Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 12:2025
DOI: 10.5281/zenodo.18013747

UNDERSTANDING SMART HOME ADOPTION THROUGH UTAUT AND PERSONAL INNOVATIVENESS: A FRAMEWORK MODEL IN VIETNAM

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Abstract

This study investigates the factors of smart home adoption among young consumers in Ho Chi Minh City, Vietnam, using the Unified Theory of Acceptance and Use of Technology (UTAUT) integrated with Personal innovation factor. A survey of 320 respondents was analyzed using AMOS to examine relationships among performance expectancy, effort expectancy, social influence, facilitating conditions, and personal innovation. Results indicate that perceived usefulness, ease of use, and social influence significantly shape adoption intentions, while personal innovation enhances individuals' willingness to adopt new technologies. Facilitating conditions further support actual usage behavior. The study extends UTAUT's applicability to the smart home context in emerging markets and highlights the psychological and technological factors driving adoption. Managerial implications emphasize the importance of designing user-friendly, reliable, and experience-oriented products to encourage adoption and sustain growth in Vietnam's rapidly developing smart home industry.

Keywords: UTAUT, Personal Innovation, Smart Home Adoption, Young Customer, Vietnam.

1. INTRODUCTION

Amidst the strong digital transformation, the smart home device market in Vietnam, particularly in Ho Chi Minh City, has emerged as a potential segment, yet it also presents numerous challenges. This growth is driven by national strategies on Industry 4.0 technology, under which Ho Chi Minh City is oriented to become a smart city and the digital economic hub of the country (Decision 392/QD-TTg, 2015; HCMC People's Committee, 2022). According to Statista (2021), the revenue of the smart home device industry in Vietnam reached approximately USD 123 million in 2020 and is projected to reach nearly USD 450 million by 2025, with growth concentrated in the entertainment, security, and lighting segments (Tri & Vy, 2024). Ho Chi Minh City has a faster development rate than other regions due to its technological infrastructure, investment capital flows, and the rise of the middle class (Lumi, 2022).

Recent research indicates that Vietnamese consumers' smart home device adoption behavior is influenced by various technical and social factors. Truong & Le (2022) assert that perceived usefulness, ease of use, security, and privacy are key factors. Trong et al.

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(2021) add that perceived usefulness and personal innovation capability strongly influence usage intention, whereas perceived risk has no significant impact. This highlights the role of user experience and trust in technology consumption decisions.

A survey in Ho Chi Minh City with over 300 users shows that emotional drivers, social influence, and trust are factors promoting usage intention, while cost is a major barrier (Tri & Vy, 2024). Key challenges include: (1) low perceived value, especially for basic products like smart light bulbs or smart plugs (Nhi, 2022); (2) concerns about personal data security and privacy (Truong & Le, 2022); (3) limited market awareness, as most users only purchase discrete devices instead of integrated ecosystems (Statista, 2021); and (4) demographic differences, with the 25–35 age group accounting for approximately 80% of those interested in smart home technology (Lumi, 2022).

From the above evidence, it can be seen that the smart home device market in Ho Chi Minh City has great potential, but the adoption rate is uneven. Analyzing usage behavior based on an appropriate model will help to better understand the influence mechanisms of technological, social, and individual factors. The topic “Integrating UTAUT and Personal Innovativeness to Explain Smart Home Adoption: Evidence from Vietnam” is necessary, as it provides scientific arguments for developing marketing strategies and products suitable for the characteristics of young urban consumers in Ho Chi Minh City.

2. LITTERATURE REVIEW

2.1. Model of Technology Acceptance (TAM)

The Technology Acceptance Model (TAM), proposed by Davis (1989), is a crucial theoretical framework for explaining the behavior of adopting new technology. TAM posits that the intention to use technology primarily depends on perceived usefulness (PU) and perceived ease of use (PEOU). Studies show that PEOU can indirectly impact intention through PU, thereby fostering a positive attitude towards technology (Hung et al., 2021). In the context of smart home devices – a typical application of the Internet of Things (IoT) – TAM has been widely applied to analyze user adoption drivers (Nikou, 2019).

