

## Research article

# Continuance intention to use artificial intelligence personal assistant: type, gender, and use experience

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## ABSTRACT

This study aims to identify the key predictors that affect the continuance intention of artificial intelligence personal assistant (AIPA). It proposes the theoretical framework which employs utilitarian value, hedonic value, perceived ease of use, perceived usefulness, novelty value, perceived enjoyment, and parasocial interaction. Data was collected from 257 users of artificial intelligence personal assistants. This study used partial least squares structural equation modeling (PLS-SEM) to analyze the empirical data. The results show that utilitarian value and hedonic value are significantly correlated with continuance intention. The findings reveal that perceived ease of use, perceived usefulness, novelty value have a significant effect on utilitarian value. The analysis results indicate that novelty value, perceived enjoyment, and parasocial interaction are significantly associated with hedonic value. The current study conducted multi-group analysis according to the AIPA type, gender, and use experience. The results of this study will be a useful guideline for research and business on AIPA.

## 1. Introduction

With the development of emerging devices such as smartphones, tablets, and smart TVs, artificial intelligence personal assistant (AIPA) is also evolving. AIPA uses natural language in processing to answer questions, make recommendations, and activate mobile apps (Iovine et al., 2020). It usually recognizes the user's voice and processes the information (McLean and Osei-Frimpong, 2019). Users can start phone calls, send emails, and find locations on a map via AIPA (Moorthy and Vu, 2015). In addition, Google Duplex can now book hair salons or make restaurant inquiries over the phone (Leviathan and Matias, 2018). AIPA market is expected to be worth \$50.9 Billion, Globally, by 2028 at a 30% CAGR (Article). Apple's Siri continues to claim the largest relative market share among smartphone assistants. Its share became low slightly in 2018 but still came in at 45.1% compared to 29.9% for Google Assistant, 18.3% for Amazon Alexa, and 4.7% for Samsung Bixby (Kinsella, 2020). Against this background, it would be valuable both academically and practically to study AIPA users' continuance intention. Therefore, this research identifies the key factors that influence continuance intention.

Users can get utilitarian and hedonic benefits from AIPA (McLean and Osei-Frimpong, 2019). The utilitarian value of the information system (IS) increases the continuance intention (Kim and Oh, 2011). Users are more likely to use voice personal assistants when assistants provide more

useful benefits (McLean and Osei-Frimpong, 2019). The hedonic value of information technology (IT) significantly determines behavioral intentions such as adoption intention and continuance intention (Kim and Oh, 2011). The subjects of this study are users of AIPA installed on smartphones. Users can easily access AIPA because they always carry their smartphones. They often use AIPA to soothe their boredom or to find fun. If AIPA provides users with greater hedonic value, users' continuous intentions may increase. Based on the above results and discussion, this study assumes that utilitarian value and hedonic value are preeminent antecedents of AIPA users' continuance intention.

Perceived ease of use and perceived usefulness are predictive variables of behavioral intention in the context of IT (Ahmad et al., 2020; Jo et al., 2011; Lu, 2014; Mohammadi, 2015). Perceived usefulness has a significant effect directly or indirectly on AI users' continuance intention (Nguyen et al., 2019, 2021). As AIPA is easier to use and provides more useful information to users, users would get greater utilitarian value from their assistants. The novelty value is related to originality and uniqueness (Mou et al., 2021). Compared to decision support technologies before AIPA, AIPA offers new experiences in the following respects. First, AIPA communicates like humans and recognizes natural language accurately (Knote et al., 2018). Existing digital assistants have processed information using text or computer code. AIPA receives command through voice and processes information directly. Second, AIPA operates multiple

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functions of smartphones on its own (Canbek and Mutlu, 2016). Third, AIPA also provides friendly conversations to users and serves as a secretary close to humans (O'Leary, 2019; Pradhan et al., 2019). Lastly, AIPA can be customized for users (Lopatovska et al., 2020). This is a completely new experience that was not seen before the emergence of advanced AIPA. This novelty may shape utilitarian benefits. Therefore, this study postulates that perceived ease of use, perceived usefulness, and novelty value play an essential role in generating utilitarian value.

Perceived enjoyment is the main explanatory variable of the hedonic IS (van der Heijden, 2004). If users experience joy and fun through communication with AIPA, they would feel higher level of hedonic values from AIPA. Parasocial interaction refers to a kind of psychological relationship that users experience during conversations with AIPA (Jang, 2020). The user may engage in a parasocial interaction with AIPA to request counseling or talk about his/her mind (Hoffman et al., 2021). In particular, as the time to stay at home to prevent COVID-19 has increased recently, users have interacted with AIPA to mitigate mental damage (Miner et al., 2020). The greater these parasocial interactions are formed, the higher the user's hedonic value may be. AIPA also responds to user jokes and chatter. These new reactions would generate hedonic value. Therefore, this study suggests that perceived enjoyment, parasocial interaction, and novelty value would drive hedonic value.

The current study aims to figure out the predictors of continuance intention of general AIPA users including business and academic areas. Even if users are engaged in various fields, there may be common factors for the continuance intention of AIPA. Moreover, this study chooses the factors influencing continuance intention based on the following rationale. First, utilitarian value and hedonic value were set as the main preceding factors because AIPA provides both usefulness and fun. AIPA can easily schedule and offer interesting search results. Utilitarian value may be formed by useful function and ease of use, and hedonic value may be determined by enjoyment and parasocial interaction. Since AIPA can be new in terms of functionality or enjoyment, novelty value would serve as the predominant antecedent of both utilitarian value and hedonic value. Second, this work endeavored to suggest new factors and paths that have not been investigated in the literature on AIPA users. Previous studies have employed an IS success model (Nguyen et al., 2021), a technology acceptance model (TAM) (Nguyen et al., 2019), an expectation confirmation model (ECM) (Nguyen et al., 2021), a unified theory of acceptance and use of technology (UTAUT) (Moorthy and Vu, 2015), a technology failure factors (Sun et al., 2021), and privacy variables (Lutz and Newlands, 2021; Rajaobelina et al., 2021). The above research has not validated the paths that this study develops. Last, this research focused on factors specialized in the nature of AIPA. AIPA offers services through interaction with users. Users may build a parasocial interaction with AIPA because it also provides a helpful dialogue for human emotions. According to the above logic, the present study adopted ease, usefulness, uniqueness, pleasure, and interaction.

The structure of this study is as follows. Section 2 presents the background and related works. Section 3 describes the research model and hypotheses. Section 4 details the methodology. Section 5 provides the results of analysis. Section 6 covers the discussion. Finally, Section 7 shows implications, limitations, and future research directions.

## 2. Background and related work

This study searched the online DB of Web of Science, Google Scholar, and leading publishers (e.g., Elsevier, Emerald, Springer, Taylor and Francis, and John Wiley & Sons) to review the relevant literature. The keywords for the research subject were AIPA, artificial intelligence assistant, intelligent virtual assistant, digital assistant, and voice assistant. To intensively review research on user behavior, this work also reflected keywords such as behavioral intention, continuance intention, influencing factor, and affecting factor. Numerous studies have analyzed the behavior of users of AIPA (McLean and Osei-Frimpong, 2019; Nguyen et al., 2021; Pal et al., 2021). Several works have identified the main

factors of AI users' behaviors from the perspective of an IS (Nguyen et al., 2019, 2021). Some research empirically verified the role of interaction based on the fact that AI interacts with humans (Hasan et al., 2021a; Jang, 2020). Prior studies have mainly focused on smartphone artificial assistants, in-home speakers, and other smart device assistants (Canbek and Mutlu, 2016; Smith et al., 2022; Sun et al., 2021). From the next paragraph, this article introduces previous studies reflecting utility and pleasure, former research introducing IS factors, and related studies based on a marketing perspective.

Some studies employed utility and pleasure in explaining the behavior of personal assistant users and analyzed them. Pal et al. (2021) examined the drivers of users' continuance usage intention of smart voice assistants. They provided evident support that trust, satisfaction, slowness of adoption, skepticism, user engagement, and attitude are the significant enablers of continuance usage intention in the voice assistant context. Particularly, the attitude was the second-order construct that consisted of a utilitarian attitude and a hedonic attitude. According to the results, users who have a utilitarian attitude and a hedonic attitude are more likely to use AIPA continuously. McLean and Osei-Frimpong (2019) explored the factors affecting the usage of an In-home voice assistant. They indicated that utilitarian benefits have a significant effect on usage. It was found that hedonic benefits do not affect usage. In-home voice assistant usually uses the same software as the assistant on the smartphone. Both Amazon Alex and Google Assistant run on smartphones as well as on smart speakers (e.g., Echo Dot and Google Nest) or other devices (e.g., Echo Show or Google Home). Since AIPA on a smartphone allows conversations anytime and anywhere, it may provide greater fun to users than in-home assistants. Therefore, this study reflects two components which are utilitarian value and hedonic value. Although Both Pal et al. (2021) and McLean and Osei-Frimpong (2019) employed a utilitarian perspective and hedonic perspective, they did not account for the preceding factors of utility and pleasure. The present research observes the formation process of utilitarian value and hedonic value.

A battery of studies has analyzed AI users' behavior by reflecting major factors that have been verified in the literature on ISs (Ashfaq et al., 2020; Nguyen et al., 2019, 2021). Nguyen et al. (2021) proposed the theoretical framework to account for the continuance intention of AI chatbots. They incorporated the constructs in DeLone and McLean's IS success model and variables in ECM. It was unveiled that trust, user satisfaction, and perceived usefulness are significantly associated with continuance intention. Also, information quality and service quality had a positive relation to user satisfaction. The ECM describes the continuing behavior of users of the ISs (Bhattacharjee, 2001). According to the model, confirmation drives perceived usefulness and satisfaction. Satisfaction forms the continuance intention. The ECM was applied on AIPA because confirmation, perceived usefulness, and satisfaction can lead to continuance intention in the context of AIPA. By considering the results in Nguyen et al. (2021), this study posits perceived usefulness as an exogenous variable within the research model. Nguyen et al. (2021) reflected essential factors which had been extensively demonstrated in IT contexts. The current study is different in that it adds AIPA-specific variables while maintaining the core determinants of IT use. Nguyen et al. (2019) developed a research model by combining the factors in IS success model and components of TAM to clarify the key factors influencing the continuance intention of the voice user interface. They discovered that perceived usefulness, perceived enjoyment, mobile self-efficacy, and trust significantly affect continuance intention via attitude. These findings made the grounds that perceived usefulness and perceived enjoyment need to be chosen as the leading factors in understanding the continuance intention of AIPA. TAM was developed to explain the acceptance of technology (Davis, 1989). According to the model, the easier and more useful the technology is, the stronger the user's intention to accept it. Technology acceptance factors have been also verified to enhance continuance intention (Jo, 2021). Although the research model in Nguyen et al. (2019) has an advantage in that it integrates traditional models in the field of ISs, it did not present

AIPA-specific variables. Pillai et al. (2020) shed light on the shopping intention at AI-controlled retail stores. They showed that innovativeness and optimism of consumers are the major antecedents of perceived ease and perceived usefulness. Also, it was revealed that perceived ease of use, perceived usefulness, perceived enjoyment, customization, and interactivity are significant predictors of the shopping intention of consumers in AI-powered automated stores. Based on the results of Pillai et al. (2020), this study reflects perceived ease of use, perceived usefulness, and perceived enjoyment. Since Pillai et al. (2020) dealt with AI-powered stores, the research results may be limitedly applicable to the shopping context. To get a broader perspective, this paper aimed to study general AIPA, which is most easily encountered by people. It will derive implications that can be applied to detailed AI subjects (e.g., shopping, game, education, etc.). Jang (2020) investigated the decision factors of usage in the domain of virtual personal assistants. They pointed out that parasocial interaction, assistant type, and loneliness play a crucial role in enhancing the level of usage. On the ground of above results (Jang, 2020; Pillai et al., 2020), this study introduces parasocial interaction as the key factor in the formation of continuance intention. Jang (2020) has limitations in that it does not consider the function, technology, and value of AIPA. To overcome it, this study measured related factors from the users' cognitive perspective.

Hasan et al. (2021) identified the determinants of brand loyalty in the context of voice-assisted AI. They found trust, interaction, and novelty value are the significant and positive precursors of brand loyalty. Perceived risk was found to hurt brand loyalty. Brand involvement and consumer innovativeness moderated the effect of novelty value on brand loyalty positively. Based on the results of Hasan et al. (2021), this study employs novelty value in elaborating continuance intention. Since Hasan et al. (2021) explained brand loyalty by examining only Siri, the result would be applicable to only a certain brand among many AIPAs. To improve the generality, this study describes the general intention of using AIPA by investigating multiple assistants. Also, Hasan et al. (2021) suggested basic interaction as the antecedent of brand loyalty. This article introduces parasocial interaction based on the human-like behavior of AIPA. Moorthy and Vu (2015) investigated the effect of privacy concerns on the use of a voice-activated personal assistant in the public space. They observed the behavior of users according to location and the type of information. The authors found that users are more likely to transmit information in private spaces than in public spaces. Users also were figured out to be more likely to transmit non-private information than private information. Xu et al. (2020) examined the roles of task complexity and problem-solving ability in shaping usage intention in AI customer service. They intimated that the consumers considered the problem-solving ability of AI to be greater than that of human customer service in low-complexity tasks. Perceived problem-solving ability mediated the effects of customers' service usage intentions with task complexity serving as a boundary condition. Xu et al. (2020) included only task-complexity and problem-solving ability because the subjects of the study were used only for utility purposes. Since AIPA can provide both utilitarian value and hedonic value, this study considered both utility and hedonic aspects. Table 1 describes a critical overview of related studies.

In summary, a large body of studies has applied the IS Success Model, TAM, and ECM, which have been widely verified in the IS field. Moreover, some researchers have introduced variables such as perceived risk, trust, interaction, and problem-solving to explain the behavior of AIPA users. Based on previous works, the current study employs the factors that precede the intention to continue using AIPA.

### 3. Research model

Figure 1 depicts the research model to identify the predictors of continuance intention in the context of AIPA. AIPA provides useful functions and answers interesting command results. Thus, this study suggests that utilitarian value and hedonic value significantly affect

continuance intention. Utilitarian value may increase if users can use helpful features from AIPAs and handle them comfortably. Hence, this research postulates that perceived ease of use and perceived usefulness are significant predictors of utilitarian value. Hedonic value may be enhanced if users are entertained with AIPA and interact with it similarly to humans. Therefore, this article posits that perceived enjoyment and parasocial interaction significantly impact hedonic value. AIPA's novelty value includes usefulness and fun. Consequently, novelty value is expected to affect both utilitarian value and hedonic value.

#### 3.1. Utilitarian value (UTV)

Utilitarian value reflects the task-specific, efficient, and economical aspects of a product/service (Yu et al., 2013). Thus, the continuous use of AIPA can be regarded as a means of accomplishing some task-related goals (Holbrook and Batra, 1987). Utilitarian benefits are related to useful help. Utilitarian value has been figured out to be the determinant of behavioral intention in the various IS contexts (Kim and Han, 2009; Kim and Oh, 2011; Ozturk et al., 2016). Users perform useful functions such as registering schedules or searching for something through AIPA. Users with a higher level of utilitarian value would increase their intention to continue using AIPA. Thus, this study predicts that utilitarian values facilitate the intention to use continuously.

H1. Utilitarian value significantly affects continuance intention.

#### 3.2. Hedonic value (HEV)

Hedonic value represents enjoyment, pleasure, and anxiety related to the use of a product/service (Holbrook and Hirschman, 1982). It can be drawn from the interaction with technology itself (Sherman et al., 1997). Hedonic value significantly determines the adoption intention or continuance intention in the IS domains (Kim and Han, 2009; Kim and Oh, 2011; Ozturk et al., 2016; Yu et al., 2013). AIPA provides fun through voice interaction with humans. Users that gain greater hedonic value are more motivated to use AIPA. Therefore, one can expect that hedonic value triggers continuance intention.

H2. Hedonic value significantly affects continuance intention.

#### 3.3. Perceived ease of use (PEU)

Perceived ease of use refers to the extent to which a person believes that using a particular system would be free of effort (Davis, 1989). It significantly drives the utilitarian performance expectancy of mobile IT (Yang, 2010). Perceived ease of use is the leading factor of utilitarian value (Ozturk et al., 2016). AIPA helps the user by processing the voice requested by the user. Perceived ease of use in the AIPA context may be related to the recognition of pronunciation and command understanding (Lopatovska et al., 2019). Users may get useful help if AIPA recognizes spoken words more accurately and performs tasks better. Easy AIPA will increase the utilitarian value of users. As a consequence, perceived ease of use is believed to positively control utilitarian value.

H3. Perceived ease of use significantly affects utilitarian value.

#### 3.4. Perceived usefulness (PUS)

Perceived usefulness is described as the user's belief about whether their experiences are improved by using technology (Bhattacharjee, 2001). It accelerates attitude or continuance intention in the domain of AIPA (Ashfaq et al., 2020; Nguyen et al., 2019, 2021). If AI offers users higher levels of perceived usefulness, their shopping intention increases in AI-powered stores (Pillai et al., 2020). AIPA may play an important role in purchasing decisions by mediating relationships between brands, retailers, and consumers (Mari, 2019). The more useful help users get from AIPA, the higher they will assess. Hence, this study proposes that perceived usefulness elevates the level of utilitarian value.

H4. Perceived usefulness significantly affects utilitarian value.

**Table 1.** A critical overview of related works.

| Study                                 | Methodology                       | Context/<br>Setting                      | Sample frame                                    | Sample<br>Size | Main Variables  | Outcomes                 | Critical Overview  |
|---------------------------------------|-----------------------------------|--|---|----------------|---|--------------------------|--|
| Pal et al. (2021)                     | Cross-sectional;<br>survey        | Smart voice<br>assistant                 | Alexa users<br>and Google<br>Assistant<br>users | 244            | User engagement; trust; privacy<br>risk; satisfaction; slowness of<br>adoption; skepticism; attitude  | Continuance<br>usage     | Pal et al. (2021) reflected the utilitarian<br>attitude and the hedonic attitude as<br>exogenous variables. On the other hand,<br>the current study observes the formation<br>process of continuance intention more<br>elaborately by presenting the evidence<br>factors that determine the utilitarian<br>value and the hedonic value.  |
| McLean and<br>Osei-Frimpong<br>(2019) | Cross-sectional;<br>survey        | AI In-home<br>voice<br>assistant         | Amazon Echo<br>users                            | 724            | Utilitarian benefits; hedonic<br>benefits; symbolic benefits; social<br>presence; social interaction;<br>perceived privacy risk   | Usage                    | McLean and Osei-Frimpong (2019)<br>explicated the use of voice assistants<br>based on utilitarian benefits and<br>hedonic benefits. The present research<br>approaches the user behavior of AIPA<br>more delicately by observing the<br>formation mechanism of utilitarian<br>value and hedonic value.   |
| Nguyen et al.<br>(2021)               | Cross-sectional;<br>survey        | Chatbot                                  | Bank's<br>chatbot users                         | 359            | Information quality; system<br>quality; service quality; trust; user<br>satisfaction; confirmation<br>expectations; perceived usefulness  | Continuance<br>intention | Nguyen et al. (2021) reflected robust<br>variables, but they have been overused<br>in IT contexts. The current study is<br>different in that it includes AIPA-specific<br>variables while maintaining the major<br>determinants of IT use.   |
| Nguyen et al.<br>(2019)               | Cross-sectional;<br>survey        | Voice-user<br>interface                  | Voice-user<br>interface<br>users                | 414            | Gender; information quality;<br>information satisfaction; system<br>quality; system satisfaction;<br>perceived usefulness; perceived<br>ease of use; perceived enjoyment;<br>mobile self-efficacy; trust;<br>perceived risk; attitude | Continuance<br>intention | Nguyen et al. (2019) introduced<br>representative variables of the IS success<br>model and technology acceptance<br>model. They did not reflect the unique<br>characteristics of AIPA, which<br>communicates through voice. The<br>present research employs AIPA-specific<br>factors and systematically structured<br>them into two aspects: utilitarian value<br>and hedonic value. |
| Pillai et al.<br>(2020)               | Cross-sectional;<br>survey        | AI-powered<br>automated<br>retail stores | AI-powered<br>store<br>consumers                | 1250           | Optimism; innovativeness;<br>discomfort; insecurity; perceived<br>usefulness; perceived ease of use;<br>perceived enjoyment;<br>customization; interactivity  | Intention to<br>shop     | Pillai et al. (2020) focused on AI in the<br>shopping environment by considering<br>the tendencies of consumers. On the<br>other hand, the current work aims to<br>study AIPA, which is most easily<br>encountered by people. It can derive<br>implications that can be applied to<br>detailed AI subjects (e.g., shopping,<br>game, education, etc.).                               |
| Jang (2020)                           | Cross-sectional;<br>survey        | Virtual<br>personal<br>assistant         | Smart<br>speaker users                          | 534            | Parasocial interaction;<br>Personification type; Loneliness   | Satisfaction             | Jang (2020) investigated only how<br>parasocial interaction, types of<br>assistants, and loneliness affect<br>satisfaction. The present paper has<br>limitations in that it does not consider<br>the function, technology, and value of<br>assistants. To overcome it, this study<br>measured related factors from the users'<br>cognitive perspective.                              |
| Hasan et al.<br>(2021)                | Cross-sectional;<br>survey        | Voice-<br>controlled AI                  | Siri users                                      | 675            | Trust; interaction; perceived risk;<br>novelty value; employment; brand<br>involvement; consumer<br>innovativeness  | Brand loyalty            | While Hasan et al. (2021) explained<br>brand loyalty by examining only Siri,<br>the current article describes the general<br>intention of using AIPA by investigating<br>multiple assistants. Hasan et al. (2021)<br>suggested basic interaction as the<br>antecedent of brand loyalty. This study<br>introduces parasocial interaction based<br>on the human-like behavior of AIPA. |
| Xu et al. (2020)                      | Study 3;<br>Experimental<br>study | AI customer<br>service                   | Bank's AI<br>Online<br>service                  | 51             | Online customer service;<br>perceived problem-solving ability;<br>task-complexity   | Usage<br>intention       | In explaining the use of AI customer<br>service, Xu et al. (2020) considered only<br>task complexity and problem-solving<br>ability. The subjects of the study are<br>used only for utility purposes. Because<br>AIPA can provide both utilitarian value<br>and hedonic value, this study considered<br>both utility and hedonic aspects.  |

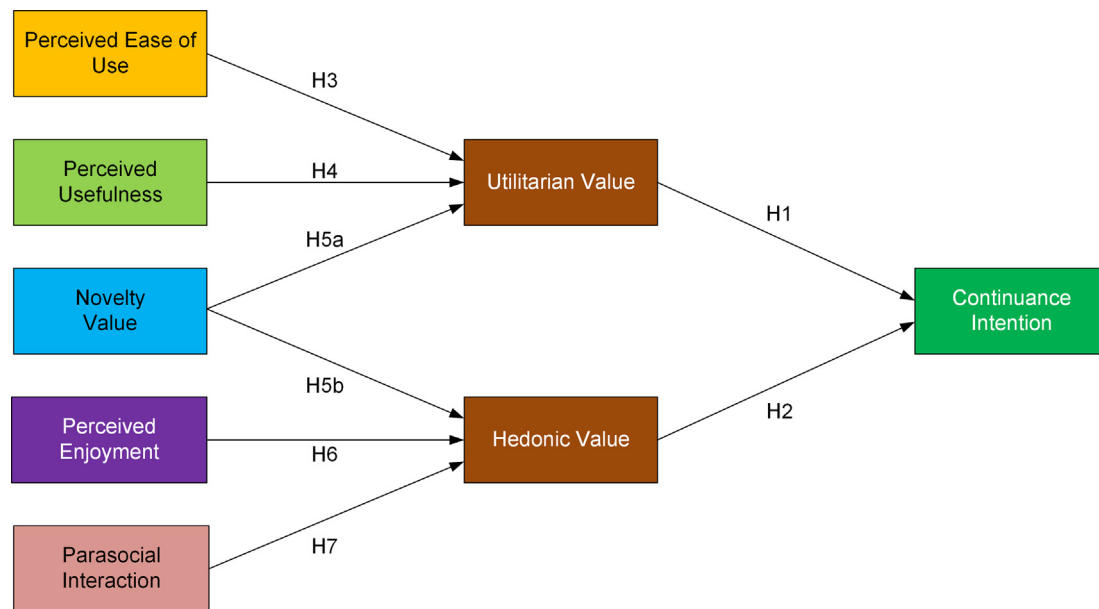


Figure 1. Research model.

### 3.5. Novelty value (NOV)

Novelty value refers to the degree to which a product/service differs from others in terms of originality and uniqueness (Mou et al., 2021). It significantly forms brand loyalty toward voice-controlled AI (Hasan et al., 2021). Unlike existing PCs and smart devices, AIPA provides useful help and fun through voice recognition. Users with a higher degree of novelty value may increase the level of utilitarian value and hedonic value. Based on this, novelty value is suggested to enhance the levels of utilitarian value and hedonic value.

H5a. Novelty value significantly affects utilitarian value.

H5b. Novelty value significantly affects hedonic value.

### 3.6. Perceived enjoyment (PEN)

Perceived enjoyment is defined as the extent to which the activity of using a specific IT is perceived to be enjoyable in its own right (Venkatesh and Davis, 2000). It is significantly associated with the continuance intention of hedonic IS (van der Heijden, 2004). When users perceive AIPA as more enjoyable, their attitudes toward AIPA are increased (Nguyen et al., 2019). Users may find pleasure in having a conversation with a device rather than a person. Perceived social interaction with AIPA is measured by the pleasure of conversation (Fernandes and Oliveira, 2021). This fun may provide users with hedonic value. Therefore, one can expect that perceived enjoyment leverage hedonic value.

H6. Perceived enjoyment significantly affects hedonic value.

### 3.7. Parasocial interaction (PSI)

Parasocial interaction is related to personal relationships, responsiveness, reality, and friendliness (Jang, 2020; Jin, 2010). Parasocial relationship enhances users' satisfaction and continuance intention of users in the context of intelligent personal assistant (Han and Yang, 2018). It has a significant correlation with perceived enjoyment (Soliman and Noorliza, 2020). As AIPA provides customized answers to users and performs interactive communication, parasocial interaction is formed between the user and the assistant. This sort of human-like communication would deliver hedonic value. In this vein, parasocial interaction is expected to raise the level of hedonic value.

H7. Parasocial Interaction significantly affects hedonic value.

## 4. Methodology

### 4.1. Measurement instrument

All measurement indicators were drawn from previously verified studies in IS and AI fields. The survey questions were modified to suit the AIPA context. All items were measured based on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). A 7-point Likert scale is more likely to generate slightly higher mean scores as compared to a 10-point scale, which makes comparing data a much easier process (Dawes, 2008). Moreover, it has been shown to provide higher sensitivity and better discrimination between participants (Cooper et al., 2006). Before survey implementation, three researchers in the IS and quantitative analysis reviewed it, assuring content validity, logical arrangement, and question ambiguity. To measure each dimension effectively in this study, the operational definitions are formulated and shown below in Table 2. Also, the measurement items and sources are presented in Table A1.

Table 2. Operational definition.

| Construct              | Operational Definition  | Number of Questions | Reference            |
|------------------------|---|---------------------|----------------------|
| Continuance Intention  | User's overall willingness to continue using AIPA                                       | 3                   | Ashfaq et al. (2020) |
| Utilitarian Value      | The degree to which AIPA provides beneficial and good value                             | 3                   | Kim and Oh (2011)    |
| Hedonic Value          | The degree to which AIPA provides pleasure, motivation, and comfort                     | 3                   | Kim and Oh (2011)    |
| Perceived Ease of Use  | The extent to which AIPA is clear, understandable, and easy to use                      | 3                   | Ashfaq et al. (2020) |
| Perceived Usefulness   | The extent to which the use of AIPA is useful and helps users complete work             | 3                   | Ashfaq et al. (2020) |
| Novelty Value          | The degree to which AIPA delivers new experiences and satisfies user curiosity          | 3                   | Hasan et al. (2021)  |
| Perceived Enjoyment    | The extent to which AIPA is enjoyable and interesting to use                            | 3                   | Ashfaq et al. (2020) |
| Parasocial Interaction | The degree to which users perceive communication with AIPA realistically and personally | 3                   | Jang (2020)          |



## 4.2. Subject and data collection

The research model was empirically tested by the use of data gathered from a cross-sectional survey. Ethical approval for the survey was obtained from the Ethical Committee of RealSecu. Data were collected from a commercial online survey provider with a large number of panels in South Korea because of low sample bias. The online link to access the questionnaire was distributed to its panels. Respondents were rewarded USD 4.18. To validate users, the questionnaire first asked whether they had used an AIPA. If their answer was affirmative, they were allowed to fill out questions. Only after answering all questions on each page could participants move to the next page. After discarding insincere responses, 257 data were utilized for the next analysis. This study checked the adequate sample size for structural equation modeling. A priori sample size calculator was used to confirm the minimum requirement for structural equation modeling (DanielSoper.com). Inputting the required information such as 0.1 anticipated effect size, 80% desired statistical power level, 8 number of latent variables, 24 number of observed variables as well as 0.05 probability level, the minimum required sample size is 200. Since the sample size of this study is 257, this requirement is met as well. Among the final samples, 52.1% were male and 47.9% were female. The mean age of the final sample was 35.1 with a standard deviation of 9.44. 102 respondents were using Siri and 124 respondents were using Bixby. The distribution of the subjects of the current study is different compared to the global market share (Kinsella, 2020). This is probably because Koreans prefer Samsung which is a Korean company and manufactures Bixby. 102 informants were using iPhones and 149 informants were using Samsung phones. Table 3 shows the demographic information of respondents in the final sample.

After data analysis, interviews were conducted with informants for an in-depth discussion of the results. A total of six respondents voluntarily participated in the interview. Guided interviews were performed.

## 5. Results

This study validated the measurement model and the structural model by using the partial least squares structural equation modeling (PLS-SEM). PLS-SEM is suitable for developing a model in exploratory research (Chin, 1998; Hair et al., 2021). It also has robustness and less restriction on the distribution of data and sample size (Falk and Miller,

1992). It has been used widely in the field of ISs (Chin et al., 2003; Kim and Kim, 2018). The conceptual model of this research includes some hypotheses that have not been verified in previous studies. The sample is not large enough. Thus, the PLS-SEM was selected for data analysis.

### 5.1. Measurement model

This study tested the reliability and validity of the measurement model. To assess reliability, this study investigated Cronbach's alpha, roh\_A, and composite reliability (CR). If Cronbach's alpha and CR estimates exceed 0.7, reliability is achieved (Nunnally, 1978). Hair et al. (2021) suggested that the minimum required value for roh\_A is 0.70. As shown in Table 4, all values (Cronbach's alpha, roh\_A, and CR) of constructs are well over the expected threshold value.

This study examined convergent validity and discriminant validity to confirm the validity of the measurement model. Convergent validity was confirmed by calculating both the average variance extraction (AVE) and the factor loads of the items associated with each construct. AVE values ranged from 0.690 to 0.896 which are greater than the recommended threshold of 0.5 (Fornell and Larcker, 1981). Factor loadings ranged from 0.790 to 0.952 and are all statistically significant at the  $p = 0.001$  levels, indicating a satisfactory presence of convergent validity (Bagozzi et al., 1991).

Discriminant validity was examined by two criteria. First, this research applied the Fornell-Larcker criterion (Fornell and Larcker, 1981). The AVE must describe the same construct more than the other constructs. In other words, the scores on the diagonal should be greater in the same construct compared with other constructs. Table 5 shows that the square root value of AVE for each construct is greater than the correlation value for that column or row. Second, this study calculated the HTMT ratio. Table 6 exhibits that the score of each construct does not exceed the threshold value of 0.85 (Henseler et al., 2015). Accordingly, the HTMT ratio is confirmed.

### 5.2. Structural model

The hypotheses were tested by using the PLS-SEM technique employed by SmartPLS 3.3.9 for Windows (Ringle et al., 2014). This study carried out bootstrapping resampling method with 5000 re-samples. The structural model was assessed by following three steps (Hair et al., 2006; Hu and Bentler, 1999; Tenenhaus et al., 2005):

1. Assess the model fit (SRMR, RMS\_theta, NFI, and GoF)
2. Assess the path coefficients and explained endogenous variables' variances ( $R^2$ )
3. Assess the level of  $Q^2$

First, this research tested the model fit indices of the structural model. Indices were standardized root mean square residual (SRMR), RMS\_theta, normative fit index (NFI), and goodness-of-Fit (GoF). SRMR should be less than 0.08 and RMS\_theta should be less than 0.1 (Hair et al., 2019). NFI must be over 0.95 (Hu and Bentler, 1999). SRMR was 0.057 and RMS\_theta was 0.169. NFI was 0.843. GoF is defined as the geometric mean of the average communality and average  $R^2$  for endogenous constructs (Tenenhaus et al., 2005). The model's GoF for this study was 0.67, indicating a large value (Wetzels et al., 2009). Although RMS\_theta and NFI do not meet the criteria, the next assessment was conducted since this work is an exploratory study to develop a research model.

Second, this study evaluated the main path coefficients and explained endogenous variables' variances ( $R^2$ ) for the structural model. As shown in Figure 2, all of the eight hypotheses in the research framework are adopted. The proposed model explained 59.6% of the variance in utilitarian value, 46.5% of the variance in hedonic value, and 63.0% of the variance in continuance intention.

Table 7 summarizes the results of hypothesis testing.

**Table 3.** Profile of respondents.

| Demographics    | Item             | Subjects (N = 257) |            |
|-----------------|------------------|--------------------|------------|
|                 |                  | Frequency          | Percentage |
| Gender          | Male             | 134                | 52.1%      |
|                 | Female           | 123                | 47.9%      |
| Age             | 10s              | 10                 | 3.9%       |
|                 | 20s              | 69                 | 26.8%      |
|                 | 30s              | 93                 | 36.2%      |
|                 | 40s              | 64                 | 24.9%      |
|                 | 50s              | 21                 | 7.3%       |
| AIPA Type       | Siri             | 102                | 35.7%      |
|                 | Bixby            | 124                | 43.4%      |
|                 | Alexa            | 2                  | 0.7%       |
|                 | Google Assistant | 27                 | 9.4%       |
|                 | Etc              | 2                  | 0.7%       |
| Number of uses  | <50              | 64                 | 24.9%      |
|                 | 50–99            | 143                | 55.6%      |
|                 | 100 or above     | 50                 | 19.5%      |
| Smartphone Type | iPhone           | 102                | 35.7%      |
|                 | Samsung phone    | 149                | 52.1%      |
|                 | LG phone         | 6                  | 2.1%       |

**Table 4.** Scale reliabilities.

| Construct              | Items | Mean  | St. Dev. | Factor Loading | Cronbach's Alpha | rho_A | CR    | AVE   |
|------------------------|-------|-------|----------|----------------|------------------|-------|-------|-------|
| Continuance Intention  | COI1  | 4.918 | 1.186    | 0.941          | 0.917            | 0.918 | 0.948 | 0.858 |
|                        | COI2  | 4.712 | 1.285    | 0.894          |                  |       |       |       |
|                        | COI3  | 4.875 | 1.210    | 0.943          |                  |       |       |       |
| Utilitarian Value      | UTV1  | 4.416 | 1.197    | 0.871          | 0.900            | 0.903 | 0.938 | 0.834 |
|                        | UTV2  | 4.580 | 1.175    | 0.933          |                  |       |       |       |
|                        | UTV3  | 4.440 | 1.163    | 0.933          |                  |       |       |       |
| Hedonic Value          | HEV1  | 4.070 | 1.393    | 0.899          | 0.866            | 0.866 | 0.918 | 0.790 |
|                        | HEV2  | 4.113 | 1.293    | 0.909          |                  |       |       |       |
|                        | HEV3  | 4.537 | 1.180    | 0.857          |                  |       |       |       |
| Perceived Ease of Use  | PEU1  | 4.074 | 1.391    | 0.830          | 0.777            | 0.834 | 0.870 | 0.690 |
|                        | PEU2  | 4.490 | 1.395    | 0.809          |                  |       |       |       |
|                        | PEU3  | 4.844 | 1.281    | 0.851          |                  |       |       |       |
| Perceived Usefulness   | PUS1  | 4.899 | 1.240    | 0.885          | 0.897            | 0.787 | 0.936 | 0.829 |
|                        | PUS2  | 4.642 | 1.325    | 0.931          |                  |       |       |       |
|                        | PUS3  | 4.432 | 1.319    | 0.914          |                  |       |       |       |
| Novelty Value          | NOV1  | 4.782 | 1.170    | 0.790          | 0.802            | 0.905 | 0.882 | 0.714 |
|                        | NOV2  | 4.241 | 1.227    | 0.854          |                  |       |       |       |
|                        | NOV3  | 4.436 | 1.289    | 0.889          |                  |       |       |       |
| Perceived Enjoyment    | PEN1  | 3.747 | 1.521    | 0.925          | 0.929            | 0.930 | 0.955 | 0.876 |
|                        | PEN2  | 3.732 | 1.437    | 0.952          |                  |       |       |       |
|                        | PEN3  | 3.977 | 1.556    | 0.930          |                  |       |       |       |
| Parasocial Interaction | PSI1  | 3.525 | 1.474    | 0.910          | 0.918            | 0.921 | 0.948 | 0.859 |
|                        | PSI2  | 3.405 | 1.573    | 0.948          |                  |       |       |       |
|                        | PSI3  | 3.066 | 1.540    | 0.922          |                  |       |       |       |

**Table 5.** Correlation matrix and discriminant assessment.

| Construct | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. COI    | 0.926 |       |       |       |       |       |       |       |
| 2. UTV    | 0.726 | 0.913 |       |       |       |       |       |       |
| 3. HEV    | 0.755 | 0.745 | 0.889 |       |       |       |       |       |
| 4. PEU    | 0.608 | 0.628 | 0.635 | 0.831 |       |       |       |       |
| 5. PUS    | 0.719 | 0.701 | 0.671 | 0.703 | 0.910 |       |       |       |
| 6. NOV    | 0.556 | 0.667 | 0.620 | 0.583 | 0.606 | 0.845 |       |       |
| 7. PEN    | 0.409 | 0.553 | 0.569 | 0.507 | 0.430 | 0.600 | 0.936 |       |
| 8. PSI    | 0.291 | 0.420 | 0.476 | 0.285 | 0.270 | 0.447 | 0.535 | 0.927 |

Note: Diagonal values are the square root of AVE.

**Table 6.** HTMT correlation matrix.

| Construct | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8 |
|-----------|-------|-------|-------|-------|-------|-------|-------|---|
| 1. COI    |       |       |       |       |       |       |       |   |
| 2. UTV    | 0.798 |       |       |       |       |       |       |   |
| 3. HEV    | 0.847 | 0.843 |       |       |       |       |       |   |
| 4. PEU    | 0.634 | 0.767 | 0.728 |       |       |       |       |   |
| 5. PUS    | 0.713 | 0.742 | 0.763 | 0.715 |       |       |       |   |
| 6. NOV    | 0.790 | 0.774 | 0.756 | 0.697 | 0.842 |       |       |   |
| 7. PEN    | 0.443 | 0.606 | 0.634 | 0.695 | 0.586 | 0.467 |       |   |
| 8. PSI    | 0.318 | 0.461 | 0.533 | 0.524 | 0.331 | 0.290 | 0.580 |   |

Finally, evaluation of the predictive relevance  $Q^2$  results was done using Blindfolding in SmartPLS, the omission distance D was 7. Table 7 illustrates the results. All values of  $Q^2$  are well over the cut-off point of 0.0. In terms of the predictive relevance of the cross-validated communality,  $Q^2$  values were calculated through the measurement model's capability to assess the path model directly from its latent variable. All  $Q^2$  values exceeded the threshold of 0.35 for strong predictive power (the

cut-off value for strong predictive is  $Q^2 \geq 0.35$ ) (Hair et al., 2006). In terms of the predictive relevance of the cross-validated redundancy,  $Q^2$  gauges the capability of the path model to predict the endogenous measuring items indirectly from the prediction of their latent variables using the related structural relations. It is only computed for endogenous constructs. Table 8 presents that the model has strong predictive relevance for the endogenous variables (continuance intention, utilitarian

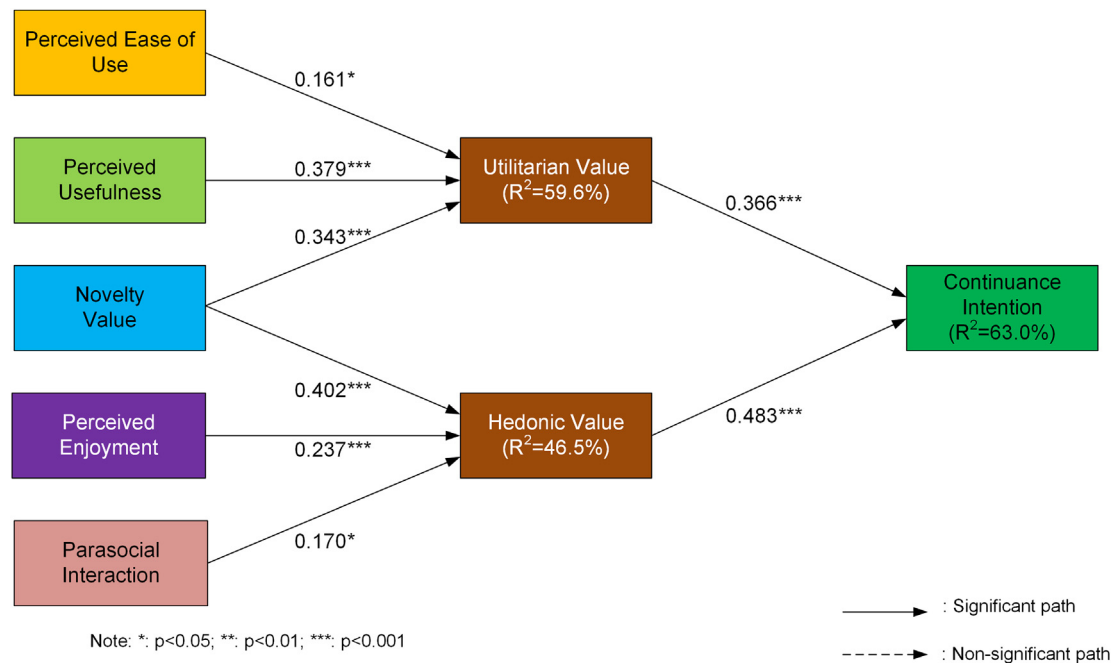


Figure 2. Results of structural modeling.

Table 7. Summary of the results.

| H   | Cause                  | Effect                | Coefficient | T-value | Hypothesis |
|-----|------------------------|-----------------------|-------------|---------|------------|
| H1  | Utilitarian Value      | Continuance Intention | 0.366       | 4.293   | Supported  |
| H2  | Hedonic Value          | Continuance Intention | 0.483       | 6.055   | Supported  |
| H3  | Perceived Ease of Use  | Utilitarian Value     | 0.161       | 2.464   | Supported  |
| H4  | Perceived Usefulness   | Utilitarian Value     | 0.379       | 6.012   | Supported  |
| H5a | Novelty Value          | Utilitarian Value     | 0.343       | 6.333   | Supported  |
| H5b | Novelty Value          | Hedonic Value         | 0.402       | 5.521   | Supported  |
| H6  | Perceived Enjoyment    | Hedonic Value         | 0.237       | 3.335   | Supported  |
| H7  | Parasocial Interaction | Hedonic Value         | 0.170       | 2.821   | Supported  |

Table 8. Results of Q<sup>2</sup> level evaluation.

| Constructs | Predictive Relevance Q <sup>2</sup>  |                           | Construct Crossvalidated Redundancy |                           |
|------------|--------------------------------------|---------------------------|-------------------------------------|---------------------------|
|            | Construct Crossvalidated Communality |                           | Construct Crossvalidated Redundancy |                           |
| COI        | 0.672                                | Strongly predictive power | 0.533                               | Strongly predictive power |
| UTV        | 0.630                                | Strongly predictive power | 0.487                               | Strongly predictive power |
| HEV        | 0.549                                | Strongly predictive power | 0.358                               | Strongly predictive power |
| PEU        | 0.371                                | Strongly predictive power | -                                   | -                         |
| PUS        | 0.617                                | Strongly predictive power | -                                   | -                         |
| NOV        | 0.420                                | Strongly predictive power | -                                   | -                         |
| PEN        | 0.702                                | Strongly predictive power | -                                   | -                         |
| PSI        | 0.673                                | Strongly predictive power | -                                   | -                         |

value, and hedonic value). Thus, the model is deemed to have considerable predictive power.

For a post hoc analysis, this study also conducted a multi-group analysis (MGA) by AIPA type (Siri and Bixby), gender, and use

experience. For Siri users, all hypotheses are supported except H6 and H7. For Bixby users, all hypotheses are supported except H7. Effects of the novelty value of utilitarian value have a significant difference between Siri users and Bixby users. The R<sup>2</sup> of utilitarian value, hedonic value, and continuance intention are 68.9%, 44.6%, and 69.1% for Siri users. The R<sup>2</sup> of utilitarian value, hedonic value, and continuance intention are 56.3%, 45.2%, and 60.1% for Bixby users. The results on AIPA-type are detailed in Table 9.

For male subsamples, all hypotheses are supported except H7. For female subsamples, all hypotheses are supported except H3. The R<sup>2</sup> of utilitarian value, hedonic value, and continuance intention are 59.4%, 50.5%, and 64.5% for males. The R<sup>2</sup> of utilitarian value, hedonic value, and continuance intention are 61.0%, 42.4%, and 61.6% for females. The gender-related results of PLS-SEM are shown in Table 10.

Finally, MGA was performed by classifying the group according to the number of uses. For users who have used the AIPA less than 50 times (Group A), four hypotheses (H2, H4, H6, and H7) are supported. For users who have used it more than 49 times and less than 100 times (Group B), all hypotheses are supported. For users who have used it more than 99 times (Group C), four hypotheses (H2, H3, H5a, and H5b) are supported. There are significant differences in H4 and H5a between group A and group B. There are no significant differences in all hypotheses between group B and group C. Furthermore, there are significant differences in H4 and H5a between group A and group C. In group A, the proposed model explained 51.8% of the variance in utilitarian value, 51.6% of the variance in hedonic value, and 49.9% of the variance in continuance intention. The R<sup>2</sup> of utilitarian value, hedonic value, and continuance intention are 64.7%, 50.7%, and 67.1% for group B. The R<sup>2</sup> of utilitarian value, hedonic value, and continuance intention are 58.9%, 41.5%, and 61.3% for group C. The PLS-SEM results on user experience are described in Table 11.

## 6. Discussion

### 6.1. Main paths

The main objective of this study was to identify the factors influencing the continuous intention to use AIPA. This has been accomplished by introducing utilitarian value and hedonic value as mediators.



**Table 9.** Results of MGA (AIPA type).

| H   | Cause | Effect | Siri        |         | Bixby       |         | Difference<br>p-value |
|-----|-------|--------|-------------|---------|-------------|---------|-----------------------|
|     |       |        | Coefficient | t-value | Coefficient | t-value |                       |
| H1  | UTV   | COI    | 0.317       | 2.452   | 0.413       | 3.534   | 0.570                 |
| H2  | HEV   | COI    | 0.550       | 4.760   | 0.443       | 4.153   | 0.484                 |
| H3  | PEU   | UTV    | 0.274       | 3.227   | 0.201       | 2.322   | 0.561                 |
| H4  | PUS   | UTV    | 0.286       | 3.229   | 0.437       | 4.153   | 0.268                 |
| H5a | NOV   | UTV    | 0.437       | 7.223   | 0.191       | 2.039   | 0.027                 |
| H5b | NOV   | HEV    | 0.494       | 4.217   | 0.357       | 3.748   | 0.363                 |
| H6  | PEN   | HEV    | 0.164       | 1.490   | 0.261       | 2.716   | 0.511                 |
| H7  | PSI   | HEV    | 0.128       | 1.557   | 0.172       | 1.782   | 0.736                 |

**Table 10.** Results of MGA (gender).

| H   | Cause | Effect | Male        |         | Female      |         | Difference<br>p-value |
|-----|-------|--------|-------------|---------|-------------|---------|-----------------------|
|     |       |        | Coefficient | t-value | Coefficient | t-value |                       |
| H1  | UTV   | COI    | 0.359       | 2.878   | 0.329       | 3.062   | 0.851                 |
| H2  | HEV   | COI    | 0.498       | 4.340   | 0.508       | 4.850   | 0.945                 |
| H3  | PEU   | UTV    | 0.223       | 2.411   | 0.094       | 1.201   | 0.293                 |
| H4  | PUS   | UTV    | 0.346       | 4.110   | 0.420       | 4.520   | 0.555                 |
| H5a | NOV   | UTV    | 0.310       | 3.673   | 0.382       | 5.176   | 0.527                 |
| H5b | NOV   | HEV    | 0.439       | 4.624   | 0.361       | 3.198   | 0.593                 |
| H6  | PEN   | HEV    | 0.230       | 2.279   | 0.249       | 2.396   | 0.898                 |
| H7  | PSI   | HEV    | 0.161       | 1.929   | 0.174       | 1.998   | 0.926                 |

**Table 11.** Results of MGA (Use experience).

| H   | Cause | Effect | A           |         | B           |         | C           |         | Difference (p-value) |       |       |
|-----|-------|--------|-------------|---------|-------------|---------|-------------|---------|----------------------|-------|-------|
|     |       |        | Coefficient | t-value | Coefficient | t-value | Coefficient | t-value | A-B                  | B-C   | A-C   |
| H1  | UTV   | COI    | 0.243       | 1.311   | 0.484       | 4.363   | 0.179       | 1.180   | 0.285                | 0.115 | 0.784 |
| H2  | HEV   | COI    | 0.540       | 3.391   | 0.381       | 3.592   | 0.641       | 4.290   | 0.415                | 0.172 | 0.623 |
| H3  | PEU   | UTV    | 0.069       | 0.529   | 0.190       | 2.169   | 0.268       | 2.041   | 0.434                | 0.619 | 0.264 |
| H4  | PUS   | UTV    | 0.648       | 5.121   | 0.325       | 4.432   | 0.132       | 0.838   | 0.034                | 0.260 | 0.010 |
| H5a | NOV   | UTV    | 0.034       | 0.233   | 0.403       | 6.541   | 0.470       | 3.786   | 0.013                | 0.589 | 0.022 |
| H5b | NOV   | HEV    | 0.171       | 1.357   | 0.408       | 3.850   | 0.480       | 4.241   | 0.148                | 0.627 | 0.081 |
| H6  | PEN   | HEV    | 0.294       | 2.216   | 0.220       | 2.094   | 0.184       | 1.253   | 0.659                | 0.849 | 0.592 |
| H7  | PSI   | HEV    | 0.405       | 2.812   | 0.205       | 2.840   | 0.092       | 0.628   | 0.232                | 0.472 | 0.110 |

H1 is supported. The results pointed out that utilitarian value has a significant positive effect on continuance intention to use AIPA. The significant relationship between utilitarian value and the behavioral intention was supported in previous research (Kim and Oh, 2011; Venkatesh and Brown, 2001). Utilitarian attitude as one of the sub-measure of attitude was revealed to affect the continuance usage of smart voice assistants (Pal et al., 2021). Utilitarian benefits were shown to positively shape the usage of in-home assistants (McLean and Osei-Frimpong, 2019). The findings of this work and those concluded in previous studies may be because utilitarian value have a great influence on continuance intention in the domain of AIPA.

H2 is supported. Hedonic value was found to have a significant positive effect on continuance intention to use AIPA. Former works also supported the relationship between hedonic value and continuance intention (Kim and Oh, 2011; Venkatesh & Brown, 2001). Hedonic attitude as one of the sub-measure of attitude was verified to influence continuance usage of smart voice assistants (Pal et al., 2021). Utilitarian benefits were demonstrated to be a significant precursor to the usage of in-home assistants (McLean and Osei-Frimpong, 2019). A plausible basis for these results is the fact that when users perceive AIPA as more

practical and fun, AIPA will undoubtedly increase their continuance intention.

H3 and H4 are supported. The findings showed that perceived ease of use and perceived usefulness have a significant influence on utilitarian value. It was revealed that perceived ease of use had a significant association with utilitarian value (Ozturk et al., 2016). Past research also verified that perceived usefulness had a significant effect on utilitarian value (Yang and Lee, 2010). These results could be accredited to the reason that when users perceive the AIPA as easy to use and useful, their continuous intention to use would be improved. Previous research also reported that perceived ease of use motivates attitude and intention to shop on AI-assisted platforms (Nguyen et al., 2019; Pillai et al., 2020). Perceived usefulness of AI was unveiled to be the key predictor of attitude (Nguyen et al., 2019) intention to shop (Pillai et al., 2020), and continuance intention (Nguyen et al., 2021). One can know that perceived ease of use and perceived usefulness play dominant roles in the decision-making process.

H5a and H5b are supported. It was found that novelty value has a significant correlation with utilitarian value and hedonic value. There was supporting evidence that the novelty value of Siri enhances brand

loyalty (Hasan et al., 2021). Since brand loyalty is affected by utilitarian value and hedonic value (Mehmood and Hanaysha, 2015), the results of the study are consistent with the outcomes of (Hasan et al., 2021). The empirical effects of novelty value on two values could be explained by the fact that when AIPA provides users with a new and unprecedented experience, they would generally get higher levels of utilitarian value and hedonic value simultaneously. This result can lead to the following discussion. The effects of novelty value would decrease over time. A function is not permanently perceived as new by users. AIPAs are becoming more and more integrated into everyday life. Moreover, various devices are becoming offer AIPAs or providing compatibility with AIPAs already on the market. The impact of novelty value may change depending on the time of market launch and the timing of research. Thus, it is necessary to perform longitudinal analysis to verify the impacts of novelty value in more depth.

H6 and H7 are supported. The results revealed that perceived enjoyment is a significant predictor of hedonic value. These results lie in the fact that when users enjoy AIPA more, they recognize AIPA more hedonic. Perceived enjoyment has been shown to affect attitude (Nguyen et al., 2019), parasocial relationships (Soliman and Noorliza, 2020), and intention to shop (Pillai et al., 2020). Combining the results of this research and previous studies together, users with higher levels of enjoyment seem to have greater attitudes, shopping intentions, and continuance intentions toward AIPA. Parasocial interaction is figured out to significantly affect hedonic value. These observations could be explained by the fact that when users interact with AIPA more friendly, they obtain a higher level of hedonic value from it. A former study supported that parasocial interaction elevates the level of satisfaction with AIPA (Jang, 2020). This paper assumed that parasocial interaction is formed in the process of using AIPA, consequently leading to an increase in hedonic value. This is because the user's actions take place in the order of interaction, parasocial interaction, perception of enjoyment (or satisfaction), and perception of hedonic value. When putting previous works and the current study together, it can be inferred that perceived enjoyment and parasocial interaction have a cyclic relationship.

## 6.2. MGA (AIPA type, gender, and use experience)

This study performed MGA as a post-analysis. The results of MGA by AIPA type pointed out that hedonic value is not affected by perceived enjoyment and parasocial interaction in Siri users. This could be accredited to the reason that novelty value has a stronger effect than perceived usefulness and parasocial interaction in enhancing hedonic value. Siri's continuous updates and functional extensions may constitute the novelty value. It was found that parasocial interaction does not influence hedonic value. The more Bixby users perceive it as enjoyable, the more hedonic value is. Compared to Siri, Bixby may provide differentiated fun. Moreover, the findings indicated that there is a significant difference in the influence of novelty value on utilitarian value between Siri users and Bixby users. The coefficient of novelty value on utilitarian value in Siri users was larger than that in Bixby users. This may suggest that Siri's functions are newer and more diverse than Bixby's. Siri came to market before Bixby and has been updated longer. Apple's accumulated know-how may have led to a higher novelty value and stronger use.

The analysis results according to gender revealed that parasocial interaction does not determine hedonic value in the male group. One possible explanation is that men are not very interested in forming a friendly rapport with AIPA. In the female group, perceived ease of use was verified to have no significant impact on utilitarian value. This could be explicated by the fact that ease of use is too essential to form the utilitarian value of women. Furthermore, it was validated that there is no significant difference between males and females. It can be guessed that utility-related variables and pleasure-linked factors form paths within the proposed framework in a similar way in both groups.

MGA on use experience yielded a variety of results. First, the results of group A are as follows. It was shown that utilitarian value does not

impact continuance intention. The findings indicated that perceived ease of use is not related to utilitarian value. Novelty value did not affect utilitarian value and hedonic value. Because the users of group A have used AIPA less than 50 times, they may not have accurately grasped the utilitarian value, ease of use, and novelty value of AIPA yet. Second, the analysis results on group B pointed out that all hypotheses are supported. Last, the findings in group C presented that utilitarian value does not lead to continuance intention. Perceived usefulness was not a motivator of utilitarian value. Hedonic value was not shaped by perceived enjoyment and parasocial interaction. This phenomenon may be because the effect of novelty value becomes stronger than utility and pleasure as usage increases.

In addition, the results of the presents study proved that the path coefficient of perceived usefulness for utilitarian value in group A is significantly larger than those in groups B and C. Interestingly, the analysis results figured out that the path coefficient of novelty value for utilitarian value in group B and C is significantly greater than those in group A. This observation leads to the following discussion. Users with less experience may have tried one or some times to take advantage of useful features first. This strongly forms the effect of perceived usefulness on utilitarian value. As usage increases, users become more aware of AIPA's diverse and amazing capabilities. Users become to experience new features and configurations that they have never known before, other than useful features and parasocial interaction. In this process, the effect on perceived usefulness is reduced and the influence of novelty value is increased.

## 7. Conclusion

### 7.1. Theoretical contributions

This study presents five theoretical contributions as follows. First, this study contributes to the existing literature in that it reflects the utilitarian value and hedonic value to understand the continuance intention of AIPA. Users get the practical help they need while talking to AIPA. Alternatively, they also use AIPA to enjoy conversations with a machine. The results revealed that both values have a significant effect on continuance intention. The path coefficient of utilitarian value is greater than that of hedonic value. Therefore, one can find that users use AIPA for usefulness than pleasure. If academia conducts multi-group analysis by separating utilitarian motivation and hedonic motivation, additional theoretical results will be drawn.

Second, this study strengthens the importance of TAM constructs and ECM constructs by validating that perceived ease of use and perceived usefulness significantly lead to continuance intention. Perceived ease of use and perceived usefulness are antecedents of intention to accept IS in TAM (Davis, 1989). Perceived usefulness is the precursor of continuance intention in ECM (Bhattacharjee, 2001). This study confirmed that AIPA is a typical IS. Subsequent studies would be able to obtain significant results if other IS factors are considered in AIPA's research.

Third, this paper adds a noteworthy contribution to the literature by verifying that novelty value significantly determines utilitarian value and hedonic value. Previous studies have explained the behavior of users by reflecting the value of novelty in detailed factors such as anthropomorphism (Soliman and Noorliza, 2020), autonomy (Hu et al., 2021), and social attraction (Han and Yang, 2018). This research approached the notion of novelty in various new functions and roles provided since AIPA appeared. Users may find AIPA interesting because AIPA is non-human, can communicate, and provides useful help. In this way, the novelty of technology adds value both effectively and hedonistically. This work drew the academic significance of novelty value that can lead to utilitarian value and hedonic value.

Fourth, this study makes a significant contribution to the literature on AIPA by uncovering that perceived enjoyment and parasocial interaction increase the degree of hedonic value. Although the path coefficient is relatively weak, additional analysis can be attempted academically

because the two factors show a significant effect. Scholars are encouraged to newly verify the relationships between perceived enjoyment, parasocial interaction, and hedonic value. Parasocial interaction may create hedonic values through perceived enjoyment.

Finally, the model of this study explains 63.0% of the variance in continuance intention. The empirical results suggest that the proposed theoretical framework can be more effective in explaining the intention to use interactive artificial intelligence continuously.

### 7.2. Managerial implications

This study provides several managerial implications as follows. First, this paper confirms that service providers should strengthen the utility and hedonic functions of AIPA. They need to examine the functions that AIPA users use a lot continuously and identify the most utilized functions in smart devices. An example is the Alexa command (Smith et al., 2022). If a few simple words for each function are specified as commands, the degree of the user's intention to use may increase (Huang, 2021). It would be good for developers to create several additional voice types. Some interviewees suggested that AIPA can reflect the voices of celebrities or reproduce the voices of people who loved but cannot talk now. Since the effect of the utilitarian value is greater than that hedonic value, it would be better for the provider to configure the useful function more diversely. One might expect that advanced assistant functions such as Google Duplex are continuously enhanced to automatically handle repetitive tasks (Leviathan and Matias, 2018; O'Leary, 2019).

Second, this study offers a way to increase utilitarian value. The executives of the AIPA company will have to operate so that communication with AIPA is easy, useful, and new. What we learned from interviews with a few respondents is that AIPA doesn't fully understand users' intentions or repeats the same thing over and over again. Therefore, managers will need to strengthen AIPA's recognition rate and expand the group of commands it can handle. It would be beneficial to set the development direction to support a simple and reliable operation for useful functions. Each manufacturer needs to differentiate functionality according to its marketing strategy.

Last, this study presents a way to improve the hedonic value. Users get a higher level of hedonic value when they form a deeper affinity with AIPA and conversations with it are funnier. Therefore, marketers may be able to increase consumption by putting phrases such as "our friend" and "medicine for loneliness" beyond the simple AI function in promoting AIPA. In addition, AIPA providers will have to show off something amazing when a new version is released. For example, AIPA may unlock a user's voice to improve mental illness (Jiang, 2020). It can talk to the user

first, such as "You had a hard day today." or "Jerry! Did the milk and cucumber taste good?"

### 7.3. Limitation and further research directions

This research has several limitations. First, this study collected samples from only one country, South Korea. In particular, the sample characteristics of the present study and the global user distribution are different. Further research is necessary to survey users in several countries to improve the representativeness and reliability of the research results. Also, it would be valuable to divide the evaluations between Siri and Bixby users. It can be checked whether the AIPA used influences the results. This would increase the objectivity of the results and indirectly assess the influence of the AIPA functions. Second, this work did not reflect demographic information. Utility and pleasure may vary according to the gender, age, and occupation of the respondents. Future studies need to consider sample characteristics as control variables to obtain more valuable results.

### Declarations

#### Author contribution statement

Hyeon Jo: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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#### Data availability statement

The authors do not have permission to share data.

#### Declaration of interest's statement

The author declares no conflict of interest.

#### Additional information

No additional information is available for this paper.

## Appendix A

**Table A1.** List of Model Constructs and Items

| Construct             | Items | Mean   | Source               |
|-----------------------|-------|--|----------------------|
| Continuance Intention | COI1  | I intend to continue my use of AI personal assistant in the future.                    | Ashfaq et al. (2020) |
|                       | COI2  | I intend to increase my use of AI personal assistant in the future.                    |                      |
|                       | COI3  | I will keep using the AI personal assistant as regularly as I do now.                  |                      |
| Utilitarian Value     | UTV1  | The use of AI personal assistant offers good value.                                    | Kim and Oh (2011)    |
|                       | UTV2  | The use of AI personal assistant is beneficial to me.                                  |                      |
|                       | UTV3  | The use of AI personal assistant is worthwhile to me.                                  |                      |
| Hedonic Value         | HEV1  | AI personal assistant is one that I enjoy.   | Kim and Oh (2011)    |
|                       | HEV2  | AI personal assistant makes me want to use them.                                       |                      |
|                       | HEV3  | AI personal assistant is one that I feel relaxed about using.                          |                      |
| Perceived Ease of Use | PEU1  | My interaction with the AI personal assistant is clear and understandable.             | Ashfaq et al., 2020  |
|                       | PEU2  | Interaction with the AI personal assistant does not require a lot of my mental effort. |                      |
|                       | PEU3  | I find the AI personal assistant to be easy to use.                                    |                      |

(continued on next column)

Table A1 (continued)

| Construct              | Items | Mean   | Source               |
|------------------------|-------|--|----------------------|
| Perceived Usefulness   | PUS1  | I find the AI personal assistant useful in my daily life.                      | Ashfaq et al., 2020  |
|                        | PUS2  | Using the AI personal assistant helps me to accomplish things more quickly.    |                      |
|                        | PUS3  | Using AI personal assistant increases my productivity.                         |                      |
| Novelty Value          | NOV1  | Using AI personal assistant is a unique experience.                            | Hasan et al. (2021)  |
|                        | NOV2  | Using AI personal assistant is an educational experience.                      |                      |
|                        | NOV3  | The experience of using AI personal assistant satisfies my curiosity.          |                      |
| Perceived Enjoyment    | PEN1  | I enjoy a conversation with the AI personal assistant.                         | Ashfaq et al. (2020) |
|                        | PEN2  | It is fun and pleasant to share a conversation with the AI personal assistant. |                      |
|                        | PEN3  | The conversation with the AI personal assistant is exciting.                   |                      |
| Parasocial Interaction | PSI1  | I could establish a personal relationship with the AI personal assistant.      | Jang (2020)          |
|                        | PSI2  | I often felt that the AI personal assistant was responsive to me.              |                      |
|                        | PSI3  | I often felt that the AI personal assistant was real.                          |                      |

## References

- Ahmad, S., Bhatti, S.H., Hwang, Y., 2020. E-service quality and actual use of e-banking: explanation through the Technology Acceptance Model. *Inf. Dev.* 36 (4), 503–519.
- Ashfaq, M., Yun, J., Yu, S., Loureiro, S.M.C., 2020. I, Chatbot: modeling the determinants of users' satisfaction and continuance intention of AI-powered service agents. *Telematics Inf.* 54, 101473.
- Bagozzi, R.P., Yi, Y., Phillips, L.W., 1991. Assessing construct validity in organizational research. *Adm. Sci. Q.* 36 (3), 421–458.
- Bhattacharjee, A., 2001. Understanding information systems continuance: an expectation-confirmation model. *MIS Q.* 25 (3), 351–370.
- Canbek, N.G., Mutlu, M.E., 2016. On the track of artificial intelligence: learning with intelligent personal assistants. *J. Human Sci.* 13 (1), 592–601.
- Chin, W.W., 1998. Issues and opinions on structural equation modeling. *MIS Q.* 22 (1), 7–16.
- Chin, W.W., Marcolin, B.L., Newsted, P.R., 2003. A partial least squares latent variable modeling approach for measuring interaction effects: results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Inf. Syst. Res.* 14 (2), 189–217.
- CISION PR Newswire, 2021. Intelligent virtual assistant market size worth \$ 50.9 billion, globally, by 2028 at 30% CAGR: verified market Research®. <https://www.prnewswire.com/news-releases/intelligent-virtual-assistant-market-size-worth-50-9-billion-globally-by-2028-at-30-cagr-verified-market-research-301414041.html>. (Accessed 25 May 2022).
- Cooper, D.R., Schindler, P.S., Sun, J., 2006. *Business Research Methods*, 9. McGraw-Hill, New York.
- DanielSoper.com. Free statistics calculators. Available at: <https://www.danielsoper.com/statcalc/default.aspx>. (Accessed 8 December 2021).
- Davis, F.D., 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q.* 13 (3), 319–340.
- Dawes, J., 2008. Do data characteristics change according to the number of scale points used? An experiment using 5-point, 7-point and 10-point scales. *Int. J. Mark. Res.* 50 (1), 61–104.
- Falk, R.F., Miller, N.B., 1992. *A Primer Soft Modeling*. University of Akron Press.
- Fernandes, T., Oliveira, E., 2021. Understanding consumers' acceptance of automated technologies in service encounters: drivers of digital voice assistants adoption. *J. Bus. Res.* 122, 180–191.
- Fornell, C., Larcker, D.F., 1981. Evaluating structural equation models with unobservable variables and measurement error. *J. Market. Res.* 18 (1), 39–50.
- Hair, J., Anderson, R., Tatham, B.R., 2006. *Multivariate Data Analysis*, sixth ed.
- Hair, J.F., Risher, J.J., Sarstedt, M., Ringle, C.M., 2019. When to use and how to report the results of PLS-SEM. *Eur. Bus. Rev.* 31 (1), 2–24.
- Hair Jr., J.F., Hult, G.T.M., Ringle, C.M., Sarstedt, M., 2021. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Sage publications.
- Han, S., Yang, H., 2018. Understanding adoption of intelligent personal assistants: a parasocial relationship perspective. *Ind. Manag. Data Syst.* 118 (3), 618–636.
- Hasan, I., Ahmed, S.P., Ahmed, S.U., Yousuf, T.B., 2021a. Factors influencing users' willingness for online messaging services: a developing country perspective. *Int. J. Mobile Commun.* 19 (1), 75–98.
- Hasan, R., Shams, R., Rahman, M., 2021b. Consumer trust and perceived risk for voice-controlled artificial intelligence: the case of Siri. *J. Bus. Res.* 131, 591–597.
- Henseler, J., Ringle, C.M., Sarstedt, M., 2015. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Market. Sci.* 43 (1), 115–135.
- Hoffman, A., Owen, D., Calvert, S.L., 2021. Parent reports of children's parasocial relationships with conversational agents: trusted voices in children's lives. *Human Behav. Emerg. Technol.* 3 (4), 606–617.
- Holbrook, M.B., Batra, R., 1987. Assessing the role of emotions as mediators of consumer responses to advertising. *J. Consum. Res.* 14 (3), 404–420.
- Holbrook, M.B., Hirschman, E.C., 1982. The experiential aspects of consumption: consumer fantasies, feelings, and fun. *J. Consum. Res.* 9 (2), 132–140.
- Hu, L.T., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct. Equ. Model.: A Multidiscip. J.* 6 (1), 1–55.
- Hu, Q., Lu, Y., Pan, Z., Gong, Y., Yang, Z., 2021. Can AI artifacts influence human cognition? The effects of artificial autonomy in intelligent personal assistants. *Int. J. Inf. Manag.* 56, 102250.
- Huang, J., 2021. Create Shortcuts Voice Commands with No Code with Alexa for Apps Shortcuts No-Code Builder. Available at: <https://developer.amazon.com/en-US/blogs/alexa/alexa-skills-kit/2021/12/create-shortcuts-voice-commands-with-no-code-with-alexa-for-apps-shortcuts>. (Accessed 1 June 2022).
- Iovine, A., Narducci, F., Semeraro, G., 2020. Conversational Recommender Systems and natural language:: a study through the Converse framework. *Decis. Support Syst.* 131, 113250.
- Jang, Y., 2020. Exploring user interaction and satisfaction with virtual personal assistant usage through smart speakers. *Archives Design Res.* 33 (3), 127–135.
- Jiang, A., 2020. Revolutionizing Health with AI Voice Assistants. Available at: <https://towardsdatascience.com/how-ai-voice-assistants-can-revolutionize-health-b08d925bd018>. (Accessed 29 May 2022).
- Jin, S.-A.A., 2010. Parasocial interaction with an avatar in second life: a typology of the self and an empirical test of the mediating role of social presence. *Presence* 19 (4), 331–340.
- Jo, H., 2021. Understanding the Key Antecedents of Users' Continuance Intention in the Context of Smart Factory. *Technology Analysis & Strategic Management*, pp. 1–14.
- Jo, H., Nam, D.-W., Kim, S.-H., 2011. A study on the intention of continuous use of smart phone. *The e-Business Studies* 12 (3), 251–268.
- Kim, B., Han, I., 2009. What drives the adoption of mobile data services? An approach from a value perspective. *J. Inf. Technol.* 24 (1), 35–45.
- Kim, B., Oh, J., 2011. The difference of determinants of acceptance and continuance of mobile data services: a value perspective. *Expert Syst. Appl.* 38 (3), 1798–1804.
- Kim, D., Kim, B., 2018. An integrative view of emotion and the dedication-constraint model in the case of coffee chain retailers. *Sustainability* 10 (11), 4284.
- Kinsella, B., 2020. Voice assistant use on smartphones rise, Siri maintains top spot for total users in the U.S. Available at: <https://voicebot.ai/2020/11/05/voice-assistant-use-on-smartphones-rise-siri-maintains-top-spot-for-total-users-in-the-u-s/>. (Accessed 31 May 2022). Voicebot.AI.
- Knote, R., Janson, A., Eigenbrod, L., Söllner, M., 2018. The what and How of Smart Personal Assistants: Principles and Application Domains for IS Research. *Multikonferenz Wirtschaftsinformatik (MKWI)*.
- Leviathan, Y., Matias, Y., 2018. Google Duplex: an AI System for Accomplishing Real-World Tasks over the Phone.
- Lopatovska, I., Griffin, A.L., Gallagher, K., Ballingall, C., Rock, C., Velazquez, M., 2020. User recommendations for intelligent personal assistants. *J. Librarian. Inf. Sci.* 52 (2), 577–591.
- Lopatovska, I., Rink, K., Knight, I., Raines, K., Cosenza, K., Williams, H., Sorsche, P., Hirsch, D., Li, Q., Martinez, A., 2019. Talk to me: exploring user interactions with the Amazon Alexa. *J. Librarian. Inf. Sci.* 51 (4), 984–997.
- Lu, J., 2014. Are personal innovativeness and social influence critical to continue with mobile commerce? *Internet Res.* 24 (2), 134–159.
- Lutz, C., Newlands, G., 2021. Privacy and smart speakers: a multi-dimensional approach. *Inf. Soc.* 37 (3), 147–162.
- Mari, A., 2019. Voice Commerce: Understanding Shopping-Related Voice Assistants and Their Effect on Brands.
- McLean, G., Osei-Frimpong, K., 2019. Hey Alexa... examine the variables influencing the use of artificial intelligent in-home voice assistants. *Comput. Hum. Behav.* 99, 28–37.
- Mehmood, K., Hanaysha, J., 2015. The strategic role of hedonic value and utilitarian value in building brand loyalty: mediating effect of customer satisfaction. *Pakistan J. Soc. Sci.* 35, 1025–1036.
- Miner, A.S., Laranjo, L., Kocaballi, A.B., 2020. Chatbots in the fight against the COVID-19 pandemic. *NPJ Digit. Med.* 3 (1), 1–4.
- Mohammadi, H., 2015. A study of mobile banking loyalty in Iran. *Comput. Hum. Behav.* 44, 35–47.
- Moorthy, A.E., Vu, K.-P.L., 2015. Privacy concerns for use of voice activated personal assistant in the public space. *Int. J. Hum. Comput. Interact.* 31 (4), 307–335.

- Mou, X., Xu, F., Du, J.T., 2021. Examining the Factors Influencing College Students' Continuance Intention to Use Short-form Video APP. *Aslib Journal of Information Management*.
- Nguyen, D.M., Chiu, Y.-T.H., Le, H.D., 2021. Determinants of continuance intention towards banks' chatbot services in Vietnam: a necessity for sustainable development. *Sustainability* 13 (14), 7625. <https://www.mdpi.com/2071-1050/13/14/7625>.
- Nguyen, Q.N., Ta, A., Prybutok, V., 2019. An integrated model of voice-user interface continuance intention: the gender effect. *Int. J. Hum. Comput. Interact.* 35 (15), 1362–1377.
- Nunnally, J.C., 1978. *Psychometric Theory*, second ed. McGraw Hill Book Company.
- O'Leary, D.E., 2019. GOOGLE'S Duplex: pretending to be human. *Intell. Syst. Account. Finance Manag.* 26 (1), 46–53.
- Ozturk, A.B., Nusair, K., Okumus, F., Hua, N., 2016. The role of utilitarian and hedonic values on users' continued usage intention in a mobile hotel booking environment. *Int. J. Hospit. Manag.* 57, 106–115.
- Pal, D., Babakerkhell, M.D., Zhang, X., 2021. Exploring the Determinants of Users' Continuance Usage Intention of Smart Voice Assistants. *IEEE Access*.
- Pillai, R., Sivathanu, B., Dwivedi, Y.K., 2020. Shopping intention at AI-powered automated retail stores (AIPARS). *J. Retailing Consum. Serv.* 57, 102207.
- Pradhan, A., Findlater, L., Lazar, A., 2019. Phantom friend" or" just a box with information" personification and ontological categorization of smart speaker-based voice assistants by older adults. *Proceedings of the ACM on human-computer interaction* 3, 1–21 (CSCW).
- Rajaobelina, L., Prom Tep, S., Arcand, M., Ricard, L., 2021. Creepiness: its antecedents and impact on loyalty when interacting with a chatbot. *Psychol. Market.* 38 (12), 2339–2356.
- Ringle, C.M., Wende, S., Becker, J.-M., 2014. *Smartpls 3*. Hamburg. SmartPLS. Available at: <https://www.smartpls.com>. (Accessed 4 August 2021).
- Sherman, E., Mathur, A., Smith, R.B., 1997. Store environment and consumer purchase behavior: mediating role of consumer emotions. *Psychol. Market.* 14 (4), 361–378.
- Smith, D., Dyson, T., Priest, D., Martin, T., 2022. Roundup of Every Alexa Command You Can Give Your Amazon Echo Device Now. Available at: <https://www.cnet.com/home/smart-home/roundup-of-every-alexa-command-you-can-give-your-amazon-echo-device-now/>. (Accessed 6 June 2022).
- Soliman, M.S.M., Noorliza, K., 2020. Explaining the competitive advantage of enterprise resource planning adoption: insights Egyptian higher education institutions. *J. Inf. Technol. Manag.* 12 (4), 1–21.
- Sun, Y., Li, S., Yu, L., 2021. The dark sides of AI personal assistant: effects of service failure on user continuance intention. *Electron. Mark.* 1–23.
- Tenenhaus, M., Vinzi, V.E., Chatelin, Y.-M., Lauro, C., 2005. PLS path modeling. *Comput. Stat. Data Anal.* 48 (1), 159–205.
- van der Heijden, H., 2004. User acceptance of hedonic information systems. *MIS Q.* 28 (4), 695–704.
- Venkatesh, V., Brown, S.A., 2001. A longitudinal investigation of personal computers in homes: adoption determinants and emerging challenges. *MIS Q.* 71–102.
- Venkatesh, V., Davis, F.D., 2000. A theoretical extension of the technology acceptance model: four longitudinal field studies. *Manag. Sci.* 46 (2), 186–204.
- Wetzels, M., Odekerken-Schröder, G., van Oppen, C., 2009. Using PLS path modeling for assessing hierarchical construct models: guidelines and empirical illustration. *MIS Q.* 33 (1), 177–195.
- Xu, Y., Shieh, C.-H., van Esch, P., Ling, I.-L., 2020. AI customer service: task complexity, problem-solving ability, and usage intention. *Australas. Mark. J.* 28 (4), 189–199.
- Yang, K., 2010. Determinants of US consumer mobile shopping services adoption: implications for designing mobile shopping services. *J. Consum. Market.* 27 (3), 262–270.
- Yang, K., Lee, H.J., 2010. Gender differences in using mobile data services: utilitarian and hedonic value approaches. *J. Res. Indian Med.* 4 (2), 142–156.
- Yu, J., Zo, H., Choi, M., Ciganeck, A., 2013. User acceptance of location-based social networking services: an extended perspective of perceived value. *Online Inf. Rev.* 37.