Technological Forecasting & Social Change 191 (2023) 122514

Contents lists available at ScienceDirect

Technological Forecasting & Social Change

journal homepage: www.elsevier.com/locate/techfore

Mobile-assisted showrooming behavior and the (r)evolution of retail: The moderating effect of gender on the adoption of mobile augmented reality

María Alesanco-Llorente [a], Eva Reinares-Lara [b], Jorge Pelegrín-Borondo [a], Cristina Olarte-Pascual [a,*]

[a] Department of Business Administration, Universidad de La Rioja, Facultad de Ciencias Empresariales, La Cigüeña 60, 26006 Logroño, La Rioja, Spain
[b] Department of Business Administration, Universidad Rey Juan Carlos, Facultad de Ciencias Jurídicas y Sociales, Paseo Artilleros s/n. 28032, Vicálvaro, Madrid, Spain

ARTICLE INFO

Keywords:
CAN model
Gender
Mobile augmented reality
Mobile-assisted showroomer
Physical stores
Smartphones

ABSTRACT

The intensive use of smartphones at physical stores has given rise to an increasingly common behavior among omnichannel consumers known as mobile-assisted showrooming (MAS). One of the technologies with the greatest capacity to engage MAS consumers at brick-and-mortar stores is mobile augmented reality (MAR). Studying this combination of customer technology (smartphone) and store technology (MAR) is thus key to reviving physical retail. In this context, this paper tests a Cognitive-Affective-Normative model to explain the intention of MAS consumers to use MAR in a physical store and analyze the moderating effect of gender on this relationship. The model is tested on a sample of 388 MAS men and 417 MAS women. The results show that the main antecedents for MAS men come from the model's cognitive dimension ("performance expectancy," "effort expectancy"), while MAS women's acceptance is most conditioned by the cognitive dimension ("performance expectancy") and normative dimension ("social influence"). These findings have theoretical implications for reviving the physical retail sector taking gender differences into account.

1. Introduction

The intensive use of smartphones at physical stores has given rise to an increasingly common behavior among omnichannel consumers known as mobile-assisted showrooming (MAS) (Fiestas and Tuzovic, 2021; Flavián et al., 2020; Viejo Fernández et al., 2020). In fact, 86.2 % of consumers claim to have used their smartphones at physical stores (iVend Retail, 2019). The ubiquity of smartphones has, on the one hand, made possible uninterrupted store/brand-customer communication and, on the other, led to the emergence of a new sales channel enabling online purchases even inside brick-and-mortar stores (Viejo Fernández et al., 2020). Additionally, smartphones have evolved into a sort of "third hand" during the shopping experience at physical stores, playing the role of personal assistant and transforming how consumers engage with retailers (Pantano and Priporas, 2016; Schneider and Zielke, 2020; Sit et al., 2018). The smartphone's breakthrough into the shopping journey and the rise of MAS behavior can thus pose a threat to brick-and-mortar retailers that fail to include smartphones in their marketing strategy (Frasquet and Miquel-Romero, 2021).

According to the Spanish Retail Confederation (Confederación Española de Comercio, 2021), 67,500 retail establishments – 15 % of the total number in Spain – shut their doors in 2020, and such closings are expected to increase in the next few years, leading to the disappearance of retail diversity in urban settings (García-Milon et al., 2021). This continued closure, exacerbated by the Covid-19 pandemic, can be explained by the gap between the slow digitization of brick-and-mortar establishments versus the accelerated embrace of digital by consumers, in general, and by MAS consumers, in particular (CORDIS, 2021; Fiestas and Tuzovic, 2021). In fact, for every euro spent at brick-and-mortar stores, 45 euro cents come from digital interactions, yet in Spain only 26.9 % of retailers use technology to communicate with consumers (Instituto Nacional de Estadística, 2021).

A suitable strategic response is thus needed to ensure the survival of brick-and-mortar retailers and their ability to compete in the current retail landscape (Willems et al., 2017). Incorporating smartphone-compatible technologies is crucial to the new business models seeking to reinvent retail and improve existing consumer-retailer interactions.

One of the technologies with the greatest capacity to bridge the

* Corresponding author.
E-mail addresses: maria.alesanco@alum.unirioja.es (M. Alesanco-Llorente), eva.reinares@urjc.es (E. Reinares-Lara), jorge.pelegrin@unirioja.es (J. Pelegrín-Borondo), cristina.olarte@unirioja.es (C. Olarte-Pascual).

https://doi.org/10.1016/j.techfore.2023.122514
Received 18 January 2022; Received in revised form 14 February 2023; Accepted 13 March 2023
Available online 28 March 2023

physical-digital ("phygital") divide and develop the new retailer concept is mobile augmented reality (MAR) (Caboni and Hagberg, 2019). This technology is characterized by its integration of real-world and virtual elements and its ability to simulate 3D (Poushneh, 2018; Watson et al., 2018). MAR is considered a powerful tool for improving in-store service (Von Briel, 2018; Flavián et al., 2019) as it generates more immersive and personal phygital shopping experiences (Bonetti et al., 2018; Dacko, 2017), helping to keep physical stores alive (Berman, 2019). Its potential use would make it possible to reduce purchase uncertainty (Beck and Crié, 2018; Poushneh, 2018) and increase satisfaction and purchase intention (Caboni and Hagberg, 2019), fulfilling a key role in customer loyalty (Brakus et al., 2009; Poushneh, 2018) and engagement (Bonetti et al., 2018; Ogunjimi et al., 2021). Despite the immense potential of MAR during the phygital shopping journey (Brengman et al., 2019; Poushneh, 2018), no previous study has examined MAS consumers' behavioral intention to use it in retail.

The rise of MAS consumers and spread of MAR in retail (Caboni and Hagberg, 2019; Lee and Leonas, 2018; Sit et al., 2018) clearly justify the value of researching them jointly. The study of key variables in MAR acceptance is a research field related to a market valued at 70 billion dollars in 2020 and expected to grow by 51.2 % in the 2020–2030 period (PwC, 2019). Additionally, although previous studies have analyzed MAS consumers' behavior (Viejo Fernández et al., 2020; Fiestas and Tuzovic, 2021), nothing is known about their intention to use MAR at brick-and-mortar stores.

With the aim of advancing knowledge of MAS consumers, this paper tests the Cognitive-Affective-Normative (CAN) theoretical model (Pelegrín-Borondo et al., 2016, 2017) to shed light on consumers' intention to use MAR at physical stores to enhance their shopping experience in an omnichannel environment. Additionally, in the research on new technology adoption modeling, some authors argue that women seek ease of use (Natarajan et al., 2017) and social approval (Lim et al., 2021), while men seek benefits; other studies do not support these findings (Yuan et al., 2016; Wang et al., 2009). Given the potential gender differences (Ameen et al., 2020; Lim et al., 2021; Shao et al., 2019), and in light of the limited research on these differences in the intention to use MAR (Paulo et al., 2018; Lim et al., 2021), this paper also aims to analyze the moderating effect of gender on MAS consumers' intention to use MAR in an omnichannel environment at physical stores.