Empirical evidence indicates that benefits such as energy saving, safety, and convenience are decisive factors for PU, while PEOU helps increase willingness to use (Muço & Özen, 2025). However, beyond these two core factors, extended TAM studies have added variables such as perceived cost, compatibility, technology trust, and security risks, which significantly influence consumer attitudes (Nikou, 2018; Camta & Tongngam, 2023). Particularly in the smart home device market, these factors play a pivotal role as users are often concerned about price, connectivity, and data security.

Concurrently, combining TAM with the UTAUT2 model allows for a more comprehensive explanation by incorporating social factors and hedonic motivation. Aldossari & Sidorova (2018) emphasize that trust and security risks are also significant barriers to IoT adoption. Therefore, research on smart home device adoption behavior needs to simultaneously consider benefits, costs, and socio-psychological factors.

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In summary, TAM not only affirms its theoretical value but also holds practical significance, helping researchers and businesses identify factors driving smart home device adoption, thereby enabling more effective design and marketing strategies in the IoT era.

2.2. Model of The Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology (UTAUT) model, developed by Venkatesh et al. (2003), is one of the comprehensive theoretical frameworks for explaining technology acceptance behavior. The model identifies four main factors influencing usage intention: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. The extended version, UTAUT2 (Venkatesh et al., 2012), adds hedonic motivation, price value, and habit, thereby enhancing its ability to predict technology consumer behavior.

In the context of smart home devices, UTAUT is widely applied to explain the drivers and barriers to user behavior. Research in Vietnam shows that emotional factors, security, and trust play a crucial role, while cost becomes a significant barrier to usage intention. In Indonesia, Nugroho and Salehudin (2024) demonstrate that facilitating conditions, habit, government support, and trust positively influence both the willingness to adopt and the willingness to pay for smart home products. This highlights the important role of public policy and technology trust in market expansion.

Furthermore, Kang, Han, and Kwon (2022) indicate that combining UTAUT with Task-Technology Fit (TTF) allows for a more comprehensive explanation of acceptance behavior, especially in smart home applications for healthcare. When technology meets actual needs, usage intention and long-term retention will be strengthened.

In summary, UTAUT and UTAUT2 not only explain smart home device adoption behavior from the perspective of benefits and convenience, but also encompass social, financial, trust, and policy support factors. This provides a solid theoretical foundation for researching and strategically planning the development of the smart home market in the IoT era.

2.3. Concept of Adoption Behavior

Consumer behavior is a central concept in the fields of marketing and organizational behavior research. This concept is understood as the entire process that individuals or groups undergo when selecting, purchasing, using, evaluating, and disposing of products or services to satisfy their needs and wants (Kotler & Keller, 2016). This process includes psychological, cultural, social, and technological factors that influence consumption decisions. In the context of digital transformation, consumer behavior increasingly extends to decisions related to adopting and integrating technology into daily life, especially among young consumers in major urban areas. Regarding consumer behavior in the field of technology products, technology adoption behavior can be understood as the process of forming perceptions, attitudes, and intentions that lead to the actual use of a new technology product or system (Davis, 1989; Venkatesh et al., 2003). To explain

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this mechanism, the Technology Acceptance Model (TAM) proposed by Davis (1989) has become a classic theoretical foundation. TAM emphasizes two central factors: perceived usefulness and perceived ease of use. Perceived ease of use directly and indirectly (via perceived usefulness) influences the intention to use, while perceived usefulness has a direct impact on user behavior.

In the field of smart home devices, recent studies in Vietnam have applied TAM and extended models like UTAUT2 to analyze consumer behavior (Trọng et al., 2021; Vy, 2024). Factors such as technology compatibility, affordability, emotional motivation, social influence, and data security are identified as playing important roles in shaping young consumers' intention to use. Combining consumer behavior theory with technology acceptance models helps build a solid scientific foundation to explain the factors influencing smart home device usage behavior in the context of digital transformation.

