business networks. Addressing emotional concerns, such as anxiety about technology, fear of change, and resistance to government oversight, is as important as demonstrating functional benefits.

Fifth, the findings suggest targeted support strategies for different SME segments. SMEs that perceive lower task-technology fit may require more intensive support including customized training, dedicated technical assistance, and possibly financial subsidies for implementation costs. Government programs could offer tiered support based on SME characteristics (size, sector, digital maturity) to ensure equitable access to e-invoice benefits. Industry associations could facilitate knowledge sharing and peer learning among SMEs facing similar challenges.

Sixth, for SME managers, the study highlights the importance of carefully evaluating task-technology fit before selecting e-invoice solutions. Rather than choosing systems based solely on cost or government recommendations, SMEs should assess how well different solutions align with their specific invoicing workflows, transaction patterns, and existing systems. Conducting pilot tests, seeking feedback from employees who will use the system daily, and planning for adequate training and change management are critical steps for successful implementation.

6.3. Limitations and Boundary Conditions

Despite its contributions, this study has several limitations that should be acknowledged and addressed in future research. First, the cross-sectional research design limits our ability to make strong causal inferences or examine how relationships among constructs evolve over time. Technology adoption is

inherently a temporal process involving stages of awareness, evaluation, adoption decision, implementation, and post-adoption adaptation. Our snapshot measurement cannot capture these dynamics or identify how beliefs and attitudes change as SMEs gain experience with e-invoices. Longitudinal research following SMEs through the adoption process would provide richer insights into temporal dynamics and the relative importance of different factors at various stages.

Second, reliance on self-reported measures introduces common method bias concerns, although our statistical remedies (Harman's single-factor test, marker variable technique) suggest this is not a severe problem in our data. Nevertheless, future research could strengthen causal inference by incorporating objective measures such as actual adoption behavior tracked through government databases, system usage logs, or third-party assessments of implementation success. Combining self-reported perceptual data with objective behavioral and performance data would provide more robust evidence of technology adoption effects.

Finally, our study focused on the adoption decision stage and did not examine post-adoption outcomes such as implementation success, sustained usage, or performance impacts. Understanding factors that predict not just adoption intention but also successful implementation and value realization is critical for assessing the ultimate impact of e-invoice initiatives. Future research should examine post-adoption variables including system utilization intensity, user satisfaction, perceived benefits realization, and impacts on operational efficiency and tax compliance.

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