

Advertising acceptance via smart speakers

João Guerreiro and Sandra Maria Correia Loureiro
*ISCTE-Instituto Universitário de Lisboa and Business Research Unit (BRU-IUL),
Lisbon, Portugal, and*

Carolina Ribeiro

ISCTE-Instituto Universitário de Lisboa, Lisboa, Portugal

Abstract

Purpose – The influence of technology on marketing communications is rising in both applications and value created. Artificial intelligence (AI) and, as a result, smart speakers are benefiting both brands and customers at many levels. In particular, AI opens up the possibility to establish human-like dialogs with customers and to advertise brands in a new and engaging way. Therefore, the purpose of this paper is to understand why and how consumers would accept receiving advertising (ad) via AI-enabled devices such as smart speakers.

Design/methodology/approach – A total of 326 individuals participated in a study that explored the factors influencing ad acceptance in smart devices. A partial least squares-structural equation model technique was used to validate the results.

Findings – The findings show that customer acceptance of ads via smart assistants is influenced by smart assistant usefulness and hedonic motivations. However, privacy risk moderates the relationship between smart speaker ease of use and smart speaker usefulness.

Originality/value – This paper explores the main drivers of ad acceptance via smart speakers and goes beyond the existing knowledge of smart speaker acceptance to further explore how this can become an important channel for brands to communicate.

Keywords Marketing communications, Artificial intelligence, Smart speakers, Advertising acceptance, Virtual assistants

Paper type Research paper

Aceptación de la publicidad a través de altavoces inteligentes

Resumen

Objetivo – La influencia de la tecnología en las comunicaciones de marketing está aumentando tanto en las aplicaciones desarrolladas como en el valor creado. La inteligencia artificial (IA) y, en consecuencia, los altavoces inteligentes están beneficiando tanto a las marcas como a los clientes a muchos niveles. En particular, la IA abre la posibilidad de establecer diálogos similares a los humanos con los clientes y de publicitar las marcas de una manera nueva y atractiva. Por lo tanto, es necesario entender por qué y cómo los



consumidores aceptarían recibir publicidad (anuncios) a través de dispositivos con IA, como los altavoces inteligentes.

Metodología – Un total de 326 personas participaron en un estudio que exploró los factores que influyen en la aceptación de la publicidad en los dispositivos inteligentes. Se utilizó una técnica PLS-SEM para validar los resultados.

Resultados – Los resultados muestran que la aceptación de los anuncios a través de los asistentes inteligentes por parte de los clientes está influenciada por la utilidad del asistente inteligente y las motivaciones hedónicas. Sin embargo, el riesgo para la privacidad modera la relación entre la facilidad de uso del altavoz inteligente y su utilidad.

Originalidad – El artículo explora los principales impulsores de la aceptación de la publicidad a través de los altavoces inteligentes y va más allá del conocimiento existente sobre la aceptación de los altavoces inteligentes para explorar más a fondo cómo esto puede convertirse en un canal importante para que las marcas se comuniquen.

Palabras clave Comunicaciones de marketing, Aceptación de la publicidad, Inteligencia artificial, Altavoces inteligentes, Asistente virtual

Tipo de artículo Trabajo de investigación

智能音箱环境下的广告接受度研究

摘要

目的 – 科技对营销传播的影响在应用和价值创造方面都在上升。人工智能 (AI) 以及智能音箱在很多层面都对品牌和客户有益。尤其是, 人工智能开辟了与客户建立类似人类对话的可能性, 并以一种新颖的、有吸引力的方式宣传品牌。因此, 了解消费者为什么以及如何接受通过人工智能设备 (如智能音箱) 接收广告 (广告) 是有必要的。

方法 – 本研究的326名参与者探讨了影响智能设备中广告接受度的因素。PLS-SEM技术被采用以对结果进行验证。

研究结果 – 研究结果显示, 客户通过智能助手接受广告会受智能助手有用性和享乐动机的影响。然而, 隐私风险调节了智能音箱的易用性和智能音箱的有用性之间的关系。

原创性 – 本文探讨了通过智能音箱接受广告的主要驱动因素, 并超越了现有的关于智能音箱接受度的知识, 进一步探讨了这如何能成为品牌沟通的重要渠道。

关键词 营销传播, 广告接受度, 人工智能, 智能音箱, 虚拟助理

文章类型 研究型论文

1. Introduction

The advertising (ad) landscape has become more digital than ever in recent decades. Spending in 2025 on digital ad is expected to account for 77.5% of the overall media (Insider Intelligence, 2022). The emphasis has been not only on digital ads as the main ad medium but also on new, exciting ways to communicate via artificial intelligence (AI), which have allowed companies to look at AI as a promising way to reach their customers (Taylor and Carlson, 2021). The AI sector, in total, is projected to rise from €19.2mn in 2020 to €161.6mn in 2025 at a rate of around 54% per year (Statista, 2020). In 2021, AI agents are embedded mostly in smart speakers such as Amazon's Alexa, Google Home, Apple's Siri and Microsoft's Cortana (Donahue and Hajizadeh, 2019). Those AI agents use natural language processing to acquire knowledge and machine learning algorithms to adapt the acquired knowledge into new and unexplored solutions (Loureiro *et al.*, 2021a). Although smart speakers are still a recent product with limited communication capabilities, two out of five people agree that voice ads are catchier and less disruptive than traditional ones. Therefore, these new smart technologies can open up new opportunities for marketers (Adobe, 2020). In 2021, a total of 43% of US households had some sort of smart device and the trend is expected to increase over the next years (Statista, 2022a). The main functionality used by households is asking questions through the voice assistant. Most of these questions

are asked by people 55 years of age or more. However, most consumers that shop for retail items via smart devices are between 18 and 34 (Statista, 2022b). Alexa, for example, is now able to respond to commands such as “Alexa, what are your deals?” and “Alexa, what’s the most popular dog food,” which means that the AI system embedded in the device will recommend specific brands based not only on consumer preferences but also on customer ratings and the company’s most valued products (Amazon, 2021). Although monetizing smart devices via ad is still in its early days, Google Assistant already has voice ads embedded in its smart devices (MarketingDive, 2022). When consumers perform a voice search on their devices, Google can present paid suggestions that are linked to the search query. Despite recommendations being the dominant type of communication, Alexa users are also now hearing voice-based ads as well (Ju *et al.*, 2017), which reinforces the importance of studying how and when consumers are willing to accept recommendations and voice-based ads via such AI enabled devices. Alexa users can now be targeted with interactive ad messages while they are listening to music or shopping for their favorite products online (Voicebot.AI, 2022). Taylor and Carlson (2021) suggest that AI will have an important role in shaping the future of ad. However, no study to date has attempted to explore how AI embedded in smart devices can be used as an effective communication tool. Existing research has been primarily focused on exploring the role of smart speakers for shopping, with limited attention to how such devices may become important ad channels. (Bakr *et al.*, 2019; Haq, 2009). Most articles on the interplay between AI and ad are focused on the creative ad process (Qin and Jiang, 2019; Vakratsas and Wang, 2020) on the role of deep fakes in ad (Kietzmann *et al.*, 2020) and on how AI-enabled checkouts affect in-store communication and patronage likelihood (van Esch *et al.*, 2021). Although Smith (2020) makes a descriptive analysis of some drivers of ad acceptance via smart speakers, there is still very limited evidence about what mediates ad acceptance through this type of medium. Indeed, questions about the extent to which customers’ technological readiness determines their acceptance of smart devices and why customers prefer AI services in the different stages of the customer journey are still unexplored (Flavián and Casaló, 2021; Belanche *et al.*, 2020). Therefore, to analyze these under-researched topics, the current paper aims to explore the antecedents of ad acceptance via smart speakers and its contributions are twofold. First, it explores how consumers can be open to accept ad messages via smart speakers and to what extent customers’ technological readiness determines such ad acceptance. Technology acceptance models (TAM) (Davis, 1989) are extended to the ad landscape by adding other constructs that determine ad usefulness and acceptance. Second, the paper examines how elements of the ad message can be important in explaining customers’ responses to smart device ads. Concepts such as hedonic motivations, ad functionality, format and relevance are regarded here as drivers of ad acceptance. An understanding of what drives consumers to accept ads via smart devices can prove to be important for both academics and managers in their search for an optimal communication tone.

2. Literature review

2.1 Digital advertising

Digital ad uses interactive and digital media to promote commercial products. This bidirectional communication allows companies to tailor communication to consumer behavior and therefore provide a better brand–consumer experience (Lee and Cho, 2020). Previous studies on ad highlighted the importance of ad format, ad relevance and ad functionality in the decision-making process (Rajala and Westerlund, 2010; Smith *et al.*, 2007; Smith, 2020). Ad format can be defined as how ad is passed to consumers (Smith, 2020). Merisavo *et al.* (2007) claimed that any device’s capability to deliver ad by location-

based, timely and personalized messages influences consumers' acceptance of ads. Ad relevance is the degree to which ad is considered pertinent, meaningful, useful, valuable and related to the user's needs and interests (Smith *et al.*, 2007). For example, using music from the 1980s in an ad can create a strong link to Baby Boomers and Generation X, thus increasing the relevance of the ad for these consumers. Finally, ad functionality refers to how the marketing message is perceived as fitting the consumers' timetable (Smith *et al.*, 2007; Smith, 2020). Consumers that perceive the ad as having high functionality often prefer ads that allow them to skip promotions and search for more information later if needed (Belanche *et al.*, 2017a; Belanche *et al.*, 2017b) or even to share the ad messages with their peers (Smith, 2020).

2.2 Advertising via virtual assistants

Virtual assistants are conversational agents that can understand human dialogue (Hoy, 2018), have agency skills to execute tasks and learning techniques that allow them to adapt to consumers' behaviors (Mari, 2019). Smart assistants such as Amazon Echo, Google Home, Apple iPhone and, more recently, the Apple HomePod speaker have an impact on how people perform daily tasks such as checking the calendar, interacting with other apps to play music or read the news, finding nearby reference points and having a spontaneous conversation (Sujata *et al.*, 2019).

Although AI is used mainly to adapt companies' messages to consumers' needs via algorithm-mediated communication (Qin and Jiang, 2019), studies suggest that AI-enabled devices will evolve to become closer to consumers and develop a bidirectional type of relationship (a kind of partner), instead of the servant type that exists today (Schweitzer *et al.*, 2019). Today, smart speakers embed AI-agents that capture users' interaction in a servant-based relationship (they only comply with users' commands). Users can ask smart speakers to buy the best deal in smartphones or to order a pizza. Even in such a relationship, AI-agents have an agency role that may influence consumers' choices (Kang and Kim, 2020). However, as the relationship progresses, smart devices will no longer be passive instruments but are expected to partner with consumers to help them in their decision-making. Past research on the use of smart devices for purchase decisions found that consumers are more willing to buy low-involvement than high-involvement products such as pizzas (Tassiello *et al.*, 2021). The same study concluded that consumers with high psychological power – those individuals that believe they are in control over others, or in control of resources or even results of actions – are also more willing to purchase via smart speakers than others (Tassiello *et al.*, 2021).

Diverse studies have investigated the drivers of technology acceptance in general (McLean and Osei-Frimpong, 2019; Moriuchi, 2019), which is a necessary step to ensure that consumers are willing to accept advertisements via smart devices. Most studies used TAM theory (Davis, 1989) or other more recent technology acceptance frameworks (TAM2, UTAUT2). These frameworks suggest that for technology to be used and accepted, it requires some degree of usefulness and ease of use, among other drivers, such as subjective norm and hedonic motivation (Venkatesh *et al.*, 2012).

More recently, researchers have also explored adoption of smart speakers (Park *et al.*, 2018; Ashfaq *et al.*, 2021; Flavián *et al.*, 2022). In a descriptive study, Smith (2020) explored the forms of marketing messages that consumers prefer to hear on smart speakers. However, his study was focused on gender differences and not on developing a conceptual and testable framework of ad acceptance via smart speakers. Therefore, to the best of the authors' knowledge, no study has yet explored what may affect consumers' willingness to accept being exposed to ads in such devices.

3. Hypothesis development

TAM theory claims that perceived ease of use and utility influence technology adoption. The “degree to which an individual feels that using and working with a specific device will be free of effort” leads to an increased perception of usefulness (Davis, 1989: 320). Users are frequently keen to implement applications that are simple to operate, communicate with and manage (Al-Shbiel and Ahmad, 2016). Perceived ease of use is a core factor that affects the perceived utility of a technical system, according to the original TAM (Kim *et al.*, 2017). Indeed, Belanche *et al.* (2017b) suggest that TAM can be an important theory in explaining ad acceptance in interactive ad formats. Although in the original TAM, ease of use is also related to intention to use, metaanalysis results show that ease of use affects acceptance more strongly when mediated by usefulness (Schepers and Wetzels, 2007). Indeed, Moriuchi (2019) recently confirmed that this effect also exists with smart devices. Therefore, we argue that as smart assistants become easier to use, customers will find them more useful, which is a necessary step to ensure ad acceptance. Hence, we suggest that:

H1a. Smart speaker ease of use positively affects smart speaker usefulness.

Smart speaker owners are willing to receive ads on their smartphones if they have the option of selecting what is promoted, if the content can be checked and if the ad is built into the smart speaker experience (Smith, 2020). Indeed, McLean and Osei-Frimpong (2019) found that the utilitarian benefits of interacting with smart speakers are drivers of smart speaker usage. Also, smart speaker functional intelligence is known to enhance consumers’ perceived level of control during the interactions with the voice assistant, which later enhances flow and consumers’ willingness to continue the relation (Poushneh, 2021). Therefore, we suggest that as functionality of the ad (the ability to interact with the content) increases, so do the utilitarian benefits of the exchange and, consequently, the smart speaker’s perceived usefulness. Hence, we formulate that:

H1b. Advertising functionality positively affects smart speaker usefulness.

Ads are relevant to consumers (Rajala and Westerlund, 2010) because they are significant, efficient, beneficial and linked to the user’s desires and preferences (Smith *et al.*, 2007). Relevance has three dimensions: interest in the product type, interest in the message objective and affordability of the marketed product (Bakr *et al.*, 2019). According to Ducoffe (1996), the more valuable ads are, the more meaningful they are. Furthermore, message specificity influences the ad’s perceived worth and consequently the perceived quality of the relationship between consumers and smart devices (Loureiro *et al.*, 2021b). Thus, the importance of ads is a critical factor in determining perceived meaning (Salois and Reilly, 2014). Consumers prefer to watch ads that are more relevant to their interests and desires to achieve the greatest possible experience when watching the ad (Smith, 2020). Therefore, we suggest that:

H1c. Advertising relevance positively affects smart speaker usefulness

Lee (2009) noted that a consumer’s approval and desire to use a particular aspect, good or service is related to the consumer’s perceived benefits. If customers feel that a device provides them with valuable knowledge, their mindset and adoption of that device increase. McLean *et al.* (2021) also showed that both perceived ease of use and perceived usefulness are fundamental drivers of consumer brand engagement and, consequently, of purchase intention via smart speakers. Because smart speakers are personal assistants, perceived usefulness refers to how much an individual believes that using a smart assistant improves

their success in performing everyday tasks (Kowalczyk, 2018). Given that ad messages can help consumers to find useful products tailored to their needs, we propose that not only does smart speaker usefulness affect ad acceptance but also that perceived usefulness plays an important role in influencing smart speaker users' willingness to consume ads. Hence, we hypothesize:

H2. Smart speaker usefulness positively affects advertising acceptance.

Despite the potential role of smart speaker usefulness in ease of use and acceptance of ad, researchers agree that in the current technological environment, the role of perceived risk to privacy in this effect cannot be ignored (Rauschnabel *et al.*, 2018). Particularly, the fear of losing control over personal information (Connolly and Bannister, 2007) and losing control over the ability to make freewill decisions (Walter and Lopez, 2008). Indeed, previous studies showed that perceived privacy risks affect the intention to use smart speakers because of consumers' concerns about their data (Cha *et al.*, 2021).

Although manufacturers of smart devices – such as Amazon and Google – have recently reinforced their concern about privacy (Amazon, 2021; Google, 2021), privacy risk is known to affect individual attitudes toward smart devices (O'Flaherty, 2018). In fact, McLean and Osei-Frimpong (2019) found that utilitarian benefits (how useful the smart speaker is for consumers' utilitarian purposes) can be affected by privacy issues. Similar effects – an influence of privacy concerns on perceived usefulness and perceived ease of use – were found in consumers' response to sponsored ads on social media (Lin and Kim, 2016). Thus, we posit that the effect of smart speakers' ease of use on smart speakers' usefulness is moderated by how much consumers perceive their privacy is at risk:

H3. Privacy risk moderates the relation between smart speakers' ease of use and smart speakers' usefulness.

While usefulness can be seen as a more utilitarian benefit, hedonic motivations refer to a person's affective feelings – such as happiness and entertainment – acquired using new technologies such as smart speakers (McLean and Osei-Frimpong, 2019). The esthetic, pleasurable and hedonic advantages that ads can bring to customers are referred to as hedonic value (Liu *et al.*, 2019). Ads should be regarded as a means of amusement and enjoyment (Pollay and Mittal, 1993). Indeed, according to Anubha and Shome (2021), each ad is seen from both a utilitarian and hedonic angle and consumer responses to such ads are influenced by how relevant the ad is to them. A relevant ad is one that aligns with the consumers' needs and increases purchase intention, consumer satisfaction and trust (Pavlou and Stewart, 2000; Alalwan, 2018). This means that the more relevant, the more useful and the more positive consumer attitudes toward accepting ads via this new media are, the greater the hedonic motivations to receive ad through these devices. Therefore, we suggest that as ad relevance increases, so does the enjoyment of listening to the advertised communication. Hence, we suggest:

H4a. Advertising relevance positively affects hedonic motivations.

Merisavo *et al.* (2007) argue that the ability of any system to deliver ads through location-based, timely and customized messages influences and dictates customer adoption of ads. As a result, Heinonen and Strandvik (2007) conclude that the campaign's format plays a role in customers' ability to receive and react to advertisements. The relationship between marketing messages and perceived meaning is critical in users' approval of communication messages and how they enjoy the ad message (Harvard *et al.*, 2021). Indeed, Carroll *et al.* (2008)

claim that the ad content is essential for marketing campaigns to be accepted. Consumers seek technology as a way to relax and extract emotional gratification from its use (McLean and Osei-Frimpong, 2019). Therefore, we suggest that a message more focused on hedonic messages and with a more entertaining communicative tone can increase hedonic motivations and propose that:

H4b. Advertising format positively affects hedonic motivations.

Advertisements with more entertaining and pleasurable elements are more appealing to consumers. As a result, enjoyable, fun ads attract and maintain interest, especially when they are relevant to customers' needs and wants. (Ling *et al.*, 2010). The more hedonic motivations are maintained, the more favorably the target audience responds to ads (Petrovici *et al.*, 2007; Pollay and Mittal, 1993). Therefore, we suggest that:

H5. Hedonic motivations positively affect advertising acceptance.

Figure 1 shows the proposed conceptual model.

4. Method

An online survey was applied in July 2020 using self-selection sampling and focused on how participants viewed the benefits of having smart speakers communicating ad messages. The survey was spread on social media (Facebook, LinkedIn, Instagram and WhatsApp)

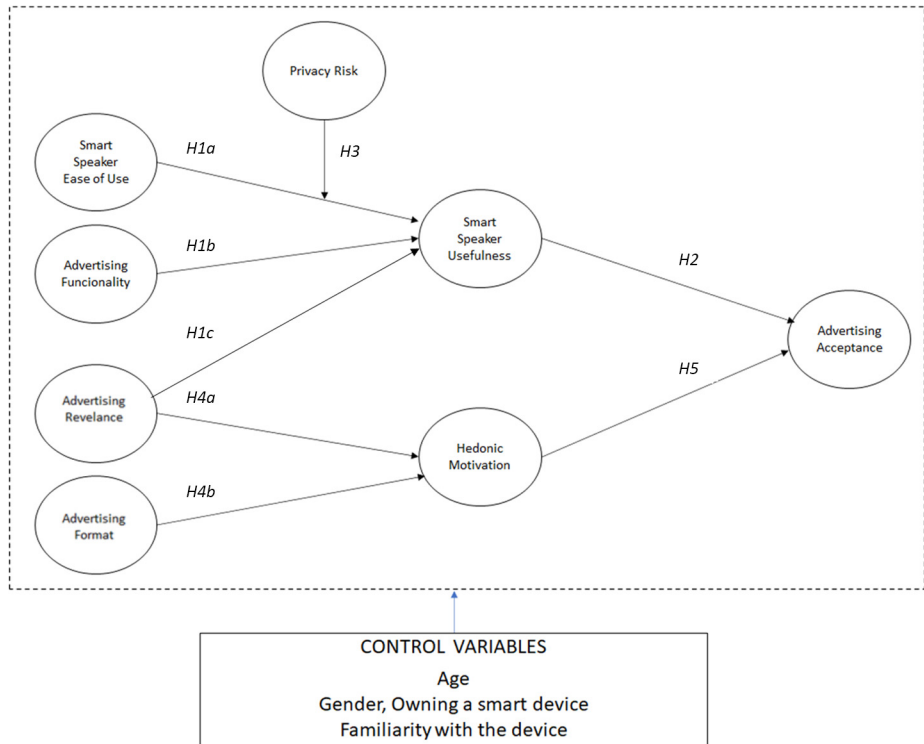


Figure 1.
Conceptual model

because of the importance of social media as a platform for digital ad (Cho *et al.*, 2019). Before filling out the survey, participants were instructed about the capabilities of smart devices by watching a small video (Youtube, 2020). Consumers were then asked to recall the last advertisement they remember and imagine having that ad communicated via the smart speaker. The questionnaire was divided in four parts. First, participants were asked about their perceptions of how easy it is to use smart speakers. A second part measured ad functionality, format and relevance. Third, participants were surveyed about motivations and ad acceptance via smart speakers. A final part of the survey measured sociodemographic characteristics, familiarity with smart speakers and concerns such as privacy risks.

Perceived ease of use (four items) and perceived usefulness (four items) were adapted from Venkatesh *et al.* (2012), and perceived functionality of ad (seven items) and perceived format of ad (12 items) were adapted from Smith (2020). Perceived relevance of ad (six items) was measured using an adapted scale of Bakr *et al.* (2019), while hedonic motivations (three items) and privacy risk (four items) were adapted from McLean and Osei-Frimpong (2019). Finally, ad acceptance was measured using three items from Parreño *et al.* (2013). All the items were rated on a seven-point Likert scale. Control variables included questions about the user's familiarity with smart speakers as well as questions about the consumer's age and gender.

A total of 407 participants answered the survey. After removing responses that contained missing values, the final sample consisted of 326 subjects (63.5% of respondents were women and 36.5% were men). Table 1 provides an overview of the sociodemographic characteristics of the study's participants.

5. Results

5.1 Common method variance

We implemented a series of procedures to reduce the risk of common method variance in the analysis, as recommended by Podsakoff *et al.* (2003). To achieve a psychological distinction of measurement, constructs were measured separately and presented in random order. Harman's one-factor test (1976) and a full collinearity assessment approach were used to measure common process bias. According to recent research, Harman's one-factor test is a powerful tool for detecting common process bias (Hair *et al.*, 2017), especially if the first eigenvalue accounts for less than 40% of all data variance (Hair *et al.*, 2017). When the variance inflation factors (VIFs) are less than 3.3, research suggests there is no evidence of common method bias (Kock and Lynn, 2012).

Harman's one-factor test showed that the first eigenvalue accounted for just 37.99% of all data variance in the study's eight conceptually relevant constructs. All of the VIFs are close to 3 and below the maximum threshold of 10, which reveals no probable collinearity issues (Hair *et al.*, 2019), as shown in Table 2. As a result, the findings indicate that traditional method variance is not a major problem in this research.

5.2 Reliability and validity tests

A partial least squares (PLS) structural equation model (SEM) was used to test the conceptual model (Hair, 2012). PLS-SEM is particularly interesting because:

- it avoids biases and inconsistent parameter estimates;
- it is effective even with smaller samples and nonnormal distributions such as Likert-scale type of measurements; and
- it avoids inadmissible solutions and factor indeterminacy (Richter *et al.*, 2016; Sarstedt *et al.*, 2016).

Variable	Cases (%)
<i>Gender</i>	
Female	207 (63.5%)
Male	119 (36.5%)
<i>Age</i>	
<25	102 (31.3%)
25–44	118 (36.2%)
>45	106 (32.5%)
<i>Education</i>	
Basic education	1 (0.3%)
High School Degree	104 (31.9%)
Bachelor's Degree	121 (37.1%)
Post-Graduation	21 (6.4%)
Master's Degree	76 (23.3%)
Doctoral Degree	3 (0.9%)
<i>Professional situation</i>	
Student	70 (21.5%)
Student–worker	37 (11.3%)
Employed	207 (63.5%)
Unemployed	7 (2.1%)
Retired	5 (1.5%)
<i>Familiarity with smart speakers</i>	
Yes	214 (65.6%)
No	112 (34.4%)
<i>Owens a smart speaker</i>	
Yes	116 (35.6%)
No	210 (64.4%)

Table 1.
Sociodemographic
description of the
respondents

The PLS-SEM model estimated for the current study revealed that some outer loadings fell below the 0.7 threshold (Hair *et al.*, 2010) and were discarded from the model. The first item in the privacy risk scale had an outer loading of 0.570. Ad format, ad relevance and ad functionality also had some items below the outer loading threshold. Ad relevance item 3 (0.616), ad relevance item 5 (0.667), ad format item 11 (0.537), ad format item 12 (0.509) and ad functionality item 1 (0.684) were also removed. After removing those items, all the constructs met the minimum thresholds in terms of composite reliability and AVE (Hair *et al.*, 2010). Table 3 shows the adapted items and the final model reliability and validity tests.

This study considers four characteristics to test the outer model: internal consistency reliability, composite reliability, convergent validity and discriminant validity. Cronbach's alpha and the construct's composite reliability are both greater than 0.70, suggesting that the model is internally reliable (Hair *et al.*, 2012). For convergent validity, the total variance extracted (AVE) from all the constructs was greater than 0.50, indicating that the construct, on average, describes more than half the variance of its indicators (Hair *et al.*, 2012).

The final model was also tested against the Heterotrait-monotrait ratio criterion. The model reveals that the model confirms its discriminant validity (Henseler *et al.*, 2015) (Table 4).

5.3 Structural model analysis

Analysis of the structural model fit reveals that the model fits the data well, with an standardized root mean-square residual of 0.075 (Henseler *et al.*, 2016). The structural model

Table 2.
Outer model VIF scores

Item	VIF
Ease of use 1	2.021
Ease of use 2	2.158
Ease of use 3	2.308
Ease of use 4	1.691
Privacy risk 1	2.345
Privacy risk 2	2.801
Privacy risk 3	2.206
Usefulness 1	2.187
Usefulness 2	2.628
Usefulness 3	3.066
Usefulness 4	2.693
Ad format 1	2.469
Ad format 2	1.990
Ad format 3	2.440
Ad format 4	2.444
Ad format 5	2.318
Ad format 6	2.452
Ad format 7	2.050
Ad format 8	2.649
Ad format 9	2.611
Ad format 10	3.023
Ad functionality 1	2.513
Ad functionality 2	3.142
Ad functionality 3	2.271
Ad functionality 4	1.709
Ad functionality 5	2.099
Ad functionality 6	1.869
Ad relevance 1	1.862
Ad relevance 2	2.168
Ad relevance 3	2.317
Ad relevance 4	2.224
Hedonic motivat. 1	2.686
Hedonic motivat. 2	4.348
Hedonic motivat. 3	3.151
Ad acceptance 1	4.733
Ad acceptance 2	7.164
Ad acceptance 3	6.368

evaluations examine the R^2 estimates, Stone–Geisser’s Q^2 , effect size (f^2), path coefficients (β) and p -values detailed in both [Figure 2](#) and [Table 5](#).

The model predicts 35.0% of the variance in perceived usefulness of smart speakers, 42.6% of the variance in hedonic motivations and 71.1% of the variance in ad acceptance, suggesting a moderate R^2 ([Henseler et al., 2009](#)). [Table 5](#) shows the results.

The model’s predictive validity is supported by the fact that all the dependent variables have a Q^2 -value greater than zero ([Henseler et al., 2009](#)). Smart speaker perceived ease of use ($\beta = 0.357, p < 0.01$), perceived ad functionality ($\beta = 0.229, p < 0.01$) and ad relevance ($\beta = 0.114, p < 0.05$) have a significant and positive impact on smart speaker perceived usefulness. The influence of smart speaker ease of use on smart speaker usefulness has a medium effect ($f^2 = 0.171$), while the remaining relationships that affect smart speaker usefulness have a low effect size. Perceived ad format ($\beta = 0.423, p < 0.01$) and perceived ad relevance ($\beta = 0.284, p < 0.01$) were hypothesized to have a direct effect

Adapted item description	Loadings
<i>Ease of use (EU) $\alpha = 0.857$; CR = 0.900; AVE = 0.692</i>	
<i>Adapted from Venkatesh et al. (2012)</i>	
Learning how to use a smart speaker is easy for me	0.827
Interacting with a smart speaker is clear and understandable	0.807
I find smart speakers easy to use	0.835
It is easy for me to become skillful at using a smart speaker	0.858
<i>Ad functionality (AF) $\alpha = 0.879$; CR = 0.907; AVE = 0.621</i>	
<i>Adapted from Smith (2020)</i>	
I prefer receiving advertisements on smart speakers that:	
Allow me to ask for more detailed information	0.777
Contain a repeat option so I can hear the message again	0.827
Provide instant access to a customer service representative online	0.801
Allow me to shop directly through the smart speaker	0.769
I can save on the smart speaker	0.788
I can share with others through social media	0.763
<i>AD format (AF) $\alpha = 0.928$; CR = 0.939; AVE = 0.608</i>	
<i>Adapted from Smith (2020)</i>	
I prefer receiving advertisements on smart speakers that:	
Provide me with information about availability and location of product/service	0.736
Tell me about a sale or discount	0.758
Are for products/services that I have specifically asked about	0.758
Tell me how the product/service will benefit me	0.789
Are for products/services that are relevant in terms of my location	0.807
Are spoken by an expert or trusted source	0.738
Explain how to use the product/service	0.801
Contain product ratings from other consumers	0.822
Are for products/services that relate to my stage in life	0.857
Are for products/services that the personal assistant thinks I may be interested in	0.723
<i>AD relevance (AR) $\alpha = 0.855$; CR = 0.902; AVE = 0.696</i>	
<i>Adapted from Bakr et al. (2019)</i>	
I prefer to receive advertising about product/services that I use in my daily life	0.781
I generally like to know about news related with products/services that I normally use	0.842
I would like to know if brands that I ask the smart speaker about launch a new product	0.867
I would like to know if the products/services that I ask the smart speaker about have a new offer	0.845
<i>Usefulness (US) $\alpha = 0.902$; CR = 0.931; AVE = 0.772</i>	
<i>Adapted from Venkatesh et al. (2012)</i>	
I find smart speakers useful in my daily life	0.856
I find using a smart speaker increases my chances of achieving things that are important to me	0.884
I find using a smart speaker helps me complete my tasks faster	0.896
I find that a smart speaker increases my productivity	0.878
<i>Hedonic motivations (HM) $\alpha = 0.908$; CR = 0.943; AVE = 0.846</i>	
<i>Adapted from McLean and Osei-Frimpong (2019)</i>	
I find that receiving advertising on a smart speaker is enjoyable	0.904
I find that the process of receiving advertising on a smart speaker is entertaining	0.947
I find that receiving advertising on a smart speaker is fun to interact with	0.907

Table 3.
Reliability and
validity test for the
complete data

(continued)

Table 3.

Adapted item description	Loadings
<i>Acceptance (ACC) $\alpha = 0.957$; CR = 0.972; AVE = 0.921</i>	
<i>Adapted from Parreño et al. (2013)</i>	
I feel positive about the idea of receiving advertising on a smart speaker	0.962
I am willing to receive advertising on a smart speaker in the future	0.949
I would listen to all advertising on smart devices in the future	0.967
<i>Privacy risk (PR) $\alpha = 0.876$; CR = 0.921; AVE = 0.796</i>	
<i>Adapted from McLean and Osei-Frimpong (2019)</i>	
I find that one of my concerns is doing financial transactions via smart speakers	0.908
I find I have some doubts over the confidentiality of my interactions with the smart speaker	0.881
I am concerned that my personal details that will be stored in the smart speaker could be stolen	0.888

Construct	AD acceptance	AD format	AD functionality	AD relevance	Hedonic motivation	Priv. risk	Smart device ease of use
AD format	0.635						
AD functionality	0.528	0.785					
AD relevance	0.645	0.772	0.772				
Hedonic motivation	0.896	0.666	0.538	0.647			
Priv. risk	0.103	0.109	0.163	0.062	0.109		
Smart device ease of use	0.367	0.386	0.336	0.383	0.421	0.072	
Smart device usefulness	0.560	0.528	0.465	0.471	0.564	0.088	0.509

Table 4.
Heterotrait-monotrait ratio criterion

on hedonic motivations. Both relationships were found to have a significant impact. However, only the effect between ad format and hedonic motivations is considered a medium effect.

Smart speaker usefulness ($\beta = 0.127, p < 0.01$) and hedonic motivations ($\beta = 0.772, p < 0.01$) were also found to exert a positive and significant impact on ad acceptance. However, only hedonic motivation is considered to have a strong effect. The results show that privacy risk has a negative moderator role in the relationship between smart speaker ease of use and smart speaker usefulness ($\beta = -0.111, p < 0.05$), thus supporting *H3*. A simple slope analysis was also conducted for clear visualization of the moderating effects. Figure 3 shows that a high level of privacy risk decreases the effect of smart speaker usefulness on smart speaker ease of use, thus reinforcing *H3*.

5.4 Mediation analysis

All direct relations with ad acceptance are supported according to the total indirect effects. The bootstrap analysis shows that all the indirect effects are significant, namely, smart speaker ease of use ($\beta = 0.045, p < 0.01$), ad functionality ($\beta = 0.029, p < 0.01$), ad format ($\beta = 0.327, p < 0.01$) and ad relevance ($\beta = 0.238, p < 0.01$). To test for partial or full mediation, the variance-accounted-for (VAF) threshold values were used. When a VAF is lower than 20% there is no mediation, a value between 20% and 80% represents partial

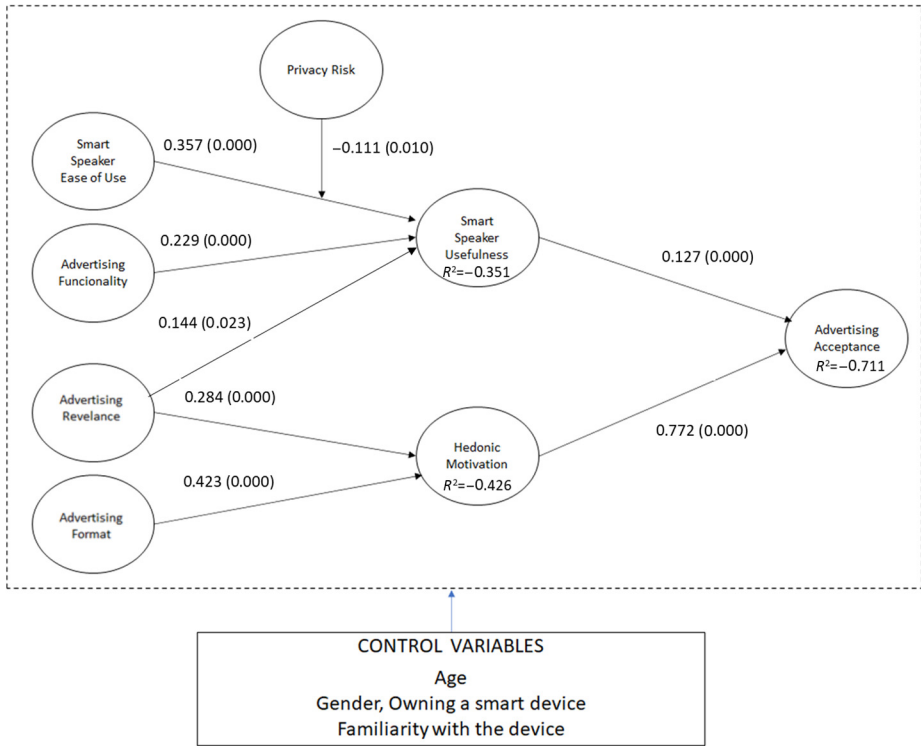


Figure 2.
PLS-SEM results of
the conceptual model

Relationship	Std β	p -value	Confidence interval		f^2
			LL	UL	
Smart speaker ease of use \rightarrow Smart speaker usefulness	0.357	0.000***	0.251	0.449	0.171
Ad functionality \rightarrow Smart speaker usefulness	0.229	0.000***	0.118	0.339	0.043
Ad relevance \rightarrow Smart speaker usefulness	0.144	0.023**	0.025	0.257	0.017
Smart speaker usefulness \rightarrow Ad acceptance	0.127	0.000***	0.057	0.201	0.041
Ad relevance \rightarrow Hedonic motivation	0.284	0.000***	0.138	0.431	0.074
Ad format \rightarrow Hedonic motivation	0.423	0.000***	0.268	0.553	0.163
Hedonic motivation \rightarrow Ad acceptance	0.772	0.000***	0.706	0.827	1.522
Privacy risk*(Smart speaker ease of use \rightarrow Smart speaker usefulness)	-0.111	0.010**	-0.194	-0.038	0.025

Variance explained: (R^2): Smart speaker usefulness ($R^2 = 0.351$); Hedonic motivation ($R^2 = 0.426$); Ad acceptance ($R^2 = 0.711$)
 Predicted validity (Q^2): Smart speaker usefulness ($Q^2 = 0.262$); Hedonic motivation ($Q^2 = 0.355$); Ad acceptance ($Q^2 = 0.648$)

Table 5.
PLS-SEM results

Notes: LL = lower limit; UP = upper limit

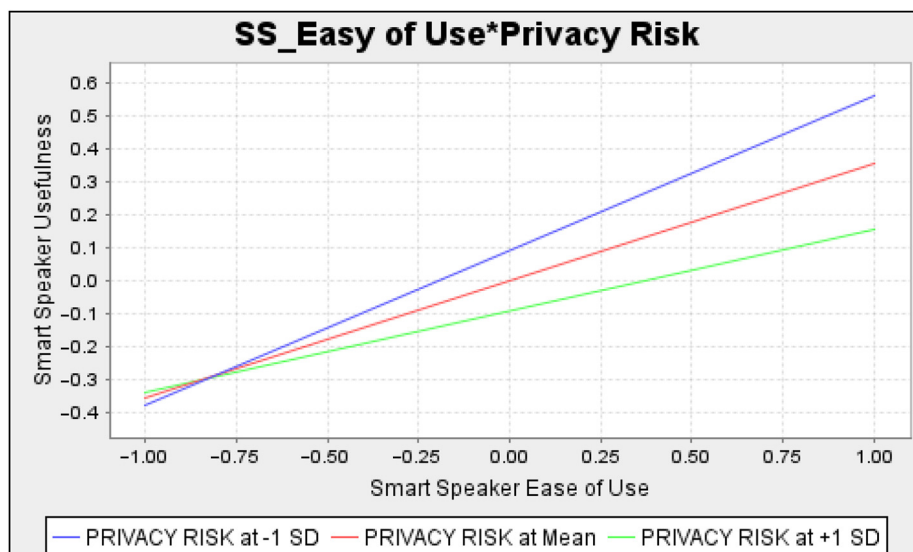


Figure 3.
Moderating effects of
privacy risk

mediation and values above 80% account for full mediation (Nitzl *et al.*, 2016). According to the ratio of the indirect-to-total effect VAF, most of the ratios are above 20% and below 80%, which suggests there is partial mediation in all relationships, except in the relationship between ad relevance → smart speaker usefulness → ad acceptance where there is no mediation (Helm *et al.*, 2010). The indirect effects with 95% confidence intervals do not include 0, which also indicates that mediation exists (Preacher and Hayes, 2008). Table 6 shows the total indirect effects, and Table 7 shows the specific indirect effects.

5.5 Control measures

Regarding the control variables of age and gender, a multigroup analysis (MGA) revealed there were no differences between age groups and gender groups (Appendix).

Although participants were exposed to a video showing how a consumer can engage with a smart device so that they could form a perception of how such an experience could affect their ad acceptance, some of them were not familiar with what a smart assistant was before watching the video and some did not have a smart device. Therefore, the same MGA test was performed to compare participants that owned a smart device with those who did

Relationships	Std. β	Std. error	p -value	Confidence interval (BC)	
				LL	UL
Smart speaker ease of use → Ad acceptance	0.045	0.014	0.002	0.019	0.076
Ad functionality → Ad acceptance	0.029	0.011	0.012	0.011	0.055
Ad relevance → Ad acceptance	0.238	0.062	0.000	0.117	0.359
Ad format → Ad acceptance	0.327	0.058	0.000	0.204	0.430

Notes: LL = lower limit; UP = upper limit

Table 6.
Total indirect effects

Table 7.
Specific indirect
effects

Relationship	Std. β	Std. error	<i>p</i> - value	Confidence interval (BC)		VAF (%)	Mediation results
				LL	UL		
Smart speaker ease of use → Smart speaker usefulness → Ad acceptance	0.045	0.014	0.002	0.019	0.076	50.18	Partial mediation
Ad functionality → Smart speaker usefulness → Ad acceptance	0.029	0.011	0.012	0.011	0.055	50.00	Partial mediation
Ad relevance → Smart speaker usefulness → Ad acceptance	0.018	0.010	0.075	0.004	0.045	7.13	No mediation
Ad format → Hedonic motivation → Ad acceptance	0.327	0.058	0.000	0.204	0.430	49.96	Partial mediation
Ad relevance → Hedonic motivation → Ad acceptance	0.219	0.060	0.000	0.104	0.337	44.58	Partial mediation

Notes: LL = lower limit; UP = upper limit

not and for participants familiar or not with smart devices. The results from the MGA presented in [Appendix](#) show no significant differences in the relationships in the model for people with and without any prior experience with smart devices and for people that owned a smart device or not.

6. Discussion

[Bakr et al. \(2019\)](#) argue that channel acceptance is important in affecting ad acceptance. The current study shows there is a positive influence of smart device ease of use on smart speaker usefulness, which agrees with TAM theories ([Davis, 1989](#)) and supports *H1a*. The study also shows that this effect is moderated by privacy risk known to affect individual attitudes toward smart devices ([O’Flaherty, 2018](#); [McLean and Osei-Frimpong, 2019](#)). This evidence supports *H3*. Indeed, as privacy risk increases, the effect of smart speaker ease of use on smart speaker usefulness decreases, which shows that privacy risks affect smart speakers’ usefulness because of consumers’ concerns about their data ([Cha et al., 2021](#)).

Perceived ad functionality was also found to have a positive impact on smart speakers’ usefulness, thus supporting *H1b*. The perceived level of control and utilitarian benefits from interacting with the smart speaker led to increased usefulness, in line with previous studies about smart speaker usage ([Smith, 2020](#); [Poushneh, 2021](#)). Ad relevance was also found to be a significant driver of smart speaker usefulness because of how the message is aligned with consumer preferences and needs ([Rajala and Westerland, 2010](#)). This result supports *H1c*. Smart speaker usefulness directly influences ad acceptance (supporting *H2*) and is found to be a partial mediator of the relationship between smart speaker ease of use and ad functionality. However, ad relevance directly influences ad acceptance but not via smart device usefulness. These results agree with studies showing that users are likely to accept ads via smart speakers, particularly if they have power over what is being promoted, such as the option to pause, save or even post the message ([Smith, 2020](#)).

The study showed that ad format not only has a strong effect on hedonic motivations (supporting *H4b*) but also a strong impact on ad acceptance via hedonic motivations as a partial mediator. This is in line with the literature on ad acceptance in general ([Dix et al., 2017](#); [Al Khasawneh and Shuhaiber, 2013](#)). Perceived ad format has a positive impact on

hedonic motivations, which are characterized as positive emotions. This occurs when the message content matches consumers' preferences, triggering positive emotions and bringing benefits to the consumers, resulting in increased ad acceptance, as demonstrated by the indirect impact.

Ad relevance was also found to correlate with hedonic motivations, thus supporting *H4a*, which suggests that ads must be viewed as pertinent, significant, useful, valuable and relevant to consumers' needs and interests to increase the enjoyment derived from such interactions (Salois and Reilly, 2014). Hedonic motivations were also found to influence ad acceptance positively (supporting *H5*), which agrees with past studies on the role of emotions in ads (Bauer *et al.*, 2005; Petrovici *et al.*, 2007; Pollay and Mittal, 1993). Indeed, hedonic motivations were found to be partial mediators of the relationship between ad relevance and ad format, meaning that although ad relevance and format affect ad acceptance directly, some of the effects are explained by the enjoyment of receiving ad via the smart device.

7. Conclusion

In the current study, we have learned that smart speakers can be a valuable channel to spread brand communication via ad messages. Although today, most smart speakers are still on-demand devices that perform tasks requested by users, some manufacturers are already testing some ad capabilities. This study shows that consumers are willing to accept such messages if they are useful and if ad format and relevance have hedonic purposes.

7.1 Theoretical implications

The current study makes two theoretical contributions. First, it explores the factors that affect advertisement acceptance via smart speakers as a communication channel. Past ad research has mainly centered on exploring smart devices as a tool for engaging with consumers and not for ad (Brill *et al.*, 2019; Hoy, 2018; Jones, 2018; Kowalczyk, 2018; McLean and Osei-Frimpong, 2019; Moriuchi, 2019). Indeed, this study is the first to address the issue of ad acceptance using smart devices and sheds some light on the most relevant factors affecting such behavior. Ease of use and functionality of the ad were found to affect the perception of smart speaker usefulness, while ad format and relevance played a role in the hedonic motivation to explore the device. Both were found to influence ad acceptance via smart speakers. A second contribution shows that ad acceptance is mediated by smart speaker usefulness and hedonic motivations with strong relationships between the antecedents (smart speaker ease of use, ad functionality, ad format and ad relevance) and the mediators and consequently with ad acceptance. Finally, the study demonstrates that there is a negative moderating effect of privacy risk between ease of use and smart speaker perceived usefulness, meaning that as consumers perceive their privacy to be at risk, they also perceive the smart device as being less useful, which then affects ad acceptance.

7.2 Managerial implications

The current study offers useful information for businesses and public administration officers who want to connect with their customers/citizens via smart devices. First, the managerial contributions are important for device manufacturers. The results highlight that the device's ease of use is fundamental for users to accept ad through these devices. Therefore, although smart speaker manufacturers are continually improving their offering, one of the key aims should be to keep the interaction with consumers as easy as possible, despite the increasing complexity of services available. For example, today most devices still require a wake word to be said before a conversation starts, such as "Hey Google [...]" or "Alexa [...]". We suggest that future developments should increase the level of

interaction and dialog between the user and the smart speaker. For example, using audio sensors, the intelligent device can capture movement in its surroundings and trigger a dialog rather than pushing the ad after a request. Such a dialog can, for example, trigger a recommendation for a specific coffee shop after the consumer wakes up. The same can be done using an embedded camera that can recognize the person(s) in the room.

Second, the managerial contributions are useful for brands/public administration entities that want to advertise their products or services via such devices. The functionality, the message format and its relevance are also fundamental drivers of ad acceptance via smart devices. This kind of device has enough information to create engaging, interactive and relevant ad content based on past behavior and relationships established between the user and the speaker. Therefore, brands must concentrate on designing interactive content that is functional and relevant to the audience to increase ad acceptance. For example, instead of promoting a random product in a coffee shop, the ad could focus on promoting the drinks and food that could be more appealing to the specific user, allowing the user to ask for more information about the promoted products.

A final managerial contribution regards the privacy concerns expressed by consumers in the current study. Previous studies suggest a personalization-privacy paradox in which personalized content can diminish consumer responses because of the risks of privacy breach (Aguirre *et al.*, 2016). We show that this paradoxical effect is present in the willingness to accept smart speaker ad, namely, because privacy risks decrease the perceived usefulness of receiving ad via smart devices. Therefore, managers should take care in how they personalize ad messages so that they do not enter the consumer's private sphere without their consent (Table 8).

8. Limitations and future research

Despite the study's contributions, some limitations can be explored in future research. First, because this is a nascent area, many consumers still do not own a smart device. This effect is seen in our sample, although our MGA did not reveal differences between owners and nonowners. Future research can replicate our findings with a larger sample of users, as more and more consumers purchase this kind of device and use it for their daily tasks. Second, consumers were asked to recall the last advertisement they remember and imagine it being

Conclusions	Theoretical and managerial implications
<ul style="list-style-type: none"> ● Smart speakers can be a valuable channel to spread brand communication via advertising messages ● Consumers are willing to accept ad messages if they are useful ● Consumers are willing to accept ad messages via smart speakers if the ad is entertaining and the ad has relevance to them 	<ul style="list-style-type: none"> ● Consider increasing the ease of use and functionality of the ad to increase smart speaker usefulness ● Make sure ads are relevant to the user to increase hedonic motivation, which will lead to smart device acceptance ● Be transparent on privacy risks because of its negative effect on smart speaker perceived usefulness ● Managers should keep the interaction of smart devices with the consumers as easy as possible, despite the increasing complexity of services available ● Managers should design interactive content that allows the user to search for more information about the product ● Managers should create ads that appeal to the specific needs and behaviors of consumers

Table 8.
Conclusions,
theoretical and
managerial
implications

communicated via the smart speaker. One of the limitations of this approach is that participants can have different perceptions of how ad could be communicated via smart speakers. Therefore, a future study can use experiments with real examples of ad via smart speakers to confirm the results. The current study also focused on the general use of smart devices without considering the tone of voice or smart device gender. Future research could explore whether AI agents with different genders and tone of voice influence ad acceptance via these devices.

References

- Adobe (2020), "Adobe: smart speakers less intrusive, more effective Ad platform", available at: www.insideradio.com/free/adobe-smart-speakers-less-intrusive-more-effective-ad-platform/article_143a35e2-fd5a-11ea-9a12-9b2a9c251ac3.html (accessed 7 May 2021).
- Aguirre, E., Roggeveen, A., Grewal, D. and Wetzels, M.G.M. (2016), "The personalization-privacy paradox: implications for new media", *Journal of Consumer Marketing*, Vol. 33 No. 2, pp. 98-110.
- Al Khasawneh, M. and Shuhaiber, A. (2013), "A comprehensive model of factors influencing consumer attitude towards and acceptance of SMS advertising: an empirical investigation in Jordan", *International Journal of Sales and Marketing Management Research and Development*, Vol. 3 No. 2, pp. 1-22.
- Alalwan, A.A. (2018), "Investigating the impact of social media advertising features on customer purchase intention", *International Journal of Information Management*, Vol. 42, pp. 65-77.
- Al-Shbiel, S.O. and Ahmad, M.A. (2016), "A theoretical discussion of electronic banking' in Jordan by integrating technology acceptance model and theory of planned behavior", *International Journal of Academic Research in Accounting, Finance and Management Sciences*, Vol. 6 No. 3, pp. 272-284.
- Amazon (2021), www.amazon.com/Alexa-Privacy-Hub/b?ie=UTF8&node=19149155011 (accessed 29 April 2021).
- Anubha, and Shome, S. (2021), "Customer engagement and advertising effectiveness: a moderated mediating analysis", *Journal of Internet Commerce*, Vol. 20 No. 4, pp. 409-449.
- Ashfaq, M., Yun, J. and Yu, S. (2021), "My smart speaker is cool! Perceived coolness, perceived values, and users' attitude toward smart speakers", *International Journal of Human – Computer Interaction.*, Vol. 37 No. 6, pp. 560-573.
- Bakr, Y., Tolba, A. and Meshreki, H. (2019), "Drivers of SMS advertising acceptance: a mixed-methods approach", *Journal of Research in Interactive Marketing*, Vol. 13 No. 1, pp. 96-118.
- Bauer, H.H., Reichardt, T., Barnes, S.J. and Marcus, M.N. (2005), "Driving consumer acceptance of location-based services in mobile applications: a theoretical framework and an empirical study", *Journal of Electronic Commerce Research*, Vol. 6 No. 3, pp. 181-192.
- Belanche, D., Flavián, C. and Pérez-Rueda, A. (2017a), "Understanding interactive online advertising: congruence and product involvement in highly and lowly arousing, skippable video ads", *Journal of Interactive Marketing*, Vol. 37, pp. 75-88.
- Belanche, D., Flavián, C. and Pérez-Rueda, A. (2017b), "User adaptation to interactive advertising formats: the effect of previous exposure, habit and time urgency on ad skipping behaviors", *Telematics and Informatics*, Vol. 34 No. 7, pp. 961-972.
- Belanche, D., Casaló, L.V., Flavián, C. and Schepers, J. (2020), "Service robot implementation: a theoretical framework and research agenda", *The Service Industries Journal*, Vol. 40 Nos 3/4, pp. 203-225.
- Brill, T.M., Munoz, L. and Miller, R.J. (2019), "Siri, alexa, and other digital assistants: a study of customer satisfaction with artificial intelligence applications", *Journal of Marketing Management*, Vol. 35 Nos 15/16, pp. 1401-1436.

- Carroll, A., Barnes, S.J. and Scornavacca, E. (2008), "Consumer perceptions and attitudes towards mobile marketing", in Jairo Gutierrez (Ed.), *Selected Readings on Telecommunications and Networking*, IGI Global, Hershey, PA, pp. 357-368.
- Cha, H.S., Wi, J.H., Park, C. and Kim, T. (2021), "Sustainability calculus in adopting smart speakers – personalized services and privacy risks", *Sustainability*, Vol. 13 No. 2, p. 602.
- Cho, H., Roh, S. and Park, B. (2019), "Of promoting networking and protecting privacy: effects of defaults and regulatory focus on social media users' preference settings", *Computers in Human Behavior*, Vol. 101, pp. 1-13.
- Connolly, R. and Bannister, F. (2007), "Consumer trust in internet shopping in Ireland: towards the development of a more effective trust measurement instrument", *Journal of Information Technology*, Vol. 22 No. 2, pp. 102-118.
- Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319-339.
- Dix, S., Phau, I., Jamieson, K. and Shimul, A.S. (2017), "Investigating the drivers of consumer acceptance and response of SMS advertising", *Journal of Promotion Management*, Vol. 23 No. 1, pp. 62-79.
- Donahue, L. and Hajizadeh, F. (2019), "Artificial intelligence in cloud marketing", in Stephan S. Jones and Frank M. Groom (Eds), *Artificial Intelligence and Machine Learning for Business for Non-Engineers*, CRC Press, pp. 77-88.
- Ducoffe, R.H. (1996), "Advertising value and advertising the web", *Journal of Advertising Research*, pp. 21-35.
- Flavián, C. and Casaló, L.V. (2021), "Artificial intelligence in services: current trends, benefits and challenges", *The Service Industries Journal*, Vol. 41 Nos 13/14, pp. 853-859.
- Flavián, C., Pérez-Rueda, A., Belanche, D. and Casaló, L.V. (2022), "Intention to use analytical artificial intelligence (AI) in services – the effect of technology readiness and awareness", *Journal of Service Management*, Vol. 33 No. 2, pp. 293-320.
- Google (2021), <https://support.google.com/googlenest/answer/7072285?hl=en> (accessed 29 April 2021).
- Hair, J., Black, W., Babin, B. and Anderson, R. (2010), *Multivariate Data Analysis*, Prentice Hall. London.
- Hair, J., Hollingsworth, C.L., Randolph, A.B., Chong, and A.Y.,L. (2017), "An updated and expanded assessment of PLS-SEM in information systems research", *Industrial Management and Data Systems*, Vol. 117 No. 3, pp. 442-458.
- Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M. (2019), "When to use and how to report the results of PLS-SEM", *European Business Review*, Vol. 31 No. 1, pp. 2-24.
- Hair, J.F., Sarstedt, M., Ringle, C.M. and Mena, J.A. (2012), "An assessment of the use of partial least squares structural equation modeling in marketing research", *Journal of the Academy of Marketing Science*, Vol. 40 No. 3, pp. 414-433.
- Haq, Z.U. (2009), "E-mail advertising: a study of consumer attitude toward e-mail advertising among indian users", *Journal of Retail and Leisure Property*, Vol. 8 No. 3, pp. 207-223.
- Havard, C.T., Ferrucci, P. and Ryan, T.D. (2021), "Does messaging matter? Investigating the influence of media headlines on perceptions and attitudes of the in-group and out-group", *Journal of Marketing Communications*, Vol. 27 No. 1, pp. 20-30.
- Heinonen, K. and Strandvik, T. (2007), "Consumer responsiveness to mobile marketing", *International Journal of Mobile Communications*, Vol. 5 No. 6, pp. 603-617.
- Helm, S., Eggert, A. and Garnefeld, I. (2010), "Modeling the impact of corporate reputation on customer satisfaction and loyalty using partial least squares", in *Handbook of Partial Least Squares*, Springer, Berlin, Heidelberg, pp. 515-534.
- Henseler, J., Hubona, G. and Ray, P.A. (2016), "Using PLS path modeling in new technology research: updated guidelines", *Industrial Management and Data Systems*, Vol. 116 No. 1, pp. 2-20.

- Henseler, J., Ringle, C.M. and Sarstedt, M. (2015), "A new criterion for assessing discriminant validity in variance-based structural equation modeling", *Journal of the Academy of Marketing Science*, Vol. 43 No. 1, pp. 115-135.
- Henseler, J., Ringle, C.M. and Sinkovics, R.R. (2009), "The use of partial least squares path modeling in international marketing", *Advances in International Marketing*, Vol. 20, pp. 277-319.
- Hoy, M.B. (2018), "Alexa, siri, cortana, and more: an introduction to voice assistants", *Medical Reference Services Quarterly*, Vol. 37 No. 1, pp. 81-88.
- Insider Intelligence (2022), www.insiderintelligence.com/insights/digital-advertising-market-trends-predictions/ (accessed September 2022).
- Jones, V.K. (2018), "Voice-activated change: marketing in the age of artificial intelligence and virtual assistants", *Journal of Brand Strategy*, Vol. 7 No. 3, pp. 233-245.
- Ju, J., Kim, D., Park, K., Park, Y., Yun, J. and Ahn, J.H. (2017), "Is advertising on an AI speaker effective? The role of interactivity, product type, and thematic congruence", *ACM International Conference Proceeding Series*, 360-365.
- Kang, H. and Kim, K.J. (2020), "Feeling connected to smart objects? A moderated mediation model of locus of agency, anthropomorphism, and sense of connectedness", *International Journal of Human-Computer Studies*, Vol. 133, pp. 45-55.
- Kietzmann, J., Mills, A.J. and Plangger, K. (2020), "Deepfakes: perspectives on the future "reality" of advertising and branding", *International Journal of Advertising*, Forthcoming, Vol. 40 No. 3, pp. 1-13.
- Kim, H.Y., Lee, J.Y., Mun, J.M. and Johnson, K.K.P. (2017), "Consumer adoption of smart in-store technology: assessing the predictive value of attitude versus beliefs in the technology acceptance model", *International Journal of Fashion Design, Technology and Education*, Vol. 10 No. 1, pp. 26-36.
- Kock, N. and Lynn, G. (2012), "Lateral collinearity and misleading results in variance-based SEM: an illustration and recommendations", *Journal of the Association for Information Systems*, Vol. 13 No. 7, pp. 1-40.
- Kowalczyk, P. (2018), "Consumer acceptance of smart speakers: a mixed methods approach", *Journal of Research in Interactive Marketing*, Vol. 12 No. 4, pp. 418-431.
- Lee, M.C. (2009), "Factors influencing the adoption of internet banking: an integration of TAM and TPB with perceived risk and perceived benefit", *Electronic Commerce Research and Applications*, Vol. 8 No. 3, pp. 130-141.
- Lee, H. and Cho, C.H. (2020), "Digital advertising: present and future prospects", *International Journal of Advertising*, Vol. 39 No. 3, pp. 332-341.
- Lin, C.A. and Kim, T. (2016), "Predicting user response to sponsored advertising on social media via the technology acceptance model", *Computers in Human Behavior*, Vol. 64, pp. 710-718.
- Ling, K.C., Piew, T.H. and Chai, L.T. (2010), "The determinants of consumers' attitude towards advertising", *Canadian Social Science*, Vol. 6 No. 4, pp. 114-126.
- Liu, F., Kanso, A., Zhang, Y. and Olaru, D. (2019), "Culture, perceived value, and advertising acceptance: a cross-cultural study on mobile advertising", *Journal of Promotion Management*, Vol. 25 No. 7, pp. 1028-1058.
- Loureiro, S.M.C., Guerreiro, J. and Tussyadiah, I. (2021a), "Artificial intelligence in business: state of the art and future research agenda", *Journal of Business Research*, Vol. 129, pp. 911-926.
- Loureiro, S.M.C., Japutra, A., Molinillo, S. and Bilro, R.G. (2021b), "Stand by me: analyzing the tourist-intelligent voice assistant relationship quality", *International Journal of Contemporary Hospitality Management*, Vol. 33 No. 11, pp. 3840-3859.
- McLean, G. and Osei-Frimpong, K. (2019), "Hey alexa . . . examine the variables influencing the use of artificial intelligent in-home voice assistants", *Computers in Human Behavior*, Vol. 99, pp. 28-37.

- McLean, G., Osei-Frimpong, K. and Barhorst, J. (2021), "Alexa, do voice assistants influence consumer brand engagement? – examining the role of AI powered voice assistants in influencing consumer brand engagement", *Journal of Business Research*, Vol. 124, pp. 312-328.
- Mari, A. (2019), "Voice commerce: understanding shopping-related voice assistants and their effect on brands", *IMMAA Annual Conference*. Northwestern University in Qatar, Doha (Qatar), October, 2.
- MarketingDive (2022), "Google brings ads to assistant search results", available at: www.marketingdive.com/news/google-brings-ads-to-assistant-search-results/552206/ (accessed 18 May 2022).
- Merisavo, M., Kajalo, S., Karjaluoto, H., Virtanen, V., Salmenkivi, S., Raulas, M. and Leppäniemi, M. (2007), "An empirical study of the drivers of consumer acceptance of mobile advertising", *Journal of Interactive Advertising*, Vol. 7 No. 2, pp. 41-50.
- Moriuchi, E. (2019), "Okay, google!: An empirical study on voice assistants on consumer engagement and loyalty", *Psychology and Marketing*, Vol. 36 No. 5, pp. 489-501.
- Nitzl, C., Roldan, J.L. and Cepeda, G. (2016), "Mediation analysis in partial least squares path modeling: helping researchers discuss more sophisticated models", *Industrial Management and Data Systems*, Vol. 116 No. 9, pp. 1849-1864.
- O'Flaherty, K. (2018), "How to secure the amazon echo", Forbes Online, available at: www.forbes.com/sites/kateoflahertyuk/2018/05/25/amazon-alexa-security-how-secure-are-voice-assistants-and-how-can-you-protect-yourself/#39bab1f13734 (accessed 17 May 2021).
- Park, K., Kwak, C., Lee, J. and Ahn, J.H. (2018), "The effect of platform characteristics on the adoption of smart speakers: empirical evidence in South Korea", *Telematics and Informatics*, Vol. 35 No. 8, pp. 2118-2132.
- Parreño, J.M., Sanz-Blas, S., Ruiz-Mafé, C. and Aldás-Manzano, J. (2013), "Key factors of teenagers' mobile advertising acceptance", *Industrial Management and Data Systems*, Vol. 113 No. 5, pp. 732-749.
- Pavlou, P.A. and Stewart, D.W. (2000), "Measuring the effects and effectiveness of interactive advertising: a research agenda", *Journal of Interactive Advertising*, Vol. 1 No. 1, pp. 61-77.
- Petrovici, D., Marinova, S., Marionv, M. and Lee, N. (2007), "Personal uses and perceived social and economic effects of advertising in Bulgaria and Romania", *International Marketing Review*, Vol. 24 No. 5, pp. 539-562.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879-903.
- Pollay, R. and Mittal, B. (1993), "Here' s the beef: and factors", *Determinants, Segments" Consumer Criticism of Advertising*, Vol. 57 No. 3, pp. 99-114.
- Poushneh, A. (2021), "Humanizing voice assistant: the impact of voice assistant personality on consumers' attitudes and behaviors", *Journal of Retailing and Consumer Services*, Vol. 58, p. 102283.
- Preacher, K.J. and Hayes, A.F. (2008), *Assessing Mediation in Communication Research*, London.
- Qin, X. and Jiang, Z. (2019), "The impact of AI on the advertising process: the chinese experience", *Journal of Advertising*, Vol. 48 No. 4, pp. 338-346.
- Rajala, R. and Westerlund, M. (2010), "Antecedents to consumers' acceptance of mobile advertisements – A hierarchical construct PLS structural equation model", *Proceedings of the Annual HI International Conference on System Sciences*, 1-10.
- Rauschnabel, P.A., He, J. and Ro, Y.K. (2018), "Antecedents to the adoption of augmented reality smart glasses: a closer look at privacy risks", *Journal of Business Research*, Vol. 92, pp. 374-384.
- Richter, G., Cepeda Carrión, J.L., Roldán, C. and Ringle, M. (2016), "European management research using partial least squares structural equation modeling (PLS-SEM)", *Editorial European Management Journal*, Vol. 34 No. 6, pp. 589-597.
- Salois, M.J. and Reilly, A. (2014), "Consumer response to perceived value and generic advertising", *Agricultural and Resource Economics Review*, Vol. 43 No. 1, pp. 17-30.

- Sarstedt, M., Hair, J.F., Ringle, C.M., Thiele, K.O. and Gudergan, S.P. (2016), "Estimation issues with PLS and CBSEM: where the bias lies!", *Journal of Business Research*, Vol. 69 No. 10, pp. 3998-4010.
- Schepers, J. and Wetzels, M. (2007), "A meta-analysis of the technology acceptance model: investigating subjective norm and moderation effects", *Information and Management*, Vol. 44 No. 1, pp. 90-103.
- Schweitzer, F., Belk, R., Jordan, W. and Ortner, M. (2019), "Servant, friend or master? The relationships users build with voice-controlled smart devices", *Journal of Marketing Management*, Vol. 35 Nos 7/8, pp. 693-715.
- Smith, K. (2020), "Marketing via smart speakers: what should alexa say?", *Journal of Strategic Marketing*, Vol. 28 No. 4, pp. 350-365.
- Smith, R.E., Mackenzie, S.B., Yang, X., Buchholz, L.M. and Darley, W.K. (2007), "Modeling the determinants and effects of creativity in advertising", *Marketing Science*, Vol. 26 No. 6, pp. 819-833.
- Statista (2020), "Artificial intelligence software market growth forecast worldwide 2019-2025", available at: www.statista.com/statistics/607960/worldwide-artificial-intelligence-market-growth/ (accessed 17 May 2021).
- Statista (2022a), "Smart home device household penetration in the United States in 2019 and 2021", available at: www.statista.com/statistics/1247351/smart-home-device-us-household-penetration/ (accessed 18 May 2022).
- Statista (2022b), "Smart or connected device use among adults in the United States as of July 2020, by age group", available at: www.statista.com/statistics/1201178/united-states-smart-home-device-usage-by-age/ (accessed 18 May 2022).
- Sujata, J., Aniket, D. and Mahasingh, M. (2019), "Artificial intelligence tools for enhancing customer experience", *International Journal of Recent Technology and Engineering*, Vol. 8 No. 2, pp. 700-706.
- Tassiello, V., Tillotson, J.S. and Rome, A.S. (2021), "Alexa, order me a pizza!": the mediating role of psychological power in the consumer-voice assistant interaction", *Psychology and Marketing*, Vol. 38 No. 7, pp. 1069-1080.
- Taylor, C.R. and Carlson, L. (2021), "The future of advertising research: new directions and research needs", *Journal of Marketing Theory and Practice*, Vol. 29 No. 1, pp. 51-62.
- Vakratsas, D. and Wang, X. (2020), "Artificial intelligence in advertising creativity", ~ *Journal of Advertising*, Vol. 50 No. 1, pp. 39-51.
- van Esch, P.V., Cui, Y. and Jain, S.P. (2021), "Stimulating or intimidating: the effect of AI-enabled in-store communication on consumer patronage likelihood", *Journal of Advertising*, Vol. 50 No. 1, pp. 63-80.
- Venkatesh, V., Thong, J. and Xu, X. (2012), "Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology", *MIS Quarterly: Management Information Systems*, Vol. 36 No. 1, pp. 157-178.
- Voicebot, A.I. (2022), "Amazon makes alexa audio ads more interactive", available at: <https://voicebot.ai/2021/10/29/amazon-makes-alexa-audio-ads-more-interactive/> (accessed 18 May 2022).
- Walter, Z. and Lopez, M.S. (2008), "Physician acceptance of information technologies: role of perceived threat to professional autonomy", *Decision Support Systems*, Vol. 46 No. 1, pp. 206-215.
- Youtube (2020), "Go shopping with alexa", available at: www.youtube.com/watch?v=iQD2waZNCao (accessed 15 July 2022).

Relationship	Age			Gender			Owning a smart speaker		Familiarity groups			
	Coef.-diff (1-2)	Coef.-diff (1-3)	Coef.-diff (2-3)	p-value (1-2)	p-value (1-3)	p-value (2-3)	Coef.-diff	p-value	Coef.-diff	p-value		
AD format → Hedonic motivations	-0.303	-0.245	0.058	0.050	0.135	0.707	0.126	0.384	0.030	0.821	-0.070	0.611
AD functionality → Smart speaker usefulness	-0.042	0.229	0.187	0.750	0.184	0.220	-0.032	0.825	0.020	0.868	0.078	0.509
AD relevance → Hedonic motivations	0.202	0.192	-0.010	0.238	0.320	0.941	-0.023	0.901	-0.085	0.595	0.007	0.954
AD relevance → Smart speaker usefulness	-0.135	-0.227	-0.091	0.399	0.199	0.564	-0.109	0.431	0.187	0.124	0.023	0.883
Hedonic motivations → AD acceptance	-0.029	0.034	0.063	0.663	0.654	0.432	-0.005	0.975	0.081	0.221	-0.062	0.314
Smart speaker ease of use * privacy risk → Smart speaker usefulness	-0.003	0.064	0.067	0.981	0.503	0.536	0.077	0.375	-0.033	0.757	-0.044	0.587
Smart speaker ease of use → Smart speaker usefulness	0.051	-0.124	-0.175	0.675	0.330	0.191	0.167	0.114	-0.085	0.476	-0.108	0.306
Smart speaker usefulness → AD acceptance	0.012	-0.004	-0.016	0.886	0.961	0.860	-0.077	0.352	-0.052	0.505	0.074	0.333

Table A1.
MGA results for control groups

Corresponding author

João Guerreiro can be contacted at: joao.guerreiro@iscte-iul.pt

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgroupublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com