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Research Article

An Integrated Framework Approach to Understanding Vietnamese People's Intention to Adopt Smart Home Solutions

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In recent years, although smart homes and smart home solutions have been widely accepted in developed regions (such as Europe, the United States, and Japan), their application in emerging countries (such as Vietnam) remains limited. This study is aimed at assessing the factors influencing Vietnamese people's intention to adopt smart home solutions based on the integration of the technology acceptance model and innovation diffusion theory. The study collected quantitative data from a survey of 310 participants in Vietnam and analyzed them using structural equation modelling with AMOS software. This study's findings show that compatibility and perceived usefulness play important roles in promoting users' intention to adopt smart home solutions. This study has practical implications for businesses in Vietnam and provides useful recommendations for future research.

1. Introduction

Aldrich [1] defines smart homes as residences equipped with computers and information technology to meet the needs of the occupants and improve their quality of life in terms of health, safety, comfort, and enjoyment. Further, using a single communication infrastructure, smart homes integrate diverse services and ensure an inexpensive, secure, and user-friendly interface with numerous features and customization options [2]. Currently, the term "smart home" is gaining popularity and is regularly cited in the field of technology as a cutting-edge trend that can offer people a more pleasant and high-class lifestyle. Smart home solutions comprise the Internet of Things applications using a home network to operate the system and increase occupants' quality of life [3].

According to Statista [4], the global smart home market revenue in 2022 will reach approximately $117.55 billion. Currently, the United States dominates the smart home market ($31.45 billion), followed by China, the United Kingdom, Germany, and Japan. The household penetration rate of smart home products is projected to increase from 14.2% in 2022 to 28.8% by 2027. It is expected that 672.6 million households worldwide will use smart homes by the year 2027. This forecast means that the global smart home market will reach $222.9 billion by 2027, with a compound annual growth rate (CAGR) of 12.47% from 2022 to 2027.

Vietnam is a developing country in the Asia-Pacific region. Smart home solutions have gradually become well-known in Vietnam since 2007. Statista [4] predicted that 22.6% of Vietnamese households will have smart home devices by 2027; in five years, there will be approximately six million smart homes in the country. The report also stated that the revenue of Vietnam's smart home market in 2022 was estimated at approximately $232.3 million. Revenue is expected to reach $460.1 million by 2027, with a 12.51% CAGR. This indicates that smart home solutions have considerable potential in Vietnam. Based on the technology acceptance model (TAM) and innovation diffusion theory (IDT), this study focuses on identifying the most significant factors that may impact potential users' intention to adopt smart home solutions and proposes suitable markets for providers in Vietnam.

The remaining sections of this paper are organized as follows: first, we introduce the theoretical framework, propose hypotheses, and develop a research model. Next, we summarize our research methodology, including our data obtaining and measurement techniques. In the following section, the survey results will be presented, including a demographic breakdown. In addition, a reliability study and model evaluation of the proposed model will be conducted to demonstrate how smart home solution adoption intentions influence consumers. In conclusion, there will be a discussion of the study's limitations, implications, conclusion, and future research potential.

1.1. Theoretical Framework and Proposed Hypotheses. The theory of reasoned action (TRA) is one of the most well-known theories regarding individual human behavior. The TRA describes the relationship between individuals' behavior and their intentions, attitudes, and beliefs. Although the TRA is widely used to explain large-scale technological acceptance, it has flaws and must be improved, especially when choosing research objectives [5]. Ajzen extended the TRA to what he called the theory of planned behavior (TPB), according to which behavioral intention is hypothesized to be the most influential predictor of people's willingness to engage in a given behavior [6]. Attitudes towards behavior, subjective norms, and perceived behavioral control affect behavioral intention. Although the TRA and TPB have been tested in various contexts [7, 8], in this study, we apply the TAM, which is based on the TRA and TPB. The TAM is the most widely used framework for exploring IT adoption/use behaviors in different fields [9, 10], including smart home solutions [11]. In line with the TRA and TPB, the TAM posits that beliefs and evaluations influence behavioral intention [12]. The TAM is an adaptation of TRA concepts in the field of IT adoption methodology, such that beliefs and evaluations are the perceived usefulness (PU) and perceived ease of use (PEOU) of technological systems [13]. The TAM included both attitudes and intentions in the original model. However, according to Davis [12], attitudes can be omitted from this model. Indeed, attitudes have been removed from all later editions of the TAM without further explanation [14, 15]. Thus, in this study, we only focus on two main structural components of the TAM model—PU and PEOU.