2.4. Concept of Personal Innovation

Personal innovation, also known as individual innovativeness, is understood as an individual's readiness to adopt and experiment with new ideas or technologies earlier than others (Lu et al., 2005). This concept reflects a cognitive and behavioral tendency that demonstrates openness to change, along with a desire to explore new technological solutions to enhance quality of life. In the context of smart home technology, personal innovation is considered a crucial psychological factor that directly influences attitudes and intentions to adopt smart devices. Individuals with a high degree of innovativeness often have more positive perceptions of the usefulness and ease of use of technology, thereby forming stronger intentions to use (Thakur & Srivastava, 2014).

Empirical results by Trong et al. (2021) show that personal innovation has a positive and statistically significant impact on the intention to use smart home devices, and is one of the strongest influencing factors in the research model. This finding aligns with Rogers' (2010) diffusion of innovation theory, which posits that early adopters play a role in driving the adoption process of new technology in society. Therefore, encouraging individual creativity and fostering technological curiosity can increase the readiness to adopt, while also bridging the gap between perception and actual usage behavior. Thus, personal innovation not only demonstrates adaptability to technology but also serves as an important driving force promoting the sustainable diffusion of smart home technology in the Internet of Things era.

2.5. Overview of related research and gaps

Based on a synthesis of previous research, scholars have developed comprehensive theoretical models to explain technology acceptance and usage behavior in the context of digital services, particularly smart home technology and online services. Firstly, research by Trong et al. (2021) in Vietnam analyzed factors influencing the intention to use smart home devices, based on the TAM (Technology Acceptance Model). Survey results in Da Nang indicated that perceived usefulness, perceived ease of use, and social influence had a positive and statistically significant impact on the behavioral intention to use smart devices. The study highlighted the role of personal innovation as a

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psychological trait that promotes readiness to adopt new technologies in daily life. This model extended the traditional TAM approach, aligning with the consumer cultural context of Vietnamese people, where community orientation and the perception of practical benefits play a prominent role in the technology acceptance process. Next, the work by Truong Le Thao Nhi (2022) also applied TAM to explore factors influencing the acceptance level of smart applications supporting household tasks – a new technology service within the sharing economy ecosystem. Through a survey of 400 users in Da Nang, the study identified six main influencing factors: perceived usefulness, perceived ease of use, enjoyment, perceived risk, information about the application, and security and privacy. The results showed that usefulness and enjoyment had the strongest influence, indicating that emotional factors and the perception of practical benefits are key drivers determining the acceptance behavior of service technology in life. From an international theoretical expansion perspective, research by Kang, Han, and Kwon (2022) in South Korea integrated two models, UTAUT (Unified Theory of Acceptance and Use of Technology) and TTF (Task–Technology Fit), to explain the acceptance behavior of smart home healthcare services (SHHSs).

With 487 valid samples, the study demonstrated that performance expectancy, effort expectancy, social influence, and facilitating conditions all significantly affected behavioral intention to use, while task-technology fit (TTF) had both direct and indirect impacts through performance expectancy. This integrated model explained 55.2% of the variance in behavioral intention and 62.5% of continuous usage intention, highlighting the superiority of combining user perception and technology fit in smart service acceptance research. Adding another research direction, Vu et al. (2025) developed a combined TAM and PERVAL (Perceived Value) model to analyze the intention to purchase convenient online technology in Vietnam. With data from 339 individuals, the results showed that perceived usefulness ($\beta = 0.27$), emotional value, blockchain utility, and ease of mobile payment were the strongest influencing factors on purchase intention. The model explained 72% of the variance in purchase intention, outperforming similar studies. Notably, social value indirectly impacted through community engagement, reflecting a cultural characteristic of Vietnamese consumers.