To this end, this study seeks to respond to the following research questions in the context of the shopping journey:

RQ1. Does the CAN model explain the behavior of this new MAS consumer in terms of his or her use of MAR?

RQ2. What are the determinants of MAS consumers' in-store MAR use?

RQ3. Are there gender-based differences in MAR acceptance?

The answers to these research questions contribute to the theory of consumer behavior modeling with regard to new technology use and further knowledge of the role of gender in this relationship. In this sense, this study is pioneering in showing that the CAN model effectively predicts MAS consumer behavior. The results also show that for MAS men considering using MAR at a physical store, "performance expectancy" is the main factor, followed, at a considerable distance, by "effort expectancy." For these shoppers, the emotional dimensions of "pleasure," "arousal," and "social influence" are not antecedents of use. While for MAS women considering using in-store MAR, "performance expectancy" is also the main factor, the other variable informing their assessment is "social influence," and, unlike men, "effort expectancy" does not influence their intention to use it. From an operational perspective, this paper aims to help retailers close the digital gap in the MAS consumer-physical store interaction, enabling them to improve their service.

2. Literature review and hypothesis development

2.1. Theoretical foundations

To identify the determinants of MAS consumers' intention to use MAR, this research uses the CAN model framework (Pelegrín-Borondo et al., 2016, 2017). The utilitarian and hedonic features that these technologies present in the user experience (Rese et al., 2017) make it possible to incorporate the variables proposed in the model. Table 1 shows the technology acceptance theories and the dimensional model of affect that have shaped the CAN model. It also describes the CAN model variables as adapted to the MAR context. (See Fig. 1.)

Previous studies show that the CAN model's variables are determinant in technology acceptance and consumer behavior (Conner et al., 2017; Reinares-Lara et al., 2018; García-Milon et al., 2020; Subero-Navarro et al., 2022). García-Milon et al. (2021) have already successfully applied the model to the acceptance of smartphone use in purchases by tourists.

Although gender has already been included as a moderating variable

Table 1
Background and definitions of the CAN model variables adapted to MAS consumers and MAR.

	Definition	References
Cognitive		
Performance expectancy	Degree to which using MAR at a physical store will provide benefits to MAS consumers.	TAM (Davis, 1989) C-TAM-TPB (Taylor & Todd, 1995b)
Effort expectancy	Degree of ease associated with the use of MAR at a physical store by MAS consumers.	TAM2 (Venkatesh & Davis, 2000) UTAUT (Venkatesh et al., 2003) TAM3 (Venkatesh & Bala, 2008) UTAUT2 (Venkatesh et al., 2012)
Affective		
Arousal dimension Pleasure dimension	Degree and intensity with which the use of MAR at a physical store generates pleasure and arousal in MAS consumers.	PAT (Russell, 1979)
Normative		
Social influence	Degree to which MAS consumers perceive that important others believe that they should use MAR at a physical store.	TRA (Fishbein & Ajzen, 1975) TPB (Ajzen, 1991) DTPB (Taylor & Todd, 1995a) C-TAM-TPB (Taylor & Todd, 1995b) TAM2 (Venkatesh & Davis, 2000) UTAUT (Venkatesh et al., 2003) TAM3 (Venkatesh & Bala, 2008) UTAUT2 (Venkatesh et al., 2012)

In chronological order: TRA: Theory of Reasoned Action; PAT: Pleasure-Arousal Theory; TAM: Technology Acceptance Model; TPB: Theory of Planned Behavior; DTPB: Decomposed Theory of Planned Behavior; C-TAM-TPB: combination of the TAM model and the TPB; UTAUT: Unified Theory of Acceptance and Use of Technology.

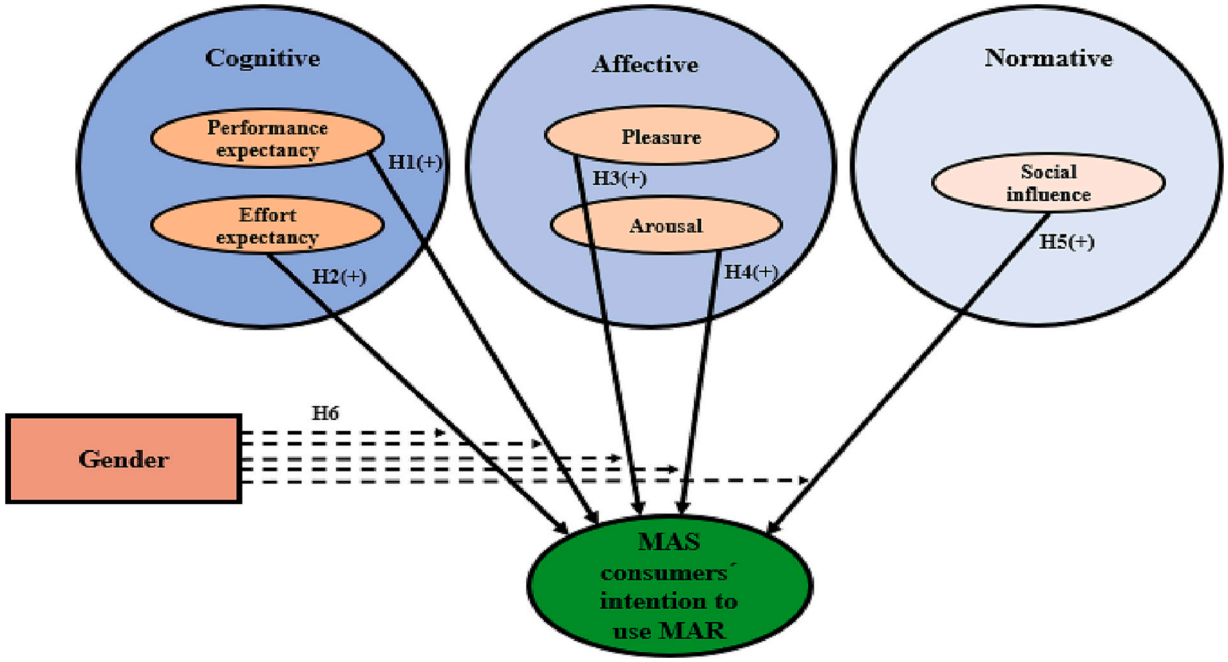

Fig. 1. Theoretical model to explain acceptance of in-store MAR technology by MAS consumers.

in technology acceptance models, such as the UTAUT2 model (Venkatesh et al., 2012), it was not included in the earlier tests of the CAN model as proposed here. The interest of including moderating variables in the CAN model was suggested by Pelegrín-Borondo et al. (2016), who found that the "end user" effect improved its explanatory and predictive power.