In addition to the TAM, IDT is a fundamental innovation theory that explains the process of technology adoption in unique and innovative services and technologies [16]. IDT argues that such services and technologies' relative advantages, complexity, compatibility (COM), observability, and trialability (TRI) affect prospective users' attitudes towards them. Previous studies have shown that a combination of theories [17–21] may provide a better explanatory model for users' intention to adopt certain technologies (e.g., smart home applications) [22, 23]. However, all the components of the IDT are not used. For example, Moore and Benbasat [24] argued that the IDT component relative advantage is similar to PU, while complexity is closely related to PEOU. Therefore, relative advantage and complexity will not be included in this study's model.

Another IDT variable, observability, is also excluded because of its irrelevance to the research context. Observability is the degree to which users perceive that they can explain, describe, or communicate the results of an innovative service [25]. It comprises innovation visibility and perceived result demonstrability [24]. People may not be able to comprehend complicated technologies and their benefits without actually using them. This is particularly true for smart home applications [26]. Additionally, previous studies have shown that observability is not significant for users' intention to adopt a given technology [21, 25]. Therefore, we did not consider the observability construct in this study.

In addition to the factors identified through the integration of the TAM and IDT, this study investigates the role of perceived enjoyment (PEN) in potential users' intention to adopt smart home solutions. PEN is defined as the degree to which a technological activity is considered enjoyable [27]. Several studies have found that PEN plays an important role in users' adoption of technology and is correlated with PU and PEOU in the TAM [28, 29]. Further, previous research has shown that PEN is important for explaining behavioral intentions [30].

1.2. PU, PEOU, and the Intention to Adopt Smart Home Solutions. PU is understood as an individual's belief about the benefits of technology, while PEOU is their belief about how easy it will be to use a specific technology [12]. In the TAM framework, easy-to-use services can increase usage intention. Usage intention is also positively influenced by services' PU. Moreover, PU positively influences services' PEOU. The impact of PU and PEOU on usage intention, as well as the relationship between these variables, has also been confirmed in various technology research contexts [13, 31, 32], including smart home solutions [21, 33, 34]. Therefore, this study assesses said relationship and posits the following hypotheses:

H1: PU has a positive impact on Vietnamese households' intention to adopt smart home solutions (INT).

H2a: PEOU has a positive impact on Vietnamese households' INT.

H2b: PEOU has a positive impact on PU.

1.3. COM and TRI as Predictors of INT. As discussed above, IDT is a fundamental innovation theory that explains technology adoption in unique and innovative services and technologies [16]. In this study, we expect that the IDT's two variables, COM and TRI, could serve as predictors of INT.

COM is the extent to which an innovation fits the home and meets its occupants' needs [35]. This refers to the degree to which an innovation stands out from all other possibilities in terms of its fit with the purpose of potential consumers [36]. In other words, the COM of technology with a user's lifestyle is expected to have a beneficial effect on INT. Recent empirical studies [21, 22] have shown that COM directly affects PU, PEOU, and INT. Hence, we propose the following hypotheses:

H3a: COM has a positive impact on Vietnamese households' INT.

H3b: COM has a positive impact on PEOU.

H3c: COM has a positive impact on PU.

TRI refers to the extent to which an innovation can be tested within a certain framework and set of conditions [35]. It can become a major determinant of consumer behavior in the context of intense competition by providing potential customers with the opportunity to test innovation for a limited time before adopting or rejecting a new technology. Lee et al. [37] observed that allowing people to experiment motivates them to decide to adopt the technology. PU and PEOU mediate the relationship between TRI and usage intention in different empirical contexts of technology [37–39]. Thus, we hypothesize the following:

H4a: TRI has a positive impact on Vietnamese households' INT.

H4b: TRI has a positive impact on PEOU.

H4c: TRI has a positive impact on PU.

