

INVESTIGATING USERS' BEHAVIORAL INTENTION TOWARD PUBLIC SELF-SERVICE TECHNOLOGIES (SSTs) BASED ON INTRINSIC MOTIVATION AND SELF-SERVICE TECHNOLOGY QUALITY

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Abstract - Public self-service technologies (SSTs) are increasingly prevalent in today's service industry, making it crucial for both academic researchers and service practitioners to understand how customers perceive them and identify ways to enhance their quality. This study examines public SST users' behavioral intentions by integrating Self-Determination Theory and Self-Service Technology Quality into the Technology Acceptance Model. Using structural equation modeling (PLS-SEM), data from 239 users were analyzed. Results reveal that Competence and Autonomy enhance Perceived Ease of Use, while Relatedness negatively affects it. Autonomy positively influences Perceived Usefulness, but no significant relationship is found between Competence or Relatedness and Perceived Usefulness. Design and Security positively impact Perceived Usefulness and Ease of Use. Perceived Ease of Use influences Perceived Usefulness, and both impact users' Attitude, which subsequently shapes their Behavioral Intentions. Finally, the findings reject the hypothesized moderating role of Social Anxiety in the relationship between Attitude toward using and Behavioral Intention.

Key words - Public self-service technology; Intrinsic motivation; Self-service technology quality; Technology acceptance; Social anxiety

1. Introduction

Do customers truly require employee interaction to enjoy a high-quality service experience? This question has become a focal point for many service providers considering the adoption of self-service technologies (SSTs). SSTs, which replace traditional human services with technological solutions, have permeated nearly every industry, transforming the way businesses and customers interact [1]. SSTs come in various forms, such as self-service kiosks, mobile apps, and other e-services, empowering customers to manage their needs independently [2]. Forbes reports an 81% customer demand for expanded self-service options, reflecting the growing trend toward automation [3]. The global self-service market is projected to grow from USD 38.22 billion in 2024 to USD 55.62 billion by 2029, with a compound annual growth rate (CAGR) of 7.79% during this period [4]. SSTs are widely used in sectors such as retail, airports, hospitality, and banking. In 2022, retail led the SST market with a 33.2% revenue share, as businesses adopted technologies like kiosks and vending machines to enhance service quality and efficiency [5].

SSTs have fundamentally transformed how businesses interact with their customers, with the latter increasingly taking on the role of co-producers in the service process

[6]. Previous studies indicate that consumers' attitudes toward SSTs largely depend on the specific type of SSTs being used [7]. Public SSTs are distinct for their accessibility and societal impact, serving diverse users in shared spaces. Unlike private ones, which primarily enhance individual business efficiency, public SSTs address broader societal needs by supporting inclusivity and improving public infrastructure, making them essential for urban management and service delivery. Given their widespread use in facilitating public services, this study focuses on public SSTs to explore the factors influencing their adoption and successful integration.

Despite the extensive adoption of SSTs, limited attention has been given to understanding the underlying factors driving user engagement. Existing research has primarily focused on technology adoption models, such as the Technology Acceptance Model (TAM), yet the influence of intrinsic motivations such as autonomy, competence, and relatedness on SST adoption remains underexplored [8]. To address this, the study incorporates insights from Self-Determination Theory (SDT) to examine the psychological dimensions that shape user engagement with public SSTs. While SSTs are designed to enhance service quality, there remains a lack of clarity regarding the specific quality dimensions that influence customer perceptions [9]. By examining key quality factors, this research aims to provide a more comprehensive framework for assessing the effectiveness of SSTs in shaping consumer behavior. Moreover, most studies focus on general factors, neglecting situational variables in public SST interactions [10]. This study explores human-technology dynamics in Vietnam's shared spaces, addressing a research gap in developing countries often overlooked in SST adoption studies [11].

In conclusion, this research explores intrinsic motivations, service quality dimensions, and contextual factors influencing public SST adoption. It aims to provide a practical and holistic understanding of customer acceptance, offering valuable insights for businesses and policymakers to guide the development and adoption of self-service technologies in Vietnam.

2. Literature review

2.1. Public SSTs

Public self-service technologies are systems that allow customers to use automated services, often alongside

interactions with other users. Some common examples include self-checkout stations, automated phone systems, and ATMs. In Vietnam, public SSTs are commonly found in urban centers, and their use in several industries such as retail, hospitality, and healthcare remains less widespread. In the retail sector, Aeon Mall and Lotte Mart have only installed self-checkout kiosks in major cities. In the healthcare sector, smart medical kiosks have been implemented in hospitals in 2024, allowing patients to register for appointments using their national ID card or VNeID, with facial recognition technology streamlining the check-in process and reducing wait times [12]. The aviation industry adopted SSTs later, with Vietjet Air launching the first self-check-in kiosks at Tan Son Nhat Airport in 2011 [13]. It wasn't until 2023 that Da Nang Airport implemented self-check-in kiosks [14]. This study focuses on public SSTs in general rather than examining any specific industry, aiming to provide an overview of their adoption and user experience in the context of Vietnam.

2.2. Technology Acceptance Model (TAM)

TAM is a widely recognized framework that incorporates three key constructs: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Attitude Toward Using (ATT) to explore technology adoption behaviors [15]. Perceived Usefulness is defined as the extent to how much a user believes a system improves their job performance, while Perceived Ease of Use reflects how easy it is to use. Within TAM, Behavioral Intention (BI) is shaped by Attitude Toward Using (ATT) [16]. This study defines Attitude Toward Using as a person's favorable or unfavorable assessment of behavior, while Behavioral Intention reflects their willingness or likelihood to adopt a technology or take action [17].

Despite its widespread adoption in research, some scholars argue that TAM's predictive strength is limited to productivity-oriented systems (utilitarian systems), often underestimating the role of intrinsic motivation [18].

2.3. Self-determination theory (SDT)

SDT is a motivational framework explaining how people pursue goals or engage in activities based on their psychological and cognitive responses [19]. This theory views humans as individuals who actively engage with their surroundings. It emphasizes three basic psychological needs: Autonomy (AU), Competence (COM), and Relatedness (REL) [20]. Firstly, Autonomy reflects a person's desire to engage in activities of their own choice and to feel responsible for their actions [21]. Next, Competence refers to an inherent need to learn and master new skills and to feel effective in activities that are personally meaningful [21]. Last but not least, Relatedness is the need to connect, care for, and feel genuinely connected to others [19].

SDT offers valuable insights into understanding consumer behavior, particularly in the adoption of SSTs [22]. However, research applying SDT to SST adoption remains limited, calling for more empirical studies and refined models to better understand this relationship [8].

2.4. A combination of TAM and SDT

As highlighted by previous research, motivation and self-determination play crucial roles in shaping users' acceptance of technology [15]. Tao and Liu [23] highlighted that TPB (Theory of Planned Behavior) and TAM often ignore motivational factors crucial to technology acceptance. To address this, they combined TAM and SDT to examine how self and social motivations impact m-health adoption. This approach has also been used to examine technology acceptance in mobile learning [16], and human computation games [24].

In the context of SSTs, the shift from human service representatives to technological solutions often requires customers to perform part of the service themselves [6]. Therefore, the success of SST implementation depends on the customers' willingness to engage their resources [2]. However, most SST acceptance studies rely on models like TAM or TPB, which view customers as passive users, while few apply SDT to explore the role of human needs in SST participation [22]. Hence, this study merges TAM and SDT to examine the impact of psychological needs on SST adoption via usefulness and ease of use.

Scholars have enhanced the predictive power of TAM by incorporating external variables related to user characteristics, supporting technology, facilitating conditions, subjective norms, etc. Given its focus on technology-mediated service quality, SST service quality can be seen as a key aspect of technological support influencing adoption decisions. This perspective aligns with [25], which initially focused on system and information quality but overlooked human interaction [26]. Their 2003 revision addressed this limitation by incorporating service quality [27], emphasizing its impact on user engagement and system success. Empirical research confirms its influence across various contexts by developing a model to assess SST service quality [28], [29].

2.5. Self-service technology quality

The SERVQUAL (Service Quality) and SERVPERF (Service Performance) scales were developed to assess service quality within the context of customer-to-employee interactions. However, researchers have argued that these frameworks may be problematic to apply for the unique aspects of service quality inherent in customer-to-SST interactions [30]. As a result, a new framework was developed for measuring SST quality based on: speed of delivery, ease of use, reliability, enjoyment, and control [31]. Later on, Lin and Hsieh developed SSTQUAL (Self-service Technology Quality), a comprehensive model, incorporating seven dimensions: functionality, enjoyment, security, assurance, design, convenience, and customization [32]. This study adopts this scale to assess public SST quality, with a specific focus on two key dimensions: Design and Security.

2.6. Social Anxiety

Social anxiety (SA) is defined as the discomfort that arises when an individual perceives that others are evaluating them as a social entity [33]. Research suggests that social anxiety is a situational factor and can arise from

situational circumstances, such as perceived crowding in an on-site service encounter [34]. In the context of public SSTs, social anxiety can occur when users interact with devices in crowded spaces, such as self-checkout counters, kiosks at airports, or ATMs. High surrounding density can exacerbate technology anxiety, as using SSTs requires significant focus and cognitive resources [35].

3. Hypothesis development

3.1. Intrinsic motivation (Competence, Autonomy, Relatedness) and Perceived Usefulness, Perceived Ease Of Use

For public SSTs, competence could include users feeling capable of completing transactions, accessing services, or solving problems independently. In technology-driven environments, studies have consistently demonstrated that perceived competence positively impacts perceived usefulness and perceived ease of use across various technological settings, such as e-learning [36]. With public SSTs, the absence of human support requires users to rely heavily on their confidence and skills to interact effectively with the system. Furthermore, prior technology experience boosts users' confidence, shaping their perception of new system usability [37]. Therefore, this study hypothesizes that:

H1a: Competence (COM) has a positive effect on Perceived Ease of Use (PEOU) of public SSTs.

H2a: Competence (COM) has a positive effect on Perceived Usefulness (PU) of public SSTs.

Grounded in SDT, autonomy in the public SST context is understood as a person's need to feel that their interactions with the technology are self-initiated, self-directed, and self-endorsed. Prior research has established that autonomy positively impacts perceived usefulness and perceived ease of use in various contexts, such as mobile learning and e-learning [16], [36]. In public SSTs, where customers co-create value [8], autonomy shapes perceptions of ease of use and usefulness. Unlike human-dependent systems, SSTs grant users full control, making them more likely to find them useful and easy to use, fostering positive intentions. Based on this evidence, we hypothesize that:

H1b: Autonomy (AU) has a positive effect on Perceived Ease of Use (PEOU) of public SSTs.

H2b: Autonomy (AU) has a positive effect on Perceived Usefulness (PU) of public SSTs.

Relatedness refers to the extent to which users feel connected, supported, and valued during their interactions with the technology. Previous research showed that relatedness influenced both perceived usefulness and perceived ease of use in the mobile learning and e-learning domains [16], [36]. In public SSTs, minimal interaction may not suit users with a high need for relatedness. These people often feel less confident and may avoid SSTs due to the lack of social support and face-to-face communication [37]. Hence, this study hypothesizes that:

H1c: Relatedness (RE) has a negative effect on Perceived Ease of Use (PEOU) of public SSTs.

H2c: Relatedness (RE) has a negative effect on Perceived Usefulness (PU) of public SSTs.

3.2. Self-service quality (design, security) and Perceived Usefulness, Perceived Ease Of Use

The design of a public SST encompasses elements such as visual appeal (e.g., the color and layout of the interface screen) and facility aesthetics (e.g., maintaining an up-to-date image), contributing to the overall design of the service system [32]. Design factors not only shape the value and functionality users associate with a product or system but also influence their emotional responses [38]. In public SSTs, a well-designed SST interface offers multiple ways to access functions, catering to diverse user preferences and further reinforcing the perceived usefulness of the system. Beyond functionality, design aesthetics strongly influence how intuitive and user-friendly a system feels. For instance, ATM layout can influence users' perception of beauty, shaping their ease-of-use evaluations [39]. Hence, we propose:

H3a: Design (DES) has a positive effect on Perceived Ease of Use (PEOU) of public SSTs.

H4a: Design (DES) has a positive effect on Perceived Usefulness (PU) of public SSTs.

Studies indicate that security, defined as freedom from risk, is a key determinant of perceived service quality [40]. Risk refers to the uncertainty arising from possible negative consequences of using a product or service [41]. In the context of public SSTs, users are required to share sensitive information, such as personal data or payment details, which heightens privacy concerns [42]. Perceived risk can significantly diminish user trust and confidence in a system. When users perceive potential risks, such as data breaches or transactional errors, they are less likely to view the system as beneficial [43]. Security also impacts perceived ease of use, as uncertainty about a system's safety can create psychological barriers, reducing users' motivation to engage with or learn the system [44]. We propose:

H3b: Security (SE) has a positive effect on Perceived Ease of Use (PEOU) of public SSTs.

H4b: Security (SE) has a positive effect on Perceived Usefulness (PU) of public SSTs.

3.3. Perceived Usefulness, Perceived Ease Of Use, and Attitude Toward Using

Perceived usefulness is the degree to which a person believes that using public SSTs will enhance their job performance, while perceived ease of use refers to the extent to which an individual expects that operating a specific system will demand minimal effort [15]. The TAM model suggests that the simpler a technology is to use, the more valuable it is perceived to be because technologies requiring less effort are more likely to improve job performance. Previous research has confirmed that perceived ease of use significantly affected perceived usefulness [45]. Hence, we hypothesize that:

H5: Perceived Ease of Use (PEOU) has a positive effect on Perceived Usefulness (PU) of using public SSTs.

Attitude toward using refers to how individuals evaluate the use of a system in their tasks [15]. For public SSTs, perceived ease of use is key to adoption, as complex systems can deter users [46]. Additionally, perceived usefulness positively influences attitudes by reinforcing the belief that the technology improves productivity, efficiency, and performance, making it more appealing [17]. From these points, we propose:

H6: Perceived Ease of Use (PEOU) has a positive effect on Attitude toward using (ATT).

H7: Perceived Usefulness (PU) has a positive effect on Attitude toward using (ATT).

3.4. Attitude Toward Using and Behavioral Intention

Behavioral intention (BI) refers to an individual's cognitive readiness to engage in a particular behavior and serves as a direct precursor to actual usage behavior [17]. The connection between attitude toward using and behavioral intention is well documented in the research literature [15]. That means individuals who hold a favorable attitude toward adopting new technologies often demonstrate strong behavioral intentions of using public SSTs [17]. This research makes the following hypothesis:

H8: Attitude Towards Using has a positive effect on Behavioral Intention of public SSTs.

3.5. The Moderating Role of Social Anxiety

According to [47], social anxiety is a prevalent human experience marked by a strong fear of being judged by others in social settings. Studies have shown that the greater the crowding, the more consumers feel stressed or lack control in the retail environment, leading to emotional responses in the form of "social anxiety" [48]. Previous studies have highlighted the moderating role of social anxiety in influencing decisions to adopt new technologies [49] and its impact on online behavior [50]. In public SST contexts, social anxiety affects behavioral intention by moderating the relationship between attitude toward using and the behavioral intention [34]. The presence of others in a waiting line or a crowded self-service area can amplify feelings of stress and social anxiety [51]. Such stress may reduce users' willingness to engage with the technology despite possible favorable attitudes toward using technology-based self-service [34]. We propose:

H9: With greater Social anxiety (SA) through perceived crowding, the positive relationship between Attitude toward using (ATT) and Behavioral Intention (BI) will be weakened.

4. Research methodology

4.1. Research methods

The study adopts a quantitative research approach, as this method is commonly used in similar prior studies and is associated with experiments that involve extensive samples and larger datasets compared to qualitative methods [52]. Therefore, the quantitative approach and questionnaire design enable data collection from a large sample, offering detailed insights for decision-makers to forecast relationships between variables.

4.2. Sampling techniques and data collection

The authors have employed convenience sampling, a non-probability sampling method, to gather data quickly and efficiently through both offline and online surveys. Convenience sampling is a cost-effective, quick method that selects respondents based on availability and willingness, making it ideal for exploratory research with limited resources [53].

A questionnaire was conducted using Google Forms to collect data through social media and an offline paper-based survey. To ensure data quality and select the appropriate target audience, our questionnaire included two screening questions. The first question was aimed at individuals who had used public SSTs at least once. The second was an attention-check question, asking respondents to choose "Flower" for the question "What is your favorite color?". Participants who failed to select the required answer were excluded from the survey. As a result, a total of 239 completed questionnaires were collected and deemed valid for data analysis in this study.

4.3. Measurements

All measures in the study were adapted from previous studies and modified to fit the public SST context (see APPENDIX 1).

The questionnaire was initially developed in English and then translated into Vietnamese by a bilingual English-Vietnamese expert to align with the context of our research. Additionally, a pilot test was conducted with ten users, including individuals knowledgeable in the field who had prior experience with public SSTs. We requested their feedback to identify any unclear or ambiguous terms in the questionnaire items.

The measures for each concept were evaluated using a 5-point Likert scale, with responses ranging from 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, to 5 – Totally agree.

5. Results and discussion

5.1. Sample profile

Data were gathered from 239 users in Vietnam who had already experienced public SSTs, covering most age groups from under 18 to over 60 years old. Additionally, the survey includes 45.2% of men, 54% of women, and others. This represents a variety of demographic segments in the use of public SSTs (see APPENDIX 2).

5.2. Measurement Validity and Construct Reliability

Based on our findings, the measurement methodology proved to be entirely satisfactory. First, the reliability of each construct was assessed by Cronbach's alpha. According to Nunnally [54], a value of 0.70 or above indicates an acceptable level of reliability. As the Cronbach's value (see Figure 1) ranged between 0.774 and 0.947, all measurements were evaluated as being acceptable. Convergent validity and reliability were assessed using composite reliability (CR), Cronbach's alpha, and average variance extracted (AVE). According to Hair *et al.* [55], the convergent validity was assessed by testing if the CR and Cronbach's alpha values for each

construct exceeded the recommended level of 0.70, and the AVE for each construct fulfills the benchmark of exceeding 0.50 [56]. Our results show that all figures are appropriate (see APPENDIX 3).

The author also conducted an analysis of discriminant validity among constructs using the Fornell-Larcker criterion [57]. This test evaluated each construct's accuracy by assessing the square root of AVE, ensuring it exceeded its correlations with other constructs, thus confirming measurement validity. Additionally, a cross-loading table further verified discriminant validity through AVE analysis.

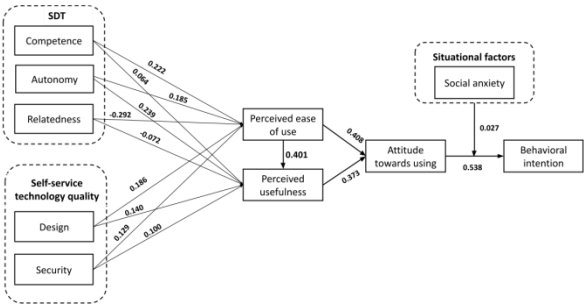


Figure 1. The results of the PLS-SEM analysis

5.3. Exploratory factor analysis

As an exploratory method, EFA is used to identify underlying factor structures, which aid in refining and validating the 38 items included in this study.

To assess data suitability for factor analysis, the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test were conducted. The KMO value must be 0.5 or higher ($0.5 \leq KMO \leq 1$) as a sufficient condition for factor analysis to be appropriate. Additionally, Bartlett's test must be statistically significant (sig Bartlett's Test < 0.05), indicating that the observed variables are correlated with the factors [58].

According to Hair *et al.* [55], an outer loading coefficient of greater than or equal to 0.7 ensures good quality. In our study, after two rounds of eliminating two items (BI3, PEOU2 <0.7), the EFA results were adjusted. Specifically, the new outer loading indexes of the remaining observed variables were all over 0.7. Besides, the revised KMO value was 0.937, and Bartlett's test of sphericity yielded $p = 0.000$. These results indicate that our factor analysis is appropriate.

5.4. Structural Model

The path relationships of the endogenous latent variables and their R^2 values were examined. The R^2 for perceived ease of use is 72.0%, while for perceived usefulness, it is 77.6%. This indicates that autonomy, competence, relatedness, design, and security explain 72% of the variance in perceived ease of use and 77.6% in perceived usefulness. Additionally, the R^2 for attitude toward using is 55.5%, and for behavioral intention, it is 79.8%, meaning the model explains 55.5% of attitude toward using and nearly 80% of behavioral intention.

To test the hypothesis, the study examines path coefficients and P-values, using a 0.05 threshold to assess

significance. The β coefficient is also analyzed to compare the impact of independent variables on dependent variables.

Table 1. Hypothesis testing results

Research hypothesis	Path (β)	T statistic	P values	Result
(H1a) COM $\rightarrow$ PEOU	0.222	3.807	0.000	Accepted
(H1b) AU $\rightarrow$ PEOU	0.185	2.548	0.011	Accepted
(H1c) RE $\rightarrow$ PEOU	-0.292	5.027	0.000	Accepted
(H2a) COM $\rightarrow$ PU	0.064	1.475	0.140	Rejected
(H2b) AU $\rightarrow$ PU	0.239	4.131	0.000	Accepted
(H2c) RE $\rightarrow$ PU	-0.072	1.288	0.198	Rejected
(H3a) DES $\rightarrow$ PEOU	0.186	3.893	0.000	Accepted
(H3b) DES $\rightarrow$ PU	0.140	3.221	0.001	Accepted
(H4a) SE $\rightarrow$ PEOU	0.129	2.061	0.039	Accepted
(H4b) SE $\rightarrow$ PU	0.100	2.187	0.029	Accepted
(H5) PEOU $\rightarrow$ PU	0.401	6.045	0.000	Accepted
(H6) PEOU $\rightarrow$ ATT	0.408	4.330	0.000	Accepted
(H7) PU $\rightarrow$ ATT	0.373	4.004	0.000	Accepted
(H8) ATT $\rightarrow$ BI	0.538	13.791	0.000	Accepted
(H9) SA x ATT $\rightarrow$ BI	0.027	0.757	0.449	Rejected

As illustrated in the Table 1, the results indicate a relationship between autonomy, competence, relatedness, and perceived ease of use ($\beta = 0.185$, $\beta = 0.222$, $\beta = -0.292$; $p < 0.05$), so H1a, H1b, and H1c are supported. While a relationship was found between autonomy and perceived usefulness ($\beta = 0.239$, $p < 0.05$), no significant relationship was observed between competence, relatedness, and perceived usefulness ($p > 0.05$). Thus, H2b is supported, while H2a and H2c are not. Furthermore, design and security showed positive correlations with both perceived ease of use ($\beta = 0.186$, $\beta = 0.129$; $p < 0.05$) and perceived usefulness ($\beta = 0.140$, $\beta = 0.100$; $p < 0.05$). Consequently, H3a, H3b, H4a, and H4b are accepted.

The study also found that perceived ease of use positively influences perceived usefulness based on H5 ($\beta = 0.401$, $p < 0.05$). Both perceived ease of use and perceived usefulness were positively correlated with attitude toward using ($\beta = 0.408$, $\beta = 0.373$; $p < 0.05$), confirming H6 and H7. Finally, a relationship between attitude toward using and behavioral intention was observed ($\beta = 0.538$, $p < 0.05$), so H8 is supported.

5.5. The moderating role of social anxiety

H9 examined whether social anxiety moderates the relationship between attitude toward using and behavioral intention. The PLS-SEM results found no significant effect ($p > 0.05$), so the hypothesis was rejected.

5.6. Discussions

5.6.1. The direct relationship between Intrinsic motivation and Perceived Usefulness, Perceived Ease Of Use

a. The effect of Competence

The study shows that competence positively impacts perceived ease of use, consistent with Nikou and Economides [16], Tao and Liu [23], and Roca and Gagné's [36]. In public SSTs, users rely on their skills, making confidence crucial for ease of use and navigation. However, competence was not found to significantly relate to perceived usefulness. This result aligns with previous research [16], [23]. A possible explanation lies in the nature of public SSTs, where perceived value is driven more by external factors, such as system features, ease of use, and the outcomes it delivers, rather than the user's confidence in their ability to operate it. Even highly competent users may find an SST ineffective if it is slow, prone to malfunctions, or fails to meet their expectations. In other words, regardless of a user's competence, their perception of usefulness is primarily shaped by how well the system performs and fulfills their needs.

b. The effect of Autonomy

As anticipated, autonomy positively influences both perceived ease of use and perceived usefulness, aligning with the findings of prior studies [16], [23], [36]. Individuals who feel a sense of autonomy when interacting with public SSTs are more likely to find the systems user-friendly and valuable. Autonomy-supportive features in SSTs can enhance user satisfaction by minimizing frustration or pressure. By empowering users, public SSTs not only increase engagement but also promote positive psychological outcomes, making the technology more effective and user-focused.

c. The effect of Relatedness

The results supported the hypothesis of a negative relationship between relatedness and perceived ease of use. This contrasts with the findings of Nikou and Economides [16], Tao and Liu [23] and Roca and Gagné's [36]. This discrepancy may arise from public SSTs lacking human interaction, leaving users who prefer social engagement feeling disconnected and frustrated, as they find self-service kiosks or automated systems less user-friendly than personal assistance. However, relatedness was not significantly linked to perceived usefulness, likely because users evaluate SSTs based on efficiency and outcomes rather than social interactions. Unlike traditional service settings, SSTs are designed for independent use, minimizing the need for external support. When systems are intuitive and functional, users can navigate them without assistance, making relatedness less relevant. Conversely, if an SST is difficult to use, users may view it as ineffective, regardless of whether they feel socially connected while using it.

5.6.2. The direct relationship between Self-service technology Quality and Perceived Usefulness, Perceived Ease Of Use

a. The effect of Design

The study's findings are consistent with prior research by Heijden [59] and Cho, Cheng, and Lai [60]. When users perceive a system's design as intuitive, visually appealing, and well-structured, they are more likely to view it as useful for accomplishing tasks efficiently and requiring less effort to operate. Additionally, the integration of aesthetic and functional elements fosters a seamless interaction experience, increasing user confidence and commitment to continued engagement with the system.

b. The effect of Security

The study's findings are consistent with Igarria [44] and Featherman and Pavlou [61]. Specifically, when users perceive a system as secure, it enhances their confidence in the technology's ability to effectively support their goals and tasks, thereby increasing its perceived usefulness. Moreover, robust security measures reduce cognitive and emotional barriers, such as anxiety or distrust, fostering a perception of seamless interaction and greater ease of use.

5.6.3. The effect of Perceived Usefulness and Perceived Ease Of Use

The direct relationship between perceived ease of use, perceived usefulness, and attitude toward using was supported in this study, aligning with previous findings [17], [62]. This explains that when users believe that public SSTs help them enhance their work performance or achieve their desired goals efficiently, they will have a more favorable attitude toward using public SSTs. Additionally, when they believe that using public SSTs does not require much effort because it is simple and easy to understand, they also tend to have a more positive attitude toward using public SSTs.

5.6.4. The effect of Attitude Toward Using

The direct relationship between attitude toward using and behavioral intention was supported in this study, consistent with previous findings [17], [63]. This explains that when participants develop a more favorable attitude toward using public SSTs, it facilitates task execution and completion, thereby encouraging their behavior. Additionally, when users have a positive attitude toward using public SSTs, they are more likely to use them frequently, recommend them to others, and rely on this technology for future interactions.

5.6.5. The rejection of the moderating role of Social Anxiety (perceived crowding)

This may initially be unexpected; however, it can be better understood when considering the contextual familiarity of Vietnamese consumers with crowded public service environments. In Vietnam, high levels of crowding are common in many service settings, leading individuals to perceive such conditions as normal rather than stressful. As a result, perceived crowding may not significantly influence their behavioral intentions. Instead, consumers, regardless of their level of social anxiety, are more likely to rely on their pre-existing attitudes toward self-service

technologies [34]. This suggests that in contexts where crowding is a routine experience, its moderating role may be significantly weakened.

6. Implications and Limitations

6.1. Implication

6.1.1. Theoretical Implications

This study makes a significant contribution to the literature on public SSTs by being one of the first to explore how both user motivation (autonomy, competence, and relatedness) from SDT and SST quality (design and security) influence perceived usefulness and ease of use from TAM, addressing a gap in most of prior TAM research that often treats users as passive adopters rather than considering their participation and co-creation behaviors in public SST interactions. The combined model provides a more balanced view of both psychological and technological determinants of user acceptance.

The results show that both competence and autonomy have a positive effect on perceived ease of use. However, a negative relationship between relatedness and perceived ease of use was found. Regarding perceived usefulness, autonomy has a positive effect, while competence and relatedness show no significant impact. The study also confirms that self-service quality (design and security) positively influences perceived usefulness and ease of use. The findings underscore the significance of evaluating the influence of motivations and self-service quality on users' perceptions.

Our findings reveal that social anxiety does not significantly alter the relationship between attitude toward using and behavioral intention. This insight contributes to the broader literature on technology acceptance by suggesting that, in the specific context of Vietnamese users, certain situational factors such as social anxiety may have a limited impact on shaping users' behavioral intentions.

6.1.2. Practical Implications

This study's findings are crucial for tech companies developing public SSTs for the Vietnamese market and businesses looking to enhance service efficiency and customer experience. They also help marketing professionals position and communicate SST benefits effectively. As public SST adoption in Vietnam remains concentrated in urban centers and varies across industries, these insights highlight opportunities for expansion and industry-specific challenges. While aviation has steadily integrated self-check-in kiosks, retail and healthcare applications remain limited, underscoring the need for strategic investment and targeted user engagement. Policymakers and urban planners can also use these findings to promote more equitable SST adoption.

The study indicates that perceived competence has a positive impact on the perceived ease of use of the system. Hence, businesses should invest in direct support programs such as on-site guidance, Vietnamese-language instructional videos, or dedicated staff to resolve user queries. Designers must prioritize creating clear, intuitive,

and easy-to-understand interfaces. For example, a self-service train ticket kiosk could guide users with visual cues like route maps and numbered steps, while a demo mode allows practice without pressure.

The sense of autonomy when interacting with the system has been proven to positively influence both perceived usefulness and ease of use. In Vietnam, forcing SST usage (e.g., reducing traditional counters) would backfire, especially in a culture that values human interaction. Instead, businesses should adopt a hybrid model, maintaining both SSTs and staffed services to allow customer choice.

While SSTs aim for automation, fully eliminating human elements would degrade user experience in Vietnam, a culture that emphasizes direct communication and community. The solution lies in designing hybrid-connected SSTs, such as integrating prominent "Help" buttons that connect users to staff via audio/chat or positioning staff near SSTs for immediate assistance. For example, in-store staff might proactively ask, "Would you prefer self-checkout or a staff-assisted counter?", an approach balancing autonomy with a sense of care.

A critical research finding reveals that competence and relatedness do not significantly influence perceived usefulness. This implies that, in Vietnam's public SST context, users' perceived value primarily hinges on core features like transaction speed, accuracy, and task efficiency, not personal confidence or social connection. Thus, instead of solely focusing on training programs or social interaction channels, managers should prioritize optimizing interfaces and reliable transaction processes to ensure system stability and efficiency.

Our study also highlights the dual roles of design and security in the successful implementation of SSTs. In Vietnam, younger, tech-savvy individuals are more likely to engage, but complex or poorly designed interfaces can cause frustration and discourage use. Therefore, only SSTs featuring intuitive and user-centered designs that align with users' cognitive capacities and expectations will achieve widespread adoption. To reinforce this, effective marketing should highlight these qualities - intuitive design, ease of use, and clear instructions to build consumer confidence, demonstrating how SSTs simplify transactions and enhance convenience. Additionally, service providers should systematically evaluate user feedback and refine system interfaces to enhance usability while maintaining the necessary level of novelty that sustains engagement.

Beyond design, security plays an equally vital role in shaping users' perceptions of SSTs. Organizations should proactively communicate the security features integrated into the system by providing clear explanations of how transactions are processed, how user data is stored, and how unauthorized access is prevented. Additionally, visible security indicators such as trust seals, biometric authentication options, or real-time fraud detection notifications can reassure users that their interactions with the technology are secure. However, security measures should be seamlessly integrated into the system to avoid unnecessary complexity.

6.2. Limitations

First, this study has a limited sample size, which impacts the accuracy and generalizability of the results. Additionally, the research was conducted in Vietnam, where public SSTs may differ from other countries. Future research could compare countries with varying SST adoption, such as Vietnam and the United States, to explore factors influencing behavioral intentions in different contexts.

Second, this study focuses on only two aspects of SSTs quality: design and security. To enhance generalizability and comprehensiveness, future research should expand its scope by examining additional factors related to self-service technology quality.

Third, we use social anxiety as a moderating variable in this study; however, the results indicate that social anxiety did not play the expected moderating role. Therefore, future studies may consider using social anxiety as an independent variable or exploring alternative moderating variables to improve the completeness of the research model.

Fourth, this study examines user motivation based on self-motivation from SDT. Future research could extend this approach by exploring additional motivational factors, such as social motivation, to provide a more comprehensive understanding of users' behavioral intentions.

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APPENDIX 1: MEASUREMENT SCALES

Autonomy – Leung and Matanda [22], Vallerand and Fortier [64]

1. I feel that the way I complete the process of using public SSTs is an expression of myself.
2. I feel good when I can make choices when using public SSTs.
3. I feel that I have the opportunity to make choices with respect to service implementation procedures while using public SSTs.
4. I would have more control of my service implementation procedures while using public SSTs.
5. The public SSTs give me more chances to control my service implementation procedures.

Competence – Leung and Matanda [22], Vallerand and Fortier [64]

1. I am fully capable of using public SSTs.
2. I am confident in my ability to use public SSTs.
3. My past experience increases my confidence in successfully using public SSTs.

4. I am better than others in using public SSTs.

5. I have a stronger capability than others in using public SSTs.

Relatedness – Vallerand and Fortier [64]

1. The public SSTs give me more chances to interact with others.

2. I feel close to others while using public SSTs.

3. I have more opportunity to be close to others while using public SSTs.

Design - Lin and Hsieh [32]

1. The layout of public SSTs is aesthetically appealing.

2. Public SSTs appear to use up-to-date technology.

Security - Lin and Hsieh [32]

1. My personal information is treated confidentially while using public SSTs.

2. I feel secure supplying relevant information when using public SSTs.

3. I feel safe in my transactions with public SSTs.

4. A clear privacy policy is stated when I use public SSTs.

Perceived ease of use - David [15]

1. I would find public SSTs easy to use.

2. Learning to operate public SSTs would be easy for me.

3. My interaction with public SSTs would be clear and understandable.

4. I would find it easy to get public SSTs to do what I want them to do.

5. Interacting with public SSTs does not require a lot of my mental effort.

Perceived usefulness - David [15]

1. Using public SSTs makes it easier for me to implement service procedures.

2. Using public SSTs improves my service implementation procedures.

3. Using public SSTs enables me to implement service procedures more quickly.

4. I find public SSTs useful for me.

5. Using public SSTs in service implementation procedures increases my productivity.

6. Using public SSTs enhances my effectiveness on my service implementation procedures.

Attitude toward using - David [15], Fishbein and Ajzen [65], Taylor and Todd [66]

1. Using public SSTs is a bad/good idea.

2. Using public SSTs is a foolish/wise idea.

3. I dislike/like the idea of using public SSTs.

4. Using public SSTs is unpleasant/pleasant.

Behavioral intention - Venkatesh *et al.* [67], David [15]

1. I intend to continuously use public SSTs in the future.

2. I would use public SSTs more frequently in the future.

3. I will actively recommend public self-technology services to people around me.

Social anxiety - Dabholkar and Bagozzi [34]

1. The number of consumers lining up behind me would make me anxious about using public SST.

APPENDIX 2: DEMOGRAPHIC INFORMATION

Measure	Items	Frequency	Percent
Gender	Male	108	45.2
	Female	129	54.0
	Prefer not to say	2	0.8
Age	Under 18 years old	13	5.4
	18-29 years old	135	56.5
	30-39 years old	44	18.4
	40-49 years old	22	9.2
	50-59 years old	18	7.5
	Above 60 years old	7	2.9
Frequency	Once/ several times a week	77	32.2
	Once/ several times a month	122	51.0
	Once/ several times a year	40	16.7

APPENDIX 3: CONSTRUCT RELIABILITY AND VALIDITY

	Cronbach's alpha	Composite reliability (rho...a)	Composite reliability (rho...c)	Average variance extracted (AVE)
ATT	0.917	0.919	0.941	0.801
AU	0.947	0.947	0.959	0.825
BI	0.867	0.868	0.938	0.883
COM	0.931	0.938	0.947	0.783
DES	0.774	0.774	0.898	0.816
PEOU	0.895	0.896	0.927	0.762
PU	0.917	0.918	0.935	0.707
RE	0.938	0.939	0.960	0.890
SE	0.892	0.894	0.925	0.757