A synthesis of the four aforementioned studies indicates that cognitive factors such as usefulness, ease of use, and perceived risk remain fundamental to technology acceptance behavior (according to TAM and UTAUT), while emotional, social, and new utility values (according to PERVAL and TTF) are increasingly emphasized in modern research. The combination of classical models and local contextual factors has expanded the ability to explain user behavior in new technological environments, especially in the context of digital transformation in Vietnam and Asia.

3. PROPOSED RESEARCH MODEL AND HYPOTHESES

In summary, after consulting and synthesizing over 04 related research models, the author has developed the following model:

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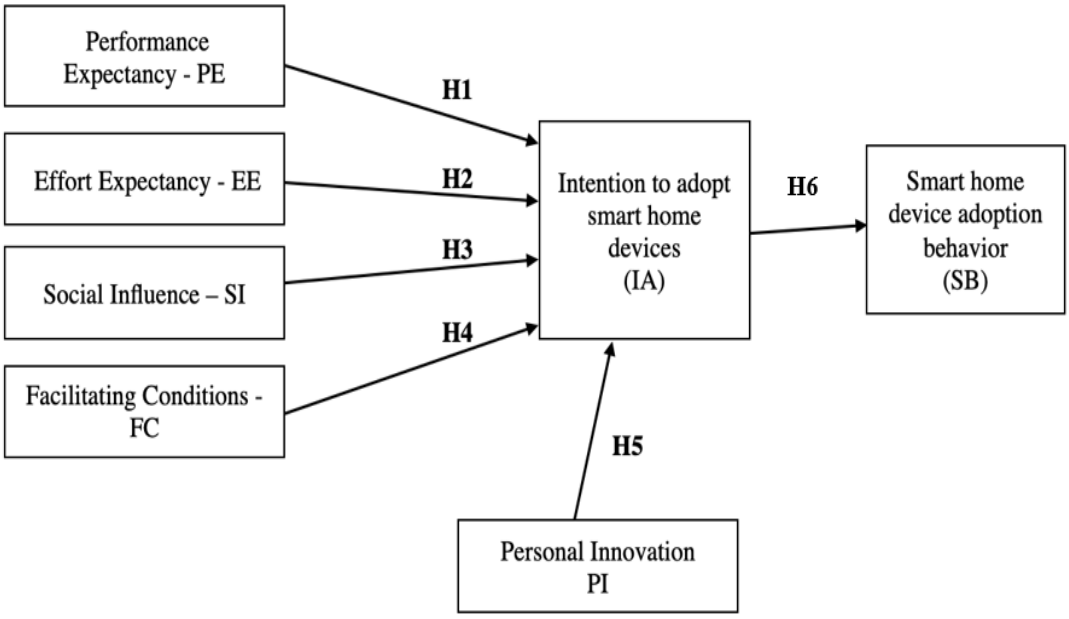

Figure 1. Conceptual model

H1: *Performance expectancy (PE) has positive influences on the Intention to adopt smart home devices.*

H2: *Effort expectancy (EE) has positive influences on the Intention to adopt smart home devices*.

H3: *Social influence (SI) has positive influences on the Intention to adopt smart home devices.*

H4: *Facilitiating conditions (FC) has positive influences on the Intention to adopt smart home devices*.

H5: *Personal innovation (PI) has positive influences on the Intention to adopt smart home devices*.

H6: *Intention to adopt smart home devices (IA) has positive influences on Smart home device adoption behavior (SB)*

4. RESEARCH METHODOLOGY

Based on the proposed research model, the research team developed a survey instrument comprising 33 observed variables distributed across 7 scales corresponding to 6 research hypotheses. The scales were inherited and adapted from previous studies with recognized reliability and validity in the field of technology consumer behavior. Each observed variable was measured using a 5-point Likert scale (from 1 – strongly disagree to 5 – strongly agree), to ensure accurate reflection of participants' attitudes and behavioral intentions. Data was collected from 320 young individuals who were aware of or had used smart home devices, using cluster sampling in representative areas of Ho

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Chi Minh City, including Saigon Ward, Thanh My Tay Ward, Hiep Binh Ward, and Di An Ward. The collected data was processed and analyzed using AMOS software, involving steps such as scale reliability testing using Cronbach's Alpha, exploratory factor analysis (EFA) to identify the latent structure of variables, and finally, linear regression analysis to test the impact of independent factors on smart home device usage behavior, through the mediating variable Intention to adopt smart home devices. This research methodology ensures scientific rigor, reliability, and internal validity in evaluating the causal relationships between variables.

5. PROPOSED SOLUTIONS

Based on the theoretical framework and the proposed research model, the application of the UTAUT (Unified Theory of Acceptance and Use of Technology) model in analyzing smart home device usage behavior is considered a suitable and highly practical approach. This model not only helps clearly explain the factors influencing the intention and behavior of technology use, but also provides specific managerial implications for businesses operating in the smart home device sector. Applying UTAUT helps managers, product developers, and marketers gain a more comprehensive understanding of the psychology, motivations, and barriers of young consumers, thereby guiding business strategies, product design, and marketing communications to better suit the needs of the modern market.

- First, Performance Expectancy (PE) – expected effectiveness – reflects users' belief that using smart home devices will help them increase work efficiency, improve quality of life, and save time. In a dynamic urban context like Ho Chi Minh City, young customer groups often have busy schedules; therefore, they prioritize devices with truly useful automation capabilities such as robot vacuum cleaners, automatic lighting systems, facial recognition door locks, or air conditioners that can be adjusted via mobile applications. Businesses should focus their communication on the practical benefits of the product rather than just emphasizing design or brand. The message "convenience – savings – efficiency" will easily resonate with young customer groups, who are pragmatic consumers valuing utility over aesthetics.
- Next, Effort Expectancy (EE) represents the degree of ease with which users learn to operate and use technology. For smart home products, a user-friendly interface, clear instructions, and simple connection procedures are key to enhancing customer experience. For example, when users only need a few taps on an application to control lighting, temperature, or security, they tend to maintain long-term usage. Businesses need to invest in User Experience/User Interface (UX/UI) design and create intuitive instructional videos, or provide technical support documents in Vietnamese to reduce barriers to technology adoption.
- For Social Influence (SI), this factor is particularly important in the behavior of young consumers—a group that tends to consult opinions from friends, relatives, or celebrities before making a decision. In the smart home market, users sharing positive experiences on social media or recommending products within the family is

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an extremely effective form of word-of-mouth marketing. Businesses should develop incentive programs for customers who refer products, or collaborate with KOLs (Key Opinion Leaders) in the smart technology and lifestyle sector to increase credibility and spread brand image.

- With Facilitating Conditions (FC), this factor reflects users' belief that they have sufficient resources, knowledge, and technical infrastructure to use technology effectively. In Vietnam, many households have not yet synchronized their electrical systems, internet, or connection spaces, which directly affects their ability to use smart devices. Businesses need to provide comprehensive installation services, 24/7 technical support, and expand product experience zones so that customers can directly verify the utility before purchasing. Additionally, optimizing compatibility between devices will also help users feel more convenient during use.
- Finally, Personal Innovation (PI) is a factor representing consumers' readiness to adopt new technology. Conservative customers or those with limited exposure to technology often have a hesitant mindset, while younger customers tend to be open and willing to experiment. Therefore, from a macro perspective, it is necessary to enhance communication campaigns about the benefits of smart technology in urban life, and from a micro perspective, businesses can organize workshops, experiential seminars, or a series of interactive activities at shopping malls to help customers gain a deeper understanding of the nature, effectiveness, and safety of smart devices.

In summary, the application of the UTAUT model in studying smart home device usage behavior not only provides theoretical value in expanding understanding of technology acceptance drivers but also offers highly practical management implications. When businesses clearly understand the characteristics of each factor in the model—from Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, to Personal Innovation—they will be able to develop products that better suit the needs of modern young customers, while increasing competitiveness and expanding market share in Vietnam's rapidly growing smart home technology industry.

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