1.4. Role of PEN. PEN refers to the degree to which technology is viewed as enjoyable, regardless of its performance [27]. Researchers have found that people interested in a new technology are more likely to use it in different situations. For example, Van der Heijden [30] and Hsu and Lin [40] found that PEN was significant in explaining the behavioral intention to use hedonic systems. It has also been found that the intention to use computers is strongly correlated with PEN [41]. We anticipated a similar relationship in our research context. In addition to its direct impact on INT, PEN is an important construct that can enhance PU and PEOU towards technology. Venkatesh [42] found that PEN can positively impact an individual's PEOU towards information technologies; he also showed that users' increased exposure to the system in practice strengthened PEN's impact on PEOU. Moreover, Teo and Noyes [43] empirically proved that this factor is a significant predictor of PU, PEOU, and intention to use technology. Thus, this study assessed PEN's impact on INT, PU, and PEOU. Therefore, we propose the following hypotheses:

H5a: PEN has a positive impact on Vietnamese households' INT.

H5b: PEN has a positive impact on PEOU.

H5c: PEN has a positive impact on PU.

Figure 1 is a diagram of these hypotheses as presented in the proposed research framework.

2. Materials and Methods

2.1. Data Collection. More than 80% of Vietnamese Internet users, corresponding to 43% of the population, use social media [44]. Facebook and Zalo scored the highest. Thus, this social media platform was utilised to attract respondents to our online survey in September 2021 and collect data from 310 respondents representing households with a potential need for smart home solutions. In this study, the snowball sampling technique was utilized. Following this technique, respondents proposed their friends and acquaintances as potential online questionnaire responders [45]. Social networks allow users to create public profiles and interact explicitly with others. Hence, the virtual snowball sampling approach identified potential respondents through prior interpersonal contact. All other items were changed or incorporated from the prior studies presented in Table 1.

A screening question was used at the start of the poll to identify qualified responders. Participants were asked to indicate whether they owned a house or an apartment. Subsequently, they were introduced to the definition of smart home solutions before being asked to confirm their understanding of the definition. To prevent missing values, the respondents were asked to reply sequentially to all obligatory questions. Participants' demographic characteristics are shown in Table 2. Younger individuals are typically more technologically adept and receptive to adopting new technologies, such as smart home solutions. On the other hand, older individuals may be more reluctant to implement new technologies and may require additional instruction or assistance to comprehend the benefits of smart home solutions. A person's location can also influence their intent to employ smart home solutions. Individuals in urban areas, where technology is more accessible and the pace of life is quicker, may be more likely to employ smart home solutions to make their lives easier and more convenient.

2.2. Measures. The measures used in this study were derived from those employed in other studies. PU, PEOU, and INT were adapted from the research of Davis [12] and Nikou [21]. The IDT's two constructs, COM and TRI, were measured using a scale adapted from the research of Rogers [46] and Nikou [21], whereas the PEN measure was adapted from Lee [47] research. We used a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) to evaluate all of the questionnaire's items. To verify the content validity of the measures, we conducted a qualitative exploratory study using data obtained from six in-depth interviews. The measurement instrument was tested with potential Vietnamese users to avoid bias and verify the clarity of the items and language. Table 3 lists the final items used in the study.

3. Results

3.1. Reliability and Validity of Measurement Scales. According to Anderson and Gerbing [48], the model was modified to ensure the reliability and validity of the measurement scales. In this study, we conducted exploratory factor analysis using SPSS 26 software to identify the basic factors and determine the degree of correlation between each factor and the observed variables. After removing some observed variables, we performed confirmatory factor analysis for the overall measurement model and determined the model fit in the next phase. The analysis results in Table 3 show that the item factor loadings (λ) are all greater than 0.6, while the composite reliability (ρ) of all constructs in the study is higher than 0.7 (ranging from 0.759 to 0.943). All constructs had an average variance extracted (AVE) greater than 0.5. Therefore, it can be said that the measurement has sufficient convergent validity and reliability [49].

Table 4 shows the descriptive statistics and discriminant validity tests for the independent constructs. The discriminant validity measures whether distinct factors are related. Discriminant validity was checked by comparing the square