2.2. Relationship between the cognitive dimension and the intention to use MAR at a physical store

The cognitive dimension consists of "performance expectancy" and "effort expectancy." Both variables have been shown to be determinants in new technology adoption and use (Kim et al., 2017). In general, when a technology is perceived to be easy to use and, also, likely to yield benefits, it affects the adoption decision, increasing the intention to use it (Giovanis et al., 2019).

In the context of MAS consumers, the literature to date only supports the relationship between "performance expectancy" and the intention to use (Mosquera et al., 2018). According to Alesanco-Llorente et al. (2021), this finding can be explained as follows: (1) MAS consumers are already familiar with the benefits of using a smartphone as part of the shopping journey, which reinforces their intention to use it; and (2) MAS consumers are "always on" (Viejo Fernández et al., 2020) and do not perceive smartphone use as requiring a greater effort in the context of a change of activity, in this case, the in-store shopping process. In the specific framework of augmented reality, the literature seems to accept these variables as antecedents of the intention to use the technology, but only in the context of online stores (Do et al., 2020; Kim and Forsythe, 2008). The conceptual framework is more contradictory with regard to the possible influence of "effort expectancy" on the intention to use in-store MAR once the threshold of the physical store has been crossed. The most recent studies on technology acceptance at brick-and-mortar stores indicate that "effort expectancy" does not influence the intention to use MAR (Holdack et al., 2020; Qin et al., 2021; Saprikis et al., 2021). However, the subject has not yet been addressed in the academic research based on the assumption that the adopter is an MAS consumer.

In light of this background, the following hypotheses are proposed:

H1. . Performance expectancy significantly and positively influences MAS consumers' intention to use MAR at physical stores.

H2. . Effort expectancy significantly and positively influences MAS consumers' intention to use MAR at physical stores.

2.3. Relationship between the affective dimension and the intention to use MAR at a physical store

Previous research has studied emotional factors in the context of technology acceptance, as they are understood to be related to decision-making in the shopping journey (Chang et al., 2014; Ding, 2018). The affective variable has been shown to be a fundamental antecedent of the intention to use a technology (Verkijika, 2020).

The Pleasure-Arousal Theory (PAT) (Russell, 1979) is useful in the analysis of emotions during the shopping experience in retail settings (Huang, 2001). The present study uses the PAT to incorporate the affective component in the model, measured through the emotional dimensions of "pleasure" and "arousal." The literature confirms that these two dimensions adequately capture the range of emotional responses (Koo and Ju, 2010). Exciting and pleasurable experiences arising from the use of a smartphone are predictive of the intention to use this technology (Kourouthanassis et al., 2015). However, more recent literature on MAS consumers has found only "pleasure" to be an antecedent of the intention to use a smartphone, not "arousal" (Alesanco-Llorente et al., 2021). These authors show that MAS consumers present a certain degree of "arousal" with regard to smartphone use (the technology is not new for them), which remains unchanged across the various situations they may encounter during the shopping journey. Taking into account these prior considerations, the following hypotheses are proposed:

H3. . The emotional dimension of pleasure significantly and positively influences MAS consumers' intention to use MAR at physical stores.

H4. . The emotional dimension of arousal significantly and positively influences MAS consumers' intention to use MAR at physical stores.

2.4. Relationship between the normative dimension and the intention to use MAR at a physical store

The normative dimension is reflected in the variable "social influence." An individual's perception of the expectations of people who are close to them concerning the use of a technology influences their intention to use it (Attuquayefio and Addo, 2014; Or et al., 2011; Venkatesh et al., 2012). Two other factors have also been taken into account to assess this variable: critical mass and social image (Wang and Wang, 2010). Significant market penetration by a technology influences the appeal of using it (critical mass). Likewise, when a given technology reflects the personal attributes a person wishes to highlight for others, it speeds its adoption (social image) (Blaise et al., 2018).

Previous studies on MAS consumers have not found the variable "social influence" to be an antecedent of the behavioral intention to use (Alesanco-Llorente et al., 2021; Hew et al., 2015; Mosquera et al., 2018). Mosquera et al. (2018) justify this finding by suggesting that consumers may perceive smartphone use as a personal and private activity. In contrast, the scant previous literature on MAR acceptance does accept this variable as an antecedent of the intention to use it in the fields of tourism (Rodrigues et al., 2019), education (Nizar et al., 2019), and retail (Cho & Kim, 2019; Saprikis et al., 2021). Given this contradictory framework, the following hypothesis is proposed:

H5. . Social influence on MAS consumers significantly and positively influences their intention to use MAR at physical stores.

2.5. The moderating effect of gender

Previous literature has highlighted the influence of gender in new technology acceptance and use (Baker et al., 2007; Shao et al., 2019). Earlier studies have examined this influence in the context of business activities that have been disrupted by the advent of the smartphone (Ameen et al., 2020; Lim et al., 2021).

From a cognitive point of view, part of the literature indicates that the motivations guiding men's decision-making are related to the benefits of the technology to be adopted, whereas women are more strongly motivated by a technology's ease of use (Natarajan et al., 2017; Venkatesh and Morris, 2000). Another part indicates that gender does not moderate the influence of "effort expectancy" or "performance expectancy" on the intention to use (Yuan et al., 2016).

The empirical evidence on the moderating role of gender in "social influence" is also contradictory. Some authors argue that women exhibit higher levels of interdependence with the people closest to them when it comes to decision-making (Venkatesh et al., 2012). Lim et al. (2021) indicate that women's decisions are affected by affective and relational factors, while men's are guided by cognitive ones. However, other studies indicate that relational needs are greater in men (Wang et al., 2009).

As this background shows, the moderating effect of gender on the CAN model relationships is unclear. Studying whether the exogenous variables influence the intention to use MAR by men and women in the same (or a different) way could be valuable, as gender is one of the variables most often used for segmentation. The results will provide a starting point for developing in-store omnichannel sales strategies with higher success rates.

To date, there is very little literature on the moderating effect of gender on MAR adoption. One of the aims of this study is thus to provide a basis for researching the influence of the antecedents ("performance expectancy", "effort expectancy", "pleasure", "arousal", and "social influence") on the intention to use MAR considering gender as a moderator. To this end, the following general hypothesis was proposed, along with the resulting five sub-hypotheses, based on the assumption that it may affect all the key relationships described in the model and explain the relationship between customer and physical-store technology:

H6. Gender plays a moderating role in the relationship between the five exogenous variables and the intention to use MAR.

H6.1. . Gender plays a moderating role in the relationship between performance expectancy and the intention to use MAR.

H6.2. . Gender plays a moderating role in the relationship between effort expectancy and the intention to use MAR.

H6.3. . Gender plays a moderating role in the relationship between the emotional dimension of pleasure and the intention to use MAR.

H6.4. . Gender plays a moderating role in the relationship between the emotional dimension of arousal and the intention to use MAR.

