

## Research Article

# Self-Service Technology Use by Older Adults: Moderating Effects of Need for Interaction

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## Abstract.

Changing face-to-face services to technology-based self-service can pose several challenges. This study aims to analyze whether the characteristics of elderly consumers who like to interact directly can moderate intentions toward behavior using self-service technology. Data were collected using questionnaires distributed to 204 elderly respondents in two provinces in Indonesia. The results showed that perceived usefulness of self-service technology is more important to increase behavioral intention to use SST than perceived ease of use. In addition, the influence of behavioral intention on self-service use behavior will be more assertive in individuals who enjoy face-to-face interaction. This study emphasizes the moderating role of the need for interaction in the relationship between behavioral intention and the use of SST among older individuals in developing countries. Self-service technology can be an alternative for older adults in developing countries to get services without relying on human services. However, the usefulness of service technology must be conveyed to consumers as service users. This research was conducted during the transition period due to COVID-19. However, future research, conducted in more normal conditions, might yield different results.

**Keywords:** self-service technology, older adult, need for interaction, TAM, developing country

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## 1. Introduction

Service research places a premium on comprehending customers' interactions with self-service technology (SST) [1]. COVID-19 has sped up the digital transformation process, rising labor costs and rules mandating a 52-hour workweek are causing human labor to be replaced by SST [2]. In Indonesia, some services intended for elderly consumers have gradually shifted from conventional to technology-based systems. One is an authentication service from a pension fund company for civil servants. The authentication process of pension fund customers must be carried out regularly every month as proof that the pension beneficiaries are still alive. The authentication process, currently limited to in-person interactions with officers at service counters, has recently expanded to include self-authentication services facilitated via a smartphone application on the customer's

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device. Authentication starts by entering a PIN or password on the application. Then, the application will guide customers to perform biometric scans of fingerprints, iris, and face and voice for data matching. If authentication is successful, pension beneficiaries can withdraw their pension funds through an automatic teller machine. However, because older people tend to have lower levels of digital literacy than younger people do, they are being denied access to services that have the potential to ease the financial and social strains that they face on a daily basis [2].

The disbursement of pension funds for retired civil servants in Indonesia has become a tradition. At the beginning of each month, retirees queue at the counter to authenticate and collect their pension simultaneously. Pensioners prefer to take their pension directly at the counter because they desire to gather with comrades-in-arms to no longer look like older adults, telling each other and exchanging information [3]. That suggests that for this elderly group, direct interaction or social contact is a favorite thing. Older adults are generally categorized as isolated/lonely individuals. Lonely and not lonely have different perceptions and are influenced differently by self-service technology that eliminates social contact [4]. In order to achieve this, SST still encounters strong opposition from elderly clients who avoid them [5].

As a theoretical basis, the Technology Acceptance Model (TAM) is the model that is considered the most suitable for obtaining an overview of technology use behavior. TAM (Perceived Ease of Use, Perceived Usefulness, and Behavioral Intention) measurements are reliable and can be used in various contexts [6]. TAM [7] developed from the reasoned action theory (TRA) to predict technology acceptance. TAM has been widely adopted to investigate user acceptance of various types of technologies, including SST in financial services [8,9], e-government [10], health services [11,12], hospitality industry [13–15], retail [16–18], airport self-check-in kiosk services [19,20], and facial recognition payment [21]. Despite numerous studies that have been conducted on the topic, the majority of research on technology adoption behavior, such as the adoption of self-service technologies (SST), has tended to focus on younger consumers [5]. This study aims to determine the SST adoption by Indonesian older adults based on the perspective of the technology acceptance model (TAM). TAM [22] theorized that behavioral intention is the primary determinant of use behavior. However, individual differences may moderate the relationship between behavioral intention and Behavior [23,24]. In order that, the current study also expands on the current TAM by including the need for human interaction as an additional moderation construct

## 2. Material and Methods

### 2.1. Technology acceptance framework

TAM theorized there are two main determinants of technology acceptance: perceived ease of use and usefulness [7]. According to TAM, first influence is the perceived ease of use. Technology that is easy to learn, controllable, clear and understandable, flexible, easy to master, and easy to use will affect the perceived usefulness of the technology and attitudes toward accepting or rejecting behavior. The second influence is perceived usefulness. Technology can make work faster, facilitate the completion of work, increase efficiency and effectiveness, and affect attitudes towards acceptance or rejection behavior and intention to use technology, which will ultimately affect the actual use or use behavior of technology.

Perceived Ease of Use in this study is the user's perception/view of the ease of operating self-authentication applications. Convenience for self-authentication users: If the technology is easy to learn and use, the instructions can be clearly understood, and a user can master or re-operate the technology efficiently. Meanwhile, perceived usefulness in this study is the user's perception of the benefits of self-authentication applications. The usefulness for users of the self-authentication application is, of course, if the application can make users feel that the authentication process can be done easily and quickly without having to queue at the counter, taking pension funds can be done without problems, and users can feel the benefits.

Several studies related to self-service technology have tested TAM variables and found that perceived ease of use affects perceived usefulness [15,17,20,25]. According to [15,17,25,26], perceived ease of use and perceived usefulness were also found to affect behavioral intention.

Furthermore, the last version of TAM [27] did not include attitude variables in the model. The TAM final model also emphasizes that behavioral intention is the primary determinant of actual use. Behavioral intention is an essential factor in technology adoption for the use of early technology and the continued use of technology. Actual use is conceptualized in the form of measuring the frequency and duration of time of technology use. [7] used actual usage measurement, and [28] used use behavior measurement. Behavioral intention affects use behavior both in using the system in the organizational and consumer contexts [28,29]. [17] found that behavioral intention to use SST positively affects the actual use of SST. For this reason, it can be hypothesized that:

H1: Perceived ease of use affects the perceived usefulness of self-authentication in elderly users.

H2: Perceived ease of use affects behavioral intention to use self-authentication in elderly users.

H3: Perceived usefulness affects behavioral intention to use self-authentication in elderly users.

H4: Behavioral intention to use affects the use behavior of self-authentication in elderly users.

## 2.2. Consumer traits

Personality research has revealed five general response tendencies that represent strong personality characteristics: agreeableness, kindness, conscientiousness, emotional stability, and culture [30]. [31] linked culture with technology use. They found that tasks take precedence over relationships in countries with individualist societies, and the internet and e-mail have a strong appeal and are often used to connect individuals. In contrast, countries with collectivist cultures prioritize relationships over task completion, and the internet and e-mail are less attractive and rarely used. Technology is more enthusiastically used in individualist societies because the need for interaction is lower than in less individualistic or collectivist societies.

In a study on SST of retail stores, [4] suggest that for older people who are socially isolated, shopping is more than just looking for goods and services but also making social contact. This consumer group considers meetings between buyers and customers directly to provide a social experience. It means that in certain age groups, namely the elderly group, there is a tendency for people to prefer social contact rather than using self-service technology. [32], in their research on SST, argued that there are variations or differences in consumers in forming attitudes and behavioral intentions in using SST due to differences in consumer behavior, one of which is the need for interaction. [32] conceptualized that using machines may not suit the perspective of individuals with high interaction needs. They would expect to interact with service personnel. Consumers with high interaction needs will lack intrinsic motivation to use self-service technology.

The need for interaction with service employees is defined as the importance of human interaction with customers in service encounters [33]. Furthermore, [34] suggests that the need for interaction is the tendency of individuals to prefer interpersonal contact with service employees when receiving services. The need for interaction in this study refers to the characteristics of consumers who like to make social contact or interact

directly with service personnel or other individuals in the service process. According to Walker et al. (2002), the authors propose that the adoption of new items is contingent upon a few key factors. These factors include the extent to which individuals desire or prefer personal contact, as well as the perceived ease of access and use. Other research recommends further investigation in the context of the right balance between human-based and technology-based interactions [35]. The need for interaction is a promising consumer characteristic to be explored [34].

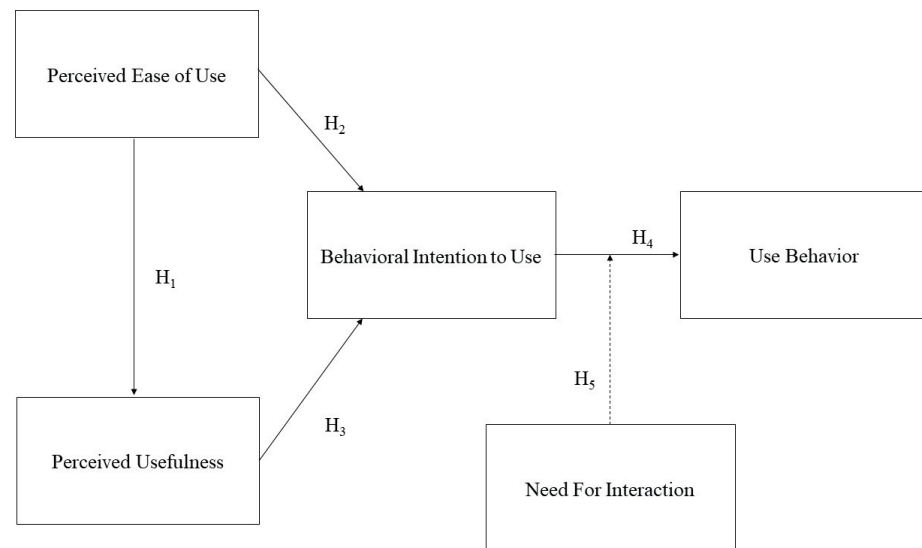
In their research on Internet banking adoption, [36] and [37] highlighted this phenomenon more to traditional barriers. When social contact is essential, internet banking will be rejected because of the lack of human interaction [36]. Customers with a high need for interaction with service personnel prefer counter services because they tend to think they cannot use SST properly [38,39]. In another study, [20] found that the need for interaction did not significantly moderate SST use behavior. However, the study did not specifically examine the elderly group and only tested this moderating effect on intention. At the same time, individual differences may moderate the relationship between behavioral intention and Behavior [23,24].

Persons with a high need for interaction will be unmotivated to use self-service technology. They prefer to interact directly with staff or service personnel. For this reason, the effect of behavioral intention on self-service technology behavior will be weaker. People with a high need for interaction may be less motivated to develop an intention to use the technology and prefer human interaction. Conversely, if someone has a low level of need for interaction, their preference tends to use self-service technology to meet their needs. In this case, the effect of behavioral intention on self-service technology use behavior will be more robust. People with a low need for interaction tend to be more open to using the technology and more motivated to develop an intention to use it. Thus, the effect of behavioral intention to use on use behavior will be more substantial for elderly consumers with a low need for interaction. Based on these arguments, the research hypothesis is:

H5: Need for interaction moderates the effect of behavioral intention on the use behavior of self-authentication in elderly users.

### 3. Methodology

This study examines the research model (Figure 1), the effect of perceived ease of use and perceived usefulness on behavioral intention to use self-service technology in elderly users, and how it influences use behavior. This study also examines the



**Figure 1:** Purposed Research Model. Source: Author's own work.

moderation of the Need for Interaction variable on the effect of Behavioral intention to use on Use behavior. Empirical testing of the proposed research model is conducted using quantitative techniques. A total of 204 individuals participated in the sample. This number follows the opinion [40], where the appropriate sample size for structural equation modeling is 100-200. Participants in this study were drawn from two provincial capitals in Indonesia, both of which have large populations of retired civil servants, namely East Java and West Java Provinces. All respondents are civil servant pension beneficiaries who have used the self-authentication application to benefit from disbursing pension funds. In addition, respondents to this study are those who fall into the elderly category in Indonesia (i.e., individuals aged 60 years or over).

The respondents were provided with a questionnaire and a researcher's statement emphasizing the need to maintain their data's confidentiality. The answers were used only for research purposes. The first part of the questionnaire captures information about the demographic profile of the respondents, and the second part captures information about the respondents' perceptions based on the statement items used to measure the variables studied. Questionnaire items were developed from previous research, including statements about perceived ease of use, perceived usefulness, behavioral intention to use, use behavior, and need for interaction. All items are translated from English to Indonesian. Variables are measured using a Likert scale of 5, where "1 = strongly disagree" to "5 = strongly agree". The survey was completed by participants who had provided their consent and expressed their willingness to serve as respondent.

## 4. Results and Discussion

The suggested model completed testing using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, utilizing the Smart PLS 3 software. In recent years, PLS-SEM has been widely used in many business studies [41,42]. PLS-SEM consists of two models, namely a measurement model (representing how measured variables represent constructs) and a structural model (showing how constructs are related to one another) [43]. The profile of the respondents in this study can be seen in Table 1. Table 1 illustrates that most respondents in this study were women aged 60-69 years with undergraduate education.

TABLE 1: Respondents profile.

Demographic Variables		Frequencies	Percent
Age	60 – 69	114	55.88%
	70 – 79	86	42.16%
	80 above	4	1.96%
Gender	Male	98	48.04%
	Female	106	51.96%
Education	Below Diploma	30	14.71%
	Diploma	39	19.12%
	Degree	102	50.00%
	Master	29	14.22%
	Doctor	4	1.96%

Source: Author's own work

The measurement model is assessed by testing internal reliability, convergent validity, and discriminant validity [40]. The results of the measurement model are presented in Table 2 and Table 3. Following the recommendations from [40], high outer loadings on a construct indicate that the associated indicators have much in common, which is captured by the construct, for indicators with very low outer loadings (below 0.40) should permanently be eliminated from the scale. Based on Table 2, the outer loading values of all indicators are in the range of 0.606 to 0.916, so all indicators are maintained in the following analysis process.

A standard measure for establishing convergent validity at the construct level is the average extracted variance (AVE). An AVE value of 0.50 or higher indicates that, on average, the construct explains more than half of the variance of its indicator [40]. The AVE value ranges from 0.544 to 0.788, greater than the recommended level. Therefore, the condition of convergent validity is met in this study. Furthermore, the Cronbach Alpha (CA) and Composite Reliability (CR) values indicate internal reliability above 0.70. Cronbach Alpha values range from 0.772 to 0.867, and composite reliability values range from 0.824 to 0.920, which supports strong internal reliability.

TABLE 2: Measurement model.

Construct	Item	Loading	CA	CR	AVE
Perceived Ease of Use (PEOU)			0.867	0.909	0.715
	PEOU 1	0.855			
	PEOU 2	0.877			
	PEOU 3	0.830			
	PEOU 4	0.818			
Perceived Usefulness (PU)			0.829	0.886	0.662
	PU1	0.829			
	PU 2	0.846			
	PU 3	0.841			
	PU 4	0.732			
Behavioral Intention to Use (BIU)			0.884	0.920	0.743
	BIU 1	0.903			
	BIU 2	0.883			
	BIU 3	0.867			
	BIU 4	0.789			
Use Behavior (UB)			0.865	0.918	0.788
	UB 1	0.893			
	UB 2	0.916			
	UB 3	0.854			
Need for Interaction (NI)			0.772	0.824	0.544
	NI 1	0.792			
	NI 2	0.606			
	NI 3	0.679			
	NI 4	0.848			

Note: CA: Cronbach alpha; CR: composite reliability; AVE: average extracted variance. Source: Author's own work

Discriminant validity was assessed by the square root of the AVE and the cross-loading matrix [40]. The results in Table 3 show the construct discriminant validity. The square root value of AVE for each latent variable is greater than the correlation value between the latent variable and other latent variables. In addition, [44] suggested that the heterotrait-monotrait ratio of correlation (HTMT) should be less than 0.85, but based on the opinion of [40] that the confidence interval of the HTMT statistic should not include the value 1 for all combinations of constructs. Based on the results in Table 3 and Table 4, the designed instrument/questionnaire has good discriminant validity.

The structural evaluation of this research model is seen from the R-square (R2) and Q-square Predictive Relevance (Q2) values shown in Table 5. The R-Square (R2) value indicates how much the exogenous construct can explain the variability of the



TABLE 3: Discriminant validity (latent variable correlation and square root of AVE).

Construct	BIU	NI	PEOU	PU	UB
BIU	0.862				
NI	-0.210	0.737			
PEOU	0.302	-0.084	0.845		
PU	0.466	-0.092	0.656	0.813	
UB	0.803	-0.231	0.329	0.488	0.888

Source: Author's own work

TABLE 4: HTMT (heterotrait–monotrait ratio).

Construct	BIU	NI	PEOU	PU
NI	0.203			
PEOU	0.344	0.143		
PU	0.544	0.172	0.762	
UB	0.920	0.202	0.383	0.577

Source: Author's own work

TABLE 5: Saturated model results.

Construct	R2	Adj. R2	VIF	Q2	SRMR
UB	0.658	0.652	1.083	0.510	0.087
BIU	0.218	0.210	1.075	0.157	
PU	0.430	0.428	1.000	0.277	

Note: VIF: Variance Inflation Factor; SRMR: Standardized Root Mean Square. Source: Author's own work.

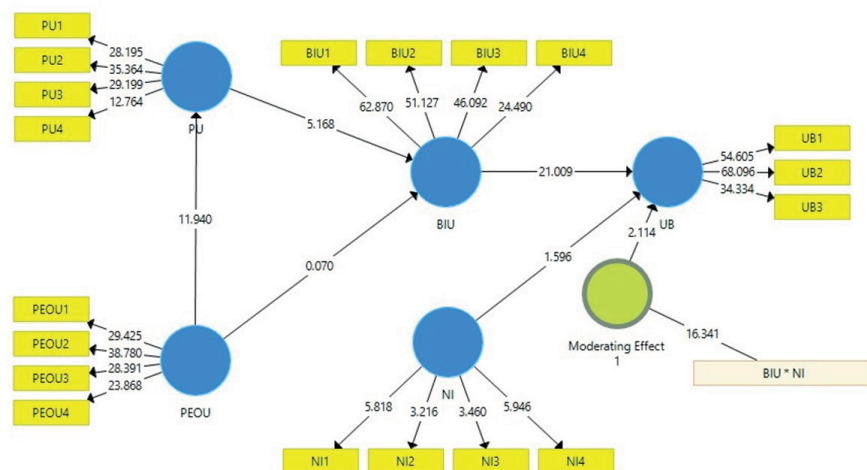


Figure 2: Structural model. Source: Author's own work.

endogenous construct. The results of the R-Square calculation show that BIU can explain UB by 65.8%, PEOU and PU can explain BIU by 21.8%, and PEOU and PEOU can explain PU by 43%. Furthermore, Q-square Predictive Relevance (Q2) shows how well

TABLE 6: Path coefficients. Source: Author's own work.

	Hypothesis	Beta	Mean	Standard Deviation	T Statistics	P- Value	Decision
H1	PEOU→PU	0.656	0.660	0.055	11.940	0.000***	Supported
H2	PEOU→BIU	-0.007	-0.012	0.106	0.070	0.944	Not Supported
H3	PU→BIU	0.471	0.480	0.091	5.168	0.000***	Supported
H4	BIU→UB	0.773	0.771	0.037	21.009	0.000***	Supported
H5	Efek Moderasi BIU*NI→UB	0.090	0.089	0.043	2.114	0.035**	Supported

Note: \*\*\*<0.001; \*\*<0.05. Source: Author's own work.

the observations made can give results to the research model. The results of the Q-Square calculation show that the model used can explain the information in the research data.

The structural model was developed to identify the relationship between constructs in the research model. This study examines the relationship between the dependent and independent variables with path coefficient ( $\beta$ ) and p-value <0.05. Based on the results of structural model testing (see Figure 2 and Table 6), perceived ease of use (PEOU) has a positive significant effect on perceived usefulness (PU) ( $\beta= 0.656$ ;  $p < 0.05$ ), which confirms H1, but PEOU has no significant effect on behavioral intention to use (BI) ( $\beta= -0.007$ ;  $p > 0.05$ ), which rejects H2. Perceived usefulness (PU) has a positive significant effect on Behavioral intention to use (BIU) ( $\beta= 0.471$ ;  $p < 0.05$ ), which confirms H3. BIU has a positive significant effect on Use Behavior (UB) ( $\beta= 0.773$ ;  $p < 0.05$ ) which confirms H4. Need for Interaction (NI) significantly moderated (strengthened) the effect of BIU on UB ( $\beta= 0.090$ ;  $p < 0.05$ ), which supports H5.

The findings indicate that there is a substantial relationship between Perceived ease of use and Perceived usefulness. However, there is no significant relationship between Perceived ease of use and Behavioral intention to use. The perceived usefulness of a technology or system has a notable impact on an individual's behavioral intention to use it. Subsequently, the behavioral intention to use the technology or system has a considerable influence on the actual usage of it. The findings of this study provide empirical support for the Theory of Acceptance Model (TAM). The concept of perceived ease of use has a significant impact on perceived usefulness, which in turn has an indirect effect on the behavioral intention to use. However, the perceived usefulness influences the intention to use self-authentication indirectly via the perceived ease of use. The greater the simplicity of use of a technology, the higher its utility and the stronger the inclination to adopt it.

Perceived usefulness will influence behavioral intention to use SST in elderly users. Usefulness for self-authentication users is that if the application can make the authentication process faster without queueing at the verification counter, withdrawing pension funds can be done without problems, and users can feel the benefits. The results of the research reinforce previous technology acceptance studies [15,17,20,25,26], which found that perceived usefulness has a significant effect on behavioral intention to use. In adopting SST, usefulness is a driving factor for intention to use. User intentions will arise to use this technology if they feel the technology can provide benefits. The findings of this study also support research conducted by [45], which states that perceived usefulness influences behavioral intention to use technology in elderly users. Older adults in this study will use SST if the application is useful.

This study further contributes to the existing body of empirical evidence about the impact of behavioral intention on use behavior, in line with the Technology Acceptance Model (TAM) theoretical framework, which posits that behavior is preceded by intention. The path coefficient value from behavioral intention to use to use behavior shows a reasonably high value compared to the path coefficient value of other variables, namely 0.773, which means that the behavior of using self-authentication services by older adults in this study is very dependent on their intentions. Furthermore, to maintain the continuity of application use, companies as service providers need to explore the factors that can influence and increase behavioral intention to use so that it will impact actual usage, which is increasingly likely or will be higher.

Contrary to initial expectations, the direct effect of perceived ease of use on behavioral intention showed insignificant results. This result could be because self-authentication application users choose to use this technology -because of its benefits. Even though it was launched for the first time in 2018, this self-authentication application began to be widely used during the COVID-19 pandemic. Counter services were minimal then, so self-service technology was considered very useful. Thus, although the technology was difficult to use, it did not significantly impact the intention to use self-authentication. They will continue to use it because they feel it is useful for routine disbursement of pension funds, especially for the older adults prone to infection, so they choose to limit interaction. This study's findings align with [46] and [19], which found that perceived ease of use does not significantly affect behavioral intention to use. In contrast to the findings of [15,17,20,25,26], which stated that perceived ease of use influences behavioral intention to use, the current study's findings indicate that perceived ease of use does not influence behavioral intention to use.

Finally, what is of concern in this study is that the need for interaction significantly moderates (strengthens) the effect of behavioral intention to use on use behavior. Unexpectedly, the presented findings diverge from the conceptual framework formed within this research endeavor. The impact of behavioral intention on using self-service technology (SST) is expected to be weak among persons who are inclined towards social connection. This is because individuals with a strong preference for interpersonal engagement tend to avoid SST actively and instead seek opportunities to interact with service personnel. Instead, in this study, the effect of behavioral intention on the use behavior of SST will be more substantial in individuals who are happy to interact. This result means that elderly respondents who enjoy interacting with others will more likely realize their intention to use self-service technology.

However, the result can be explained as follows: even though it was launched in 2018, this self-authentication application began to be intensively implemented during the COVID-19 pandemic. At that time, social restrictions and counter-service restrictions were imposed. Older people with a high need for interaction may face limited access to direct interaction with staff or personnel. They may face geographical constraints, limited mobility, or situations where human interaction cannot be accommodated. Thus, self-service technology can be an alternative that allows them to carry out authentication without relying on human services. Second, older people with a high need for interaction may also realize that human interaction has limitations, especially regarding availability and time. They may object to long queues or limited counter service hours (human service). In this case, self-service technology can provide flexibility and convenience in periodic authentication for disbursing pension funds without queueing.

This finding has theoretical implications related to the need for interaction moderation evidence, especially on the effect of behavioral intention to use on self-service technology use behavior in elderly users. Based on existing research on technology acceptance by older people, the moderating effect is still limited to the use of gender, age, voluntariness of use, experience, and purchase/non-purchase groups [47]. The need for interaction is an individual characteristic (internal factor). An individual has self-regulation, where a person can regulate thoughts, behavior, and emotions in achieving goals. Thus, disturbing internal factors are easier to control than external factors. Several studies have found that older people are more able to control their emotions and have emotional stability [48] so that they can withhold personal pleasure to achieve goals. For this reason, older adults with a high need for interaction continue to use SST because the more important goal is to fulfill the authentication obligation to disburse the monthly

pension and avoid the risk of being exposed to the virus if they have to come to the service counter.

Service provider companies that use self-service technology must consider individual characteristics to provide appropriate and convenient consumer services. The company's strategic policies towards digitalization (including providing information technology-based services) must align with the needs of consumers as technology users. In addition, this finding has relevant implications for self-service technology providers. Service technology must be conveyed to consumers as service users so they can feel the difference between using technology and not using it. The application of service technology must significantly impact the effectiveness and efficiency of services to maintain and increase user interest in using technology. Understanding consumer perceptions of the use of technology will help companies as technology-based service providers maintain and increase consumer interest in using service technology sustainably. So that there is no discontinuance and loss due to technology investment caused by the user does not feel the benefits.

## 5. Conclusion

This study presents a reasonably accurate model predicting the adoption of self-service technology. Perceived ease of use still shows a strong influence as a determining factor of perceived usefulness. This study also provides empirical evidence of the effect of behavioral intention to use on use behavior, as TAM theorizes that behavior is preceded by intention. Furthermore, this study proves the moderating role of the need for interaction in the TAM model. Adopting technology as an innovation requires a process, including leading consumers to accept and get used to new behaviors. However, every customer has different needs according to their characteristics. In the service context, apart from implementing self-service technology, it is necessary to maintain traditional service systems or human contact to meet customers' needs. However, it should be noted that this study has several limitations. First, this model was tested empirically in a particular country, Indonesia, and only covered two provinces. Indonesia still has a disparity in infrastructure readiness and technological literacy across the country. However, future research may include additional regions in Indonesia or even additional countries to improve the results further. Second, as a moderator, this study focuses on human interaction. Other moderating variables, such as self-efficacy, self-awareness, and inherent novelty seeking, could be analyzed in future studies.

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