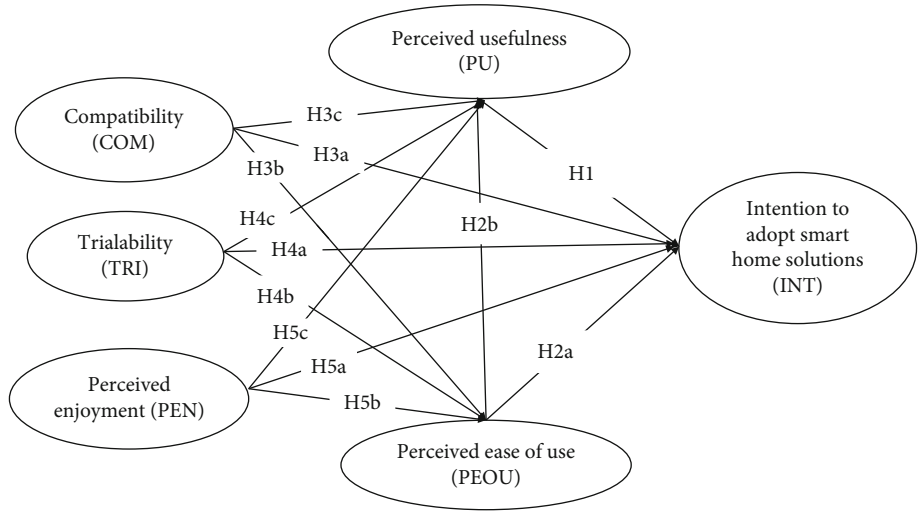

Figure 1: Research model.

Table 1: Study constructs, components, and references.

Construct	Items	Item description	References
PU	PU1	Using smart home solutions helps me save time at work.	([12]; [31]; [32]; [13]; [21]; [33]; [34])
	PU2	Using smart home solutions helps me improve my work efficiency.	
	PU3	Using smart home solutions helps me improve my quality of life.	
	PU4	Through smart home solutions, I can easily access new technologies.	
	PU5	Smart home solutions help my family be more secure in life.	
	PU6	I think smart home solutions will help increase my ability to connect with family and loved ones.	
	PU7	In general, I feel that smart home solutions are useful.	
PEOU	PEOU1	I think I can easily use smart home solutions.	
	PEOU2	I think I can master smart home solutions in a short time.	
	PEOU3	Overall, I feel that using smart home solutions is easy.	
COMP	COMP1	I feel that smart home solutions fit my lifestyle.	([35]; [22]; [21]; [16])
	COMP2	I feel that smart home solutions are compatible with my daily needs.	
	COMP3	I think smart home solutions fit my family's needs and life.	
	COMP4	I think smart home solutions are suitable for my current home.	
TRI	TRI1	Before opting to utilize smart home solutions, I believe I should test them out to assess their quality.	([35]; [37]; [38]; [39])
	TRI2	Before properly using smart home solutions, I believe it is important to go through a trial period to determine their level of safety.	
	TRI3	Being able to try and experience smart home solutions before using them is extremely important to me.	
	TRI4	I think it is important to thoroughly research and clarify questions about smart home solutions before intending to use them.	
PEN	PEN1	I love to experience new technologies.	([27]; [42]; [30]; [40])
	PEN2	I think that smart home solutions are considerably interesting.	
	PEN3	I think smart home solutions will bring many new experiences for users.	
	PEN4	I love discovering new technologies.	
	PEN5	I love discovering new things about technology in life.	
INT	INT1	I intend to use smart home solutions in the future.	([14]; [15]; [16]; [17]; [18]; [19]; [20]; [21])
	INT2	I intend to use smart home solutions.	
	INT3	As smart home technology becomes more prevalent, I will consider utilizing (or upgrading) a smart home system for my home.	
	INT4	In the near future, I intend to install smart home solutions in my home.	

Table 2: Participants' demographic characteristics.

Consumer profile	Frequency	Percentage
Gender		
Male	122	39.4
Female	188	60.6
Occupation		
Managers/employees in private/foreign companies	197	63.5
Functionaries/employees in state enterprises/organizations	49	15.8
Others	64	20.6
Place of residence		
Hanoi city	209	67.4
Other provinces	101	32.6
Age		
20–25	39	12.6
26–30	113	36.5
31–40	111	32.5
41–45	29	9.4
46–50	28	9.0

Note: $n = 310$.

root of the AVE to the correlation between this construct and other components in the model (bivariate correlations). All values in Table 4 show the results of the discriminant analysis. As all the AVEs were higher than the factor correlation coefficients, the discriminant validity of the measures was demonstrated [50].

3.2. Hypothesis Testing Results. After analyzing the scale's reliability and validity, a structural model was created to evaluate the study hypotheses. This was bootstrapped using 500 samples. The structural model fit measurements showed an adequate fit [49]: chi-square = 2.775, goodness of fit index = 0.806, Tucker-Lewis' index = 0.895, comparative fit index = 0.908, and root mean squared error of approximation = 0.076. The R^2 values for INT, PU, and PEOU were 0.691, 0.658, and 0.545, respectively.

Table 5 and Figure 2 show the combined results of hypothesis testing in the research model. First, H1, H2a, and H2b exhibited TAM connections. H1 focused on the influence of PU on INT, whereas H2a and H2b considered the influence of PEOU on INT and PU. According to the results, PU has a positive and significant impact on INT ($\beta = 0.235$; p value < 0.05), while PEOU also has an impact on PU ($\beta = 0.216$; p value < 0.05), supporting H1 and H2b. However, the path from PEOU to INT was not significant ($p > 0.05$). Thus, H2a was not supported.

In terms of the hypotheses involved with the TAM and IDT's variables, the results showed that the paths from COM to INT, PEOU, and PU were positive and significant (INT: $\beta = 0.581$; p value < 0.001; PEOU: $\beta = 0.329$; p value < 0.001; PU: $\beta = 0.252$; p value < 0.001). Consequently, H3a, H3b, and H3c were supported. Conversely, the path from TRI to INT and PEOU was not significant; therefore, H4a and H4b were not supported.

Finally, the associations among PEN, PEOU, and PU were positive and significant (PEOU: $\beta = 0.456$; $p < 0.001$; PU: $\beta = 0.345$; $p < 0.001$). In other words, both H5b and H5c were supported. Nevertheless, regarding the path from PEN to INT, the results show that PEN and INT were not positive or significant (p value > 0.05); thus, H5a was not supported.

Among the significant variables affecting INT, COM had the greatest influence ($\beta = 0.581$), followed by PU ($\beta = 0.235$). When looking at the significant variables that affect PU, PEN had the greatest influence ($\beta = 0.345$), whereas TRI had the smallest impact ($\beta = 0.149$). Similarly, the study found that PEN had the greatest effect on PEOU ($\beta = 0.456$), followed by COM ($\beta = 0.329$).

4. Discussion

First, our findings showed a significant correlation between PU and intention to adopt smart home solutions. PU significantly and positively affected INT and mediated the influence of PEOU on intention. This may be because when customers perceive the usefulness of a product through its ease of use, they may want to use it more. This conclusion supports previous findings in the literature concerning the beneficial correlation between PU and INT [21, 33, 34].

Second, we found that PEOU did not directly affect INT. This contrasts with what has been discovered in studies conducted in developed nations [12, 29]. This may be because most of the participants (>80%) in our survey were millennials aged 20–40 years. Millennials, born between 1980 and the early 2000s, are generally well-educated and technology-savvy [51]. Recently, it was discovered that Vietnamese millennial customers have the characteristics of a global generation and are open-minded [52]. These

Table 3: Reliability and convergent validity of measurement scales.

Construct	Items	Factor loading (λ)	Composite reliability (ρ)	AVE
PU	Using smart home solutions helps me save time at work.	0.755	0.900	0.563
	Using smart home solutions helps me improve my work efficiency.	0.768		
	Using smart home solutions helps me improve my quality of life.	0.799		
	Through smart home solutions, I can easily access new technologies.	0.745		
	Smart home solutions help my family be more secure in life.	0.705		
	I think smart home solutions will help increase my ability to connect with family and loved ones.	0.650		
	In general, I feel that smart home solutions are useful.	0.814		
PEOU	I think I can easily use smart home solutions.	0.609	0.759	0.515
	I think I can master smart home solutions in a short time.	0.742		
	Overall, I feel that using smart home solutions is easy.	0.789		
COMP	I feel that smart home solutions fit my lifestyle.	0.820	0.906	0.707
	I feel that smart home solutions are compatible with my daily needs.	0.909		
	I think smart home solutions fit my family's needs and life.	0.877		
	I think smart home solutions are suitable for my current home.	0.748		
TRI	Before opting to utilize smart home solutions, I believe I should test them out to assess their quality.	0.779	0.884	0.657
	Before properly using smart home solutions, I believe it is important to go through a trial period to determine their level of safety.	0.870		
	Being able to try and experience smart home solutions before using them is extremely important to me.	0.857		
	I think it is important to thoroughly research and clarify questions about smart home solutions before intending to use them.	0.727		
PEN	I love to experience new technologies.	0.873	0.943	0.768
	I think that smart home solutions are considerably interesting.	0.904		
	I think smart home solutions will bring many new experiences for users.	0.844		
	I love discovering new technologies.	0.893		
	I love discovering new things about technology in life.	0.866		
INT	I intend to use smart home solutions in the future.	0.824	0.884	0.656
	I intend to use smart home solutions.	0.853		
	As smart home technology becomes more prevalent, I will consider utilizing (or upgrading) a smart home system for my home.	0.791		
	In the near future, I intend to install smart home solutions in my home.	0.770		

Source: AMOS output.

Table 4: Descriptive statistics and discriminant validity.

Constructs	Mean	SD	PEN	PU	INT	TRI	PEOU	COM
PEN	4.405	0.724	0.876*					
PU	4.213	0.695	0.745	0.750*				
INT	4.038	0.854	0.638	0.701	0.810*			
TRI	4.347	0.735	0.529	0.526	0.414	0.810*		
PEOU	3.882	0.793	0.696	0.682	0.624	0.412	0.718*	
COM	3.898	0.884	0.675	0.689	0.804	0.417	0.651	0.841*

Source: AMOS output. *Square root of the average variance extracted from each construct.

Table 5: Hypothesis testing results.

Hypotheses	Paths			Std. beta	S.E.	C.R.	p value	Supported
H1	PU	⟶	INT	0.235	0.102	2.948	0.003	Yes
H2a	PEOU	⟶	INT	0.070	0.090	0.893	0.372	No
H2b	PEOU	⟶	PU	0.216	0.070	2.786	0.005	Yes
H3a	COM	⟶	INT	0.581	0.080	7.745	***	Yes
H3b	COM	⟶	PEOU	0.329	0.070	4.327	***	Yes
H3c	COM	⟶	PU	0.252	0.055	3.817	***	Yes
H4a	TRI	⟶	INT	0.011	0.063	0.213	0.831	No
H4b	TRI	⟶	PEOU	0.033	0.066	0.521	0.603	No
H4c	TRI	⟶	PU	0.149	0.048	2.934	0.003	Yes
H5a	PEN	⟶	INT	0.017	0.093	2.233	0.815	No
H5b	PEN	⟶	PEOU	0.456	0.087	5.670	***	Yes
H5c	PEN	⟶	PU	0.345	0.071	4.729	***	Yes

Source: AMOS output. $^{**}p < 0.05$, $^{***}p < 0.001$.

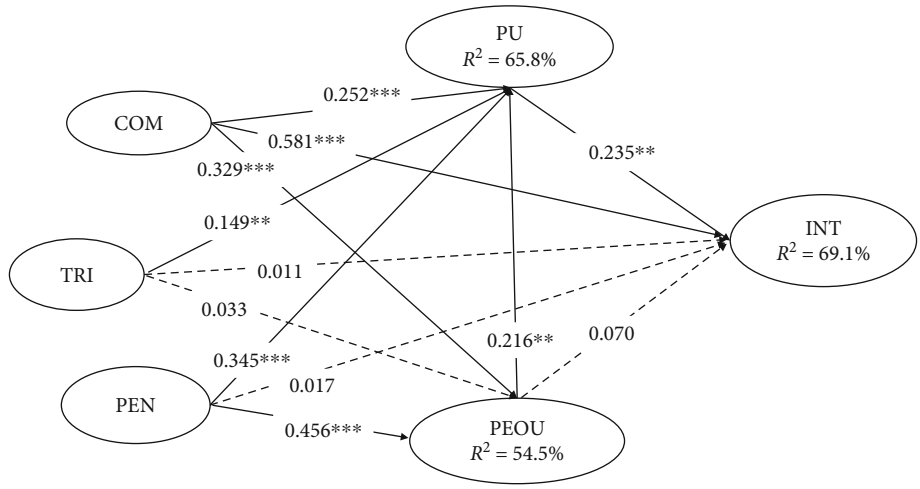

Figure 2: Structural model results. $^{**}p < 0.05$; $^{***}p < 0.001$; ⟶: non-significant path.

generational features help them not perceive the difficulty of using new technologies. Thus, PEOU had no significant influence on INT.

COM was found to have a direct and positive impact on INT. This result corroborates Malek and Mat [36] findings. Moreover, our results are compatible with the findings of other studies [37–39] that showed that COM had a positive impact on PU and PEOU. However, contrary to our expectations, the direct impact of TRI on INT was not significant. TRI had only an indirect effect on INT via PU. This means that TRI can enhance consumers' beliefs about smart home technology but does not directly determine their adoption intention. This is perhaps explained by the fact that Vietnamese consumers today, especially millennials, are already familiar with smart home technology. They are also more certain about their consumption habits than previous generations [51, 52]. Therefore, TRI is insignificant in forming their intentions to adopt technology; they simply want to test the product to evaluate its usefulness.

Finally, this study revealed that PEN has a substantial impact on the key constructs of TAM: PU and PEOU. These findings confirm the results of previous studies on the intention to adopt technologies [42, 47]. These results support our hypothesis that when customers find a product useful and easy to use because of its fun and attractive qualities, they have an increased intention to use it. The reason may be that Vietnamese people are no longer astonished or highly fascinated by new technologies because they have been exposed to them in recent decades. Thus, the attractiveness of a product decreases or is no longer the main factor affecting customer behavior.

4.1. Implications. This study has several contributions and implications. First, our theoretical model and research results provide novel perspectives on potential users' intention to adopt smart home solutions in developing countries. Contrary to past studies, our model emphasizes the significance of COM and PU in increasing INT. Therefore, our

approach does not replace the theoretical frameworks of the TAM and IDT but complements them.

Our research model incorporates the theoretical frameworks of TAM and IDT and an external factor, PEN, to determine the factors influencing INT in the Vietnamese context. This study offers valuable insights into the field of technology and sets the stage for future research. It confirms that the TAM and IDT frameworks are theoretically suitable to analyze the smart home context and that the combination of these two frameworks is significant in explaining Vietnamese households' INT.

In addition to its practical contributions, this study can help businesses plan suitable product development and marketing activities. Vietnam is a rapidly growing market for smart home technologies. Smart home suppliers should create strategies to develop services and increase benefits for potential customers. This study shows a strong and positive relationship between COM and PU, PEOU, and INT. Thus, understanding the factors that affect customer behavior can provide important market insights for providers. In particular, businesses should focus on highlighting the most important benefits of smart home solutions for Vietnamese households, such as device compatibility with the home and their various benefits regarding work and daily life. Hence, marketing and communication initiatives should emphasize these advantages.

4.2. Limitations and Further Research. Our study has several limitations. In reality, the model used in this study simply considers adoption intention. In investigating the hypothesis, the current study did not take into consideration the interrelationship between demographic parameters. For instance, it is generally accepted that demographic features such as gender, occupation, and age are closely related. Additionally, our study just focused on urban location. In contrast, the individuals in rural areas with limited access to technology may be more unwilling to adopt smart home solutions or require additional instructional materials and assistance to comprehend their benefits. When attempting to comprehend the Vietnamese people's intent to adopt smart home solutions, it is especially important to consider their age and location. By comprehending these variables, companies can create targeted marketing and education campaigns to increase adoption rates. Future studies should examine behavior to explain real consumer behavior towards smart home technology, even if the intention has typically been considered the major determinant of actual behavior. Finally, we examined only a single sample, primarily focusing on Vietnamese millennials, using a sample mostly consisting of young participants may also skew the results towards factors that are more relevant to younger individuals, rather than to the specific that older individuals or individuals from different cultural and location backgrounds may face when adopting smart home solution technology. Future research should extend the sample to compare the different generational patterns of smart home solutions' adoption to ensure that the sample used for research is representative of the broader population and includes individuals from a range of ages, backgrounds, and experiences in order to provide robust and accurate results. Revisiting this study as cross-national comparative research in the ASEAN region for a more comprehensive view of smart home solutions-related behavior is also an interesting direction that could offer valuable contributions.

Data Availability

The data used to support the findings of the study can be obtained from the corresponding author upon request.

Ethical Approval

Approval was obtained from the ethics committee of the Posts and Telecommunications Institute of Technology, Vietnam. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

Consent

When the interviews started, the research aims were communicated to the respondents, who were also informed that their participation was completely voluntary and that they might be able to terminate at any time. Respondents received their verbal, informed consent. To secure the confidentiality of respondents, transcripts were pseudonymized.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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