H6.5. . Gender plays a moderating role in the relationship between social influence and the intention to use MAR.

3. Methodology

3.1. Sample and data collection

The data were collected through telephone interviews conducted by qualified interviewers with consumers in Logroño (Spain) in October and November 2020. The sampling procedure was equal quota sampling by gender. Inclusion in the sample depended on the respondent's answer to a filter question regarding smartphone use during the shopping journey at a physical store that made it possible to determine whether or not they were an MAS consumer. This question consisted of seven items scored on an 11-point scale, taken from the literature (Mosquera et al., 2018). Specifically, mobile-assisted showroomer consumers were identified based on a series of behaviors related to their smartphone use at physical stores during their shopping journey (Table 2). The question was worded as follows: *Please indicate how often you use your smartphone in (physical) clothing stores on a scale of 0 ("I never use it") to 10 ("I always use it").*

To make it easier for the respondents to understand the questions and better follow the telephone interview, they were sent a link with videos and images of MAR. As a result of the fieldwork, a total of 854 surveys was obtained. Of these, 49 surveys were rejected because the respondent did not report having engaged in any MAS behavior at a physical store. This left a final sample of 805 valid surveys (388 from MAS men and 417 from MAS women). In other words, 94.37 % of the sample were MAS consumers.

Table 2
MAS consumer sample distribution.

Gender	Men: 388 (48.2 %); Women: 417 (51.8 %)
Age	16–25: 249 (30.9 %); 26–35: 141 (17.5 %); 36–45: 136 (16.9 %); 46–55: 157 (19.5 %); > 56: 122 (15.2 %)
Educational attainment	No formal education: 9 (1.1 %); Primary school: 173 (21.5 %); Secondary school: 376 (46.7 %); College: 247 (30.7 %)

In-store smartphone use	Degree or use (scale of 0 to 10)		Percentage of MAS by type of smartphone use
	Mean	Standard deviation	
1. Look for product information	4.92	3.11	85.1 %
2. Compare prices	4.54	3.20	82.0 %
3. Compare products	4.46	3.21	81.0 %
4. Read reviews by other shoppers	3.80	3.20	73.7 %
5. Share photos	5.89	2.91	93.0 %
6. Redeem coupons	4.76	3.42	79.3 %
7. Pay	3.33	3.59	57.8 %

Table 3
Individual reliability of the indicators.

Construct/associated items	Loadings		Construct/associated items	Loadings	
	MAS Men	MAS Women		MAS Men	MAS Women
Performance expectancy (PE)			Arousal (A)		
PE1	0.86	0.85	A1	0.88	0.81
PE2	0.84	0.81	A2	0.77	0.88
PE3	0.74	0.83	Social influence (SI)		
PE4	0.81	0.83	SI1	0.91	0.91
Effort expectancy (EE)			SI2	0.93	0.93
EE1	0.87	0.88	SI3	0.92	0.97
EE2	0.97	0.96	Intention to use (IU)		
EE3	0.93	0.97	IU1	0.93	0.96
EE4	0.85	0.89	IU2	0.93	0.92
Pleasure (P)			IU3	0.95	0.98
P1	0.95	0.84			
P2	0.85	0.86			

3.2. Measurement scales

The survey questions related to the cognitive and normative dimensions were adapted from the most current antecedent of the CAN model, namely, Venkatesh et al. (2012). To measure the emotional dimensions, the guidelines established by Loureiro (2015) were followed. That author reduces the measurement of the two dimensions proposed by the PAT (Russell, 1979) – "pleasure" and "arousal" – to two bipolar pairs of adjectives. Miniero et al. (2014) conclude that reducing these scales increases their reliability (Appendix A). All variables were measured using an 11-point Likert scale ranging from 0 (strongly disagree) to 10 (strongly agree).

3.3. Data analysis process

The Consistent Partial Least Squares (PLSc) technique (Dijkstra and Henseler, 2015a, b) has been validated to perform multigroup analysis by means of a non-parametric test (Henseler et al., 2009; Dijkstra and Henseler, 2015b), as is the case in the present study (Hair et al., 2011). It was also chosen for the following reasons: (a) it is less sensitive than other PLS-SEM techniques to type 1 and type 2 errors; (b) it is more highly recommended for use with models with reflective exogenous variables (Dijkstra and Henseler, 2015a, b) and a composite endogenous variable (Sarstedt et al., 2016), as in the present case; (c) it corrects the tendency observed in other PLS techniques to skew factor loadings upward and underestimate regression coefficients (Gefen et al., 2011; Aguirre-Urreta and Rönkkö, 2018); (d) it shows low sensitivity to violations of assumptions of normality (Dijkstra and Henseler, 2015a, b); and (e) the results obtained through the PLSc-SEM technique show a high affinity with the results of the main CB-SEM techniques (Dijkstra and Henseler, 2015a, b).

4. Results

4.1. Assessment of the measurement model

The reliability and convergent validity of this reflective model was analyzed through the following indicators: (1) the existence of individual reliability, whereby each construct indicator must have a load value >0.707 for each item (Nunnally and Bernstein, 1994) (see Table 3); (2) Cronbach's alpha and the composite reliability index, which must be >0.70 (Carmines and Zeller, 1979); and (3) the existence of convergent validity between the construct's indicators, to which end those indicators with an average variance extracted (AVE) >0.50 are accepted (Fornell and Larcker, 1981). All these requirements were met, and all the indicators were kept.

Next, discriminant validity was analyzed, obtaining evidence by: (1) comparing the square root of the AVE and the interconstruct correlations (Roldán & Sánchez-Franco, 2012), where the square root of the AVE must be greater than the correlations between constructs (Fornell and Larcker, 1981); and (2) calculating the heterotrait-monotrait ratio of correlations (HTMT), which should have values <0.90 (Henseler et al., 2016). These requirements were also met (see Table 4). These results confirm that the models are reliable and valid.

To check for common method bias, the partialing out "marker" variable method recommended by Podsakoff et al. (2003) was used, following the process suggested by Tehseen et al. (2017). To this end, a marker variable was introduced as a predictor for the endogenous constructs of the models for men and for women. Subsequently, the R^2 values of the endogenous constructs before and after the marker variable was added were examined. The results showed the same R^2 values before and after the marker variable was introduced for both models, thereby establishing that there is no substantial common method bias.

4.2. Assessment of the structural model

The proposed model explains the behavioral intention to use MAR at physical stores. The value for the adjusted R^2 statistic was 0.56 for MAS men and 0.51 for MAS women (see Table 5). These results, both >0.50, confirm the model's goodness of fit (Hair et al., 2011; Henseler et al., 2009). Likewise, the model's predictive power was confirmed through the PLS Predict Q^2 statistic, which had a positive value (>0) (Hair et al., 2014), namely, 0.49 for men and 0.46 for women. Once the explanatory and predictive relevance had been verified, the significance and effect size of the relationships were checked.

The results obtained fully support only one of the proposed hypotheses: H1. It is thus confirmed that there is a positive and significant relationship between "performance expectancy" and the intention to use MAR at physical stores for both MAS men and MAS women. Additionally, two other hypotheses – H2 and H5 – were partially accepted. "Effort expectancy" influences the intention to use MAR in MAS men, but not MAS women. In contrast, the normative factor "social influence" affects only MAS women's intention to use this in-store technology. Finally, no support was found for hypotheses H3 and H4, as the relationship was not significant for either group. This indicates that affective variables do not influence the intention to use MAR.

4.3. Multigroup analysis

A multigroup analysis was performed to test whether there were significant differences in the calculated parameters of the models for each of the two groups, MAS men and MAS women. To analyze the differences in key relationships between the models and evaluate any possible moderating effects, two non-parametric statistics were

Table 4
Construct reliability, convergent validity, and discriminant validity of "Men" and "Women".

Construct	Cronbach's alpha	CRI	AVE	PE	EE	P	A	SI	IU
MAS men									
PE	0.89	0.86	0.66	**0.81**	0.63	0.58	0.46	0.61	0.73
EE	0.95	0.95	0.82	0.63	**0.91**	0.42	0.38	0.44	0.58
P	0.89	0.90	0.81	0.58	0.42	**0.90**	0.54	0.41	0.47
A	0.81	0.81	0.68	0.46	0.38	0.54	**0.82**	0.36	0.39
SI	0.94	0.94	0.85	0.61	0.44	0.41	0.36	**0.92**	0.50
IU	0.95	0.95	0.87	0.73	0.58	0.47	0.38	0.50	**0.93**
MAS women									
PE	0.90	0.90	0.69	**0.83**	0.69	0.59	0.32	0.63	0.66
EE	0.96	0.96	0.85	0.69	**0.92**	0.46	0.38	0.42	0.48
P	0.84	0.84	0.72	0.59	0.45	**0.85**	0.54	0.47	0.49
A	0.83	0.83	0.71	0.32	0.38	0.54	**0.84**	0.27	0.31
SI	0.96	0.96	0.88	0.63	0.42	0.47	0.27	**0.94**	0.61
IU	0.97	0.97	0.91	0.66	0.48	0.49	0.31	0.61	**0.95**

CRI: Composite Reliability Index; AVE: Average Variance Extracted. The items on the diagonal (in bold) are the square roots of the AVE. The items below the diagonal are the interconstruct correlations. The items above the diagonal are the HTMT values.

Table 5
Effect on the endogenous variable and goodness of fit.

	R^2	Q^2	Direct effect	Correlation	Variance explained (%)
MAS men	0.56	0.49			
H1: PE→(+)IU			0.54	0.73	39.15
H2: EE→(+)IU			0.19	0.58	10.96
H3: P → (+)IU			0.05	0.47	2.18
H4: A → (+)IU			0.02	0.38	0.61
H5: SI→(+)IU			0.06	0.50	3.19
MAS women	0.51	0.46			
H1: PE→(+)IU			0.39	0.66	25.90
H2: EE→(+)IU			0.03	0.48	1.29
H3: P → (+)IU			0.09	0.49	4.39
H4: A → (+)IU			0.04	0.31	1.29
H5: SI→(+)IU			0.30	0.61	18.39

Table 6
Multigroup comparison.

	Path coefficient differences	PLS-MGA		Permutation test	
		p-Value	Significance	p-Value	Significance
H1: PE→(+)IU	0.14	0.20	n.s.	0.19	n.s.
H2: EE→(+)IU	0.16	0.05	sig.**	0.04	sig.**
H3: P → (+)IU	−0.04	0.64	n.s.	0.66	n.s.
H4: A → (+)IU	−0.03	0.76	n.s.	0.73	n.s.
H5: SI→ (+)IU	−0.24	0.00	sig.***	0.00	sig.***

Sig. = significance; n.s. = not significant; sig.** = differences significant at 95 %; sig.*** = differences significant at 99 %.

Table 7
Results of Step 2 of the MICOM procedure.

	Original correlation	Correlation of permutation means	5 %	Permutation p-values
EE	1.00	1.00	1.00	0.51
SI	1.00	1.00	1.00	0.61

analyzed. According to Afthanorhan et al. (2015, p. 23), "the practice of [a] parametric approach to multigroup analysis is quite unfair to determine the significance of [a] causal effect when comparing two groups."

The columns "PLS-MGA" (PLS Multi-Group Analysis) and "Permutation test" of Table 6 show the p-values obtained applying the method proposed by Henseler et al. (2009) and Edgington and Onghena (2007), respectively, and the degree of significance of the relationships applying PLSc. The relationships between "social influence" and "effort expectancy" and "intention to use" differed significantly by gender according to both of the tests performed. No significant differences were found in the other relationships.

To check the invariance of the relationship measurement models in the variables in which statistically significant differences were observed between men and women ("effort expectancy" and "social influence"), the MICOM procedure was applied, following the three steps proposed by Henseler et al. (2016): (1) the configurational invariance was established as the two models have the same configuration; (2) compositional invariance was also established, as shown in Table 7; and (3) no differences were found in the mean values and variances, as shown in Table 8. Therefore, full measurement invariance was established.

Table 8
Results of Step 3 of the MICOM procedure.

	Equality of means				Equality of variances			
	Dif.	2.5 %	97.5 %	Permutation p-values	Dif.	2.5 %	97.5 %	Permutation p-values
EE	0.02	−0.14	0.14	0.85	−0.04	−0.18	0.19	0.64
SI	0.05	−0.14	0.13	0.47	−0.13	−0.18	0.17	0.14

Dif.: differences.

5. Discussion

Technology is evolving quickly, providing stores with tools seemingly taken from science fiction, capable of transforming the shopping experience in today's new OCR and opening up extraordinary possibilities for suppliers and consumers alike. Based on these premises, the present study aims to determine the intention of MAS consumers to use MAR at physical stores in order, first, to enhance their shopping experience in an omnichannel environment and, second, to help revive brick-and-mortar retail.

To fulfill this objective, this study advances in the identification of the antecedents of MAS consumers' intention to use MAR in-store, considering the moderating role of gender due to its effect on the acceptance of disruptive technologies (e.g., Baker et al., 2007; Venkatesh et al., 2012; Shao et al., 2019; Ameen et al., 2020; Lim et al., 2021).

5.1. General model

With regard to the cognitive dimension, "performance expectancy" was found to be the most important antecedent in the intention to use MAR at physical stores. These findings are consistent with previous research that has highlighted this variable as the main determinant of the intention to use MAR (Saprikis et al., 2021; Shang et al., 2017). In contrast, "effort expectancy" has only a limited influence on MAS men and none on MAS women. In the literature, this variable has not previously been identified as an antecedent of the intention to use in men, whereas women are considered to seek ease of use in a technology (Natarajan et al., 2017; Venkatesh and Morris, 2000). This unexpected new finding could have a twofold interpretation: (1) both groups, aware of the benefits of using a smartphone at a physical store, would understand that MAR will maintain (or increase) performance during their shopping journey; and (2) MAS women may consider MAR an accessory technology to the smartphone, which they have a certain degree of mastery over in the purchase process. In contrast, MAS men would perceive MAR as a new technology requiring a new learning process to use.

The effect of the affective dimension on the intention to use MAR was not significant in the models of either group, contrary to the prior literature showing that the use of MAR at a physical store generates a range of emotions (Kourouthanassis et al., 2015). In the specific case of MAS consumers, albeit without distinguishing by gender, Alesanco-Llorente et al. (2021) found that "pleasure" is determinant in the intention to use a smartphone; García-Milon et al. (2021) likewise found it to be determinant of smartphone use during the tourist shopping journey. This shows that the degree of "pleasure" and "arousal" of MAS consumers upon using their smartphone during the shopping journey remains unchanged following the addition of an MAR application. One possible explanation for this surprising result could be the Covid-19 pandemic period in which the research was conducted, which has forced brick-and-mortar stores to implement exceptional safety measures. At the same time, consumers have begun to plan their shopping more, making MAS consumers more utilitarian and leading them to place greater value on the functional as opposed to the affective aspects of MAR when it comes to their intention to use it.

Finally, the normative dimension has a significant positive effect on the intention to use MAR in MAS women, but not in MAS men. In the literature, evidence had not previously been found of the direct effect of "social influence" on the use of MAR in the consumer context (Paulo et al., 2018; Saprikis et al., 2021), although none of the papers segmented the sample by gender as was done here. However, this new evidence is consistent with part of the literature in the field of technology acceptance (Lim et al., 2021; Venkatesh et al., 2012). In keeping with the arguments of Mosquera et al. (2018), and advancing in the knowledge of technology acceptance, one possible explanation of the lack of "social influence" in the segment of men could be that MAS men perceive the use of MAR in the shopping journey as a private activity.

5.2. Gender effect

The empirical evidence on the moderating role of gender is contradictory; some studies indicate that women's decisions are affected by affective and relational factors, while men's are guided by cognitive ones (Lim et al., 2021). However, other studies indicate that men have greater relational needs than women (Wang and Wang, 2010). As noted, in the present paper, differences were identified between MAS men and MAS women for two of the key relationships specified in the model: "effort expectancy" and "social influence." It is thus concluded that gender partially moderates the antecedent variables of the CAN model to explain the intention to use MAR in-store.

6. Conclusions

Current studies on MAS consumer behavior provide little guidance for physical retail in its process of digitization. Often, such studies do not allow brick-and-mortar retailers to suitably adapt to available new technologies, such as MAR, taking this new behavior pattern into account. The present research thus has important implications for advancing knowledge of MAS consumers, insofar as it sheds new light on their intention to use MAR and provides a starting point for future research.

The present study is pioneering in its analysis of the factors driving MAS consumers' use of MAR. It is the first study to analyze the moderating effect of gender on the MAS-MAR relationship. Furthermore, it offers a new perspective for the development of augmented reality applications for the retail context and for enhancing the MAS consumer's shopping experience.

The findings suggest that MAS consumers should perceive benefits in the use of MAR to facilitate the shopping journey in an omnichannel environment. Less important, but nevertheless influential, is for MAR to be perceived, by MAS men, as easy to use and not requiring much effort and, by MAS women, as accepted by people in their circle of influence. These findings, together with the fact that emotions were not found to influence the intention to use MAR, indicate that MAS consumers prioritize the usefulness of MAR in the shopping journey. Finally, MAR should also be understood as a technology capable of offering a seamless shopping experience that breaks down the barriers between the online and offline worlds, the OCR strategy's maxim.

6.1. Theoretical implications

The present research contributes to technology acceptance models at the theoretical level by proposing and testing the first theoretical model

to shed light on MAS consumers' intention to use MAR in-store. Although smartphones are a widely accepted technology, MAR is still in the early stages of its inclusion at sales outlets; it is expected to transform the shopping journey. The proposed model combines powerful constructs and, by integrating the cognitive, affective, and normative dimensions, correctly predicts the intention to use the MAR at a physical store. It can further be concluded that gender has a moderating effect in this model, as the CAN model's explanatory and predictive power with regard to this new reality is greater for MAS men (R^2 = 56.1 %) than for MAS women (R^2 = 51.3 %). This is an important contribution that furthers knowledge of the role of gender in new technology use and addresses a gap identified in the literature (e.g., Mosquera et al., 2018; Subero-Navarro et al., 2022).

Second, this research improves the theoretical knowledge of MAS consumers. The three-dimensional CAN model showed that when an MAS man is considering using the MAR at a physical store, "performance expectancy" is the main factor, followed, at a considerable distance, by "effort expectancy." For MAS men, "social influence" does not matter when it comes to defining the antecedents of use. "Performance expectancy is also the main factor for MAS women considering using in-store MAR. However, the other variable informing their assessment is "social influence," and, unlike men, "effort expectancy" does not influence their intention to use it. The emotional dimension is not among the antecedents of use for either group. This is an important contribution in the field of MAS consumer behavior research, as it provides evidence of the greater importance of the cognitive dimension (i.e., "performance expectancy") than the emotional one. The expected benefits of MAR use – usefulness, possibility of achieving shopping objectives quickly, speed, and productivity – are essential to its acceptance by consumers who already use their smartphone in their shopping journeys.

6.2. Practical contributions

The results show that MAS consumers will accept MAR if using it delivers benefits. The strong link between smartphone acceptance and "performance expectancy" would allow retailers to use this technology to present additional information about products and services (e.g., composition, use, whether they are in stock, etc.) in an appealing way and even customize marketing actions, such as deals or discounts. Other benefits resulting from the use of MAR could be associated with reducing purchase uncertainty. Many products cannot be tried on or tested, whether due to space constraints and/or limited stock on the shelves at the point of sale, hygiene issues (e.g., makeup), or the large effort entailed in determining their suitability (e.g., furniture); smartphones, and, in particular, MAR, are one way to address this problem. MAR also enables customers to visualize how products, such as clothes or glasses, will look on them, thereby obviating the need to try them on. In this regard, incorporating in-store MAR applications would make it possible to give MAS consumers a more complete picture of the product or generate "test experiences" and, thus, reduce return rates. These benefits can also be extended to the post-purchase stage, providing more visual advice for the assembly of certain products or generating new ideas or proposed uses. This customization that it enables in the evaluation stage would increase consumers' commitment and the likelihood of purchase (Bonetti et al., 2018; Dacko, 2017). Given that the emotional dimensions were not found to be antecedents in the intention to use MAR at physical stores, the MAR's functional features or benefits should be highlighted more than the affective features to influence the intention to use.

In light of the MAS men segment's needs, retailers should implement their MAR in a way that is perceived as being user-friendly. In and of itself, the interaction that MAR enables with products facilitates making the shopping experience more intuitive (Caboni and Hagberg, 2019). Given the nature of MAS consumers and their smartphone skills and abilities, MAR applications should be presented similarly to other commonly installed smartphone apps. As for the MAS women segment, which has a greater need for social approval, retailers should harness the power of social media to boost their MAR and/or enable interaction (or participation) between multiple users. This will reinforce awareness of both the brand or store itself and of the in-store technology as a mechanism for attracting new customers. Once MAR has achieved significant market penetration, its use will become more attractive, reducing the need for approval (Wang and Wang, 2010).

6.3. Limitations and future research

This study has some limitations that open new avenues of research. This research focuses on retail stores, and the sample was taken from the city of Logroño (Spain), which limits the model's generalizability to other industries or different cultural or geographical areas. Additionally, this study included only MAS consumers, without taking into account those people who lack experience in the use of a smartphone at a physical store. Future research could look at this segment and determine whether the proposed model might also explain its behavioral intention. Future studies should also include other constructs, such as perceived risk or habit, to test whether their inclusion would increase the model's predictive power in terms of the intention to use MAR.

Additionally, the study indicates that, for men, the control variables "educational attainment" and "age" were not significant. In contrast, for women, while the control variable "educational attainment" was likewise not significant, the "age" variable had a p-value >0.01 but <0.05. Future research should thus include the "age" variable as a moderator and analyze its effects. Finally, it would be interesting to analyze the influence of other moderating variables, such as the degree of personal innovativeness or the consumer's technology availability.

CRediT authorship contribution statement

Conception and design of study: Alesanco-Llorente, M., Reinares-Lara, E., Pelegrín-Borondo, J., Olarte-Pascual, C.; acquisition of data: Alesanco-Llorente, M., Reinares-Lara, E., Pelegrín-Borondo, J., Olarte-Pascual, C.; analysis and/or interpretation of data: Alesanco-Llorente, M., Reinares-Lara, E., Pelegrín-Borondo, J., Olarte-Pascual, C.

Drafting the manuscript: Alesanco-Llorente, M., Reinares-Lara, E., Pelegrín-Borondo, J., Olarte-Pascual, C.; revising the manuscript critically for important intellectual content: Alesanco-Llorente, M., Reinares-Lara, E., Pelegrín-Borondo, J., Olarte-Pascual, C.

Approval of the version of the manuscript to be published (the names of all authors must be listed): Alesanco-Llorente, M., Reinares-Lara, E., Pelegrín-Borondo, J., Olarte-Pascual, C.

Funding

This work was supported by the Chair in Commerce at the Universidad de La Rioja; the COBEMADE research group at the Universidad de La Rioja; the Comunidad Autónoma de La Rioja; the Universidad de La Rioja through the program "Joint programming actions" [grant number 2020/00077/001 (reference: PP-2020-02)] and by a predoctoral contract FPI-CAR 2021.

Declaration of competing interest

None.

The work described has not been published previously and is not under consideration for publication elsewhere.

Data availability

Data will be made available on request.

Appendix A. Constructs, variables, and items

Construct	Variable	Item	Source
Cognitive	Performance expectancy	PE1. Using MAR at stores will be useful to me. PE2. Using MAR at stores will increase my chances of achieving my goals. PE3. Using MAR will allow me to shop faster. PE4. Using MAR will help me shop more productively.	Adapted from Venkatesh et al. (2012)
	Effort expectancy	EE1. It will be easy for me to learn to use MAR at stores. EE2. Using MAR at stores will be clear and understandable for me. EE3. It will be easy for me to use MAR at stores. EE4. It will be easy for me to become proficient in using MAR at stores.	
Affective	Pleasure	P1. Annoyed-Pleased P2. Unhappy-Happy	Adapted from Loureiro (2015)
	Arousal	A1. Excited-Calm A2. Stimulated-Relaxed	
Normative	Social influence	SI1. People who are important to me will think that I should use MAR at stores. SI2. People who influence me will think that I should use MAR at stores. SI3. People whose opinions I value will prefer that I use MAR at stores.	Adapted from Venkatesh et al. (2012)
Intention to use MAR at physical stores		IU1. I intend to use MAR at stores in future purchases. IU2. I will probably use MAR at stores in future purchases. IU3. I will use MAR at stores in future purchases.	Adapted from Venkatesh et al. (2012)

References

Afthanorhan, A., Nazim, A., Ahmad, S., 2015. Permutation test, non-parametric, and confidence set approaches to multigroup analysis for comparing 2 groups using partial least square structural equation modeling (pls-sem). Int. J. Math. Stat. Stud. 194–201 https://doi.org/10.9734/BJAST/2015/14380.

Aguirre-Urreta, M.I., Rönkkö, M., 2018. Statistical inference with PLSc bootstrap confidence intervals. MIS Q. 42 (3), 1001–1020. https://doi.org/10.25300/MISQ/2018/13587.

Ajzen, I., 1991. The theory of planned behavior. Organ. Behav. Hum. Decis. Process. 50, 179–211.

Alesanco-Llorente, M., Pelegrín-Borondo, J., Reinares-Lara, E., y Olarte-Pascual, C., 2021. Augmented reality as a key to open the physical store to the mobile-assisted showroomer: present or future of retail? Revista de Marketing y Publicidad. CEF 4, 31–60. https://doi.org/10.51302/marketing.2021.802.

Ameen, N., Tarhini, A., Shah, M.H., Madichie, N.O., 2020. Employees' behavioural intention to smartphone security: a gender-based, cross-national study. Comput. Hum. Behav. 104, 106184 https://doi.org/10.1016/j.chb.2019.106184.

Attuquayefio, S., Addo, H., 2014. Using the UTAUT model to analyze students' ICT adoption. Int. J. Educ. Dev. Using Inf. Commun. Technol. 10 (3), 75–86.

Baker, E.W., Al-Gahtani, S.S., Hubona, G.S., 2007. The effects of gender and age on new technology implementation in a developing country. Inf. Technol. People 20 (4), 352–375. https://doi.org/10.1108/09593840710839798.

Beck, M., Crié, D., 2018. I virtually try it… I want it! Virtual fitting room: a tool to increase on-line and off-line exploratory behavior, patronage and purchase intentions. J. Retail. Consum. Serv. 40, 279–286. https://doi.org/10.1016/j.jretconser.2016.08.006.

Berman, B., 2019. Flatlined: combatting the death of retail stores. Bus. Horiz. 62 (1), 75–82. https://doi.org/10.1016/j.bushor.2018.08.006.

Blaise, R., Halloran, M., Muchnick, M., 2018. Mobile commerce competitive advantage: a quantitative study of variables that predict m-commerce purchase intentions. J. Internet Commer. 17 (2), 96–114. https://doi.org/10.1080/15332861.2018.1433911.

Bonetti, F., Warnaby, G., Quinn, L., 2018. Augmented reality and virtual reality in physical and online retailing: a review, synthesis and research agenda. In: Augmented Reality and Virtual Reality. Springer, Cham, pp. 119–132. https://doi.org/10.1007/978-3-319-64027-3_9.

Brakus, J.J., Schmitt, B.H., Zarantonello, L., 2009. Brand experience: what is it? How is it measured? Does it affect loyalty? J. Mark. 73 (3), 52–68. https://doi.org/10.1509/jmkg.73.3.052.

Brengman, M., Willems, K., Van Kerrebroeck, H., 2019. Can't touch this: the impact of augmented reality versus touch and non-touch interfaces on perceived ownership. Virtual Reality 23 (3), 269–280. https://doi.org/10.1007/s10055-018-0335-6.

Caboni, F., Hagberg, J., 2019. Augmented reality in retailing: a review of features, applications and value. Int. J. Retail Distrib. Manag. 47 (11), 1125–1140. https://doi.org/10.1108/IJRDM-12-2018-0263.

Carmines, E.G., Zeller, R.A., 1979. Reliability and Validity Assessment. Sage publications, Thousand Oaks. California.

Chang, S.H., Chih, W.H., Liou, D.K., Hwang, L.R., 2014. The influence of web aesthetics on customers' PAD. Comput. Hum. Behav. 36, 168–178. https://doi.org/10.1016/j.chb.2014.03.050.

Cho, S.H., Kim, C.S., 2019. Consumer attitudes, intention to use technology, purchase intention of Korean 20's women on the acceptance of Fashion Augmented Reality (FAR) with the application of the UTAUT model. J. Korean Soc. Cloth. Text. 43 (1), 125–137. https://doi.org/10.5850/JKSCT.2019.43.1.125.

Confederación Española de Comercio, 2021. La CEC empeora sus previsiones y advierte de que. sin ayudas efectivas. el 30% de los comercios podría cerrar antes de final de año. available at. http://www.cec-comercio.org/wp-content/uploads/2017/02/08092020_NP-CEC.pdf. (Accessed 1 November 2023).

Conner, S.L., Reardon, J., Miller, C., Salciuviene, L., Auruskeviciene, V., 2017. Cultural antecedents to the normative. Affective. And cognitive effects of domestic versus foreign purchase behavior. J. Bus. Econ. Manag. 18 (1), 100–115. https://doi.org/10.3846/16111699.2016.1220975.

CORDIS, 2021. Digitalización de tiendas físicas tradicionales. Kaching - the future of retail in the palm of your hands. available at. https://cordis.europa.eu/article/id/413185-digitising-brick-and-mortar-retail-stores/es. (Accessed 25 October 2023).

Dacko, S.G., 2017. Enabling smart retail settings via mobile augmented reality shopping apps. Technol. Forecast. Soc. Chang. 124, 243–256. https://doi.org/10.1016/j.techfore.2016.09.032.

Davis, F.D., 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Q. 13 (3), 319–340. https://doi.org/10.2307/249008.

Dijkstra, T.K., Henseler, J., 2015. Consistent partial least squares path modelling. MIS Q. 39 (2), 297–316. https://doi.org/10.25300/MISQ/2015/39.2.02.

Dijkstra, T.K., Henseler, J., 2015b. Consistent and asymptotically normal PLS estimators for linear structural equations. Comput. Stat. Data Anal. 81, 10–23. https://doi.org/10.1016/j.csda.2014.07.008.

Ding, N., 2018. Emotional effect of cinematic VR compared with traditional 2D film. Telematics Inform. 35 (6), 1572–1579. https://doi.org/10.1016/j.tele.2018.04.003.

Do, H.N., Shih, W., Ha, Q.A., 2020. Effects of mobile augmented reality apps on impulse buying behavior: an investigation in the tourism field. Heliyon 6 (8), e04667. https://doi.org/10.1016/j.heliyon.2020.e04667.

Edgington, E., Onghena, P., 2007. Randomization Tests. CRC press.

Fiestas, J.C., Tuzovic, S., 2021. Mobile-assisted showroomers: understanding their purchase journey and personalities. J. Retail. Consum. Serv. 58, 102280 https://doi.org/10.1016/j.jretconser.2020.102280.

Fishbein, M., Ajzen, I., 1975. Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Addison-Wesley, Reading, MA.

Flavián, C., Ibáñez-Sánchez, S., Orús, C., 2019. The impact of virtual. Augmented and mixed reality technologies on the customer experience. J. Bus. Res. 100, 547–560. https://doi.org/10.1016/j.jbusres.2018.10.050.

Flavián, C., Gurrea, R., Orús, C., 2020. Combining channels to make smart purchases: the role of webrooming and showrooming. J. Retail. Consum. Serv. 52, 101923 https://doi.org/10.1016/j.jretconser.2019.101923.

Fornell, C., Larcker, D.F., 1981. Structural equation models with unobservable variables and measurement error: algebra and statistics. J. Mark. Res. 18 (3), 382–388. https://doi.org/10.1177/002224378101800313.

Frasquet, M., Miquel-Romero, M.J., 2021. Competitive (versus loyal) showrooming: an application of the push-pull-mooring framework. J. Retail. Consum. Serv. 62, 102639 https://doi.org/10.1016/j.jretconser.2021.102639.

García-Milon, A., Juaneda-Ayensa, E., Olarte-Pascual, C., Pelegrín-Borondo, J., 2020. Towards the smart tourism destination: key factors in information source use on the tourist shopping journey. Tour. Manag. Perspect. 36, 100730 https://doi.org/10.1016/j.tmp.2020.100730.

García-Milon, A., Olarte-Pascual, C., Juaneda-Ayensa, E., 2021. Assessing the moderating effect of COVID-19 on intention to use smartphones on the tourist shopping journey. Tour. Manag. 87, 104361 https://doi.org/10.1016/j.tourman.2021.104361.

Gefen, D., Rigdon, E., Straub, D., 2011. An update and extension to SEM guidelines for administrative and social science research. MIS Quarterly 35 (2), iii–xiv. https://doi.org/10.2307/23044042.

Giovanis, A., Assimakopoulos, C., Sarmaniotis, C., 2019. Adoption of mobile self-service retail banking technologies. Int. J. Retail Distrib. Manag. 47 (9), 894–914. https://doi.org/10.1108/IJRDM-05-2018-0089.
Hair, J.F., Ringle, C.M., Sarstedt, M., 2011. PLS-SEM: indeed a silver bullet. J. Mark. Theory Pract. 19 (2), 139–152.
Hair, J.F., Sarstedt, M., Hopkins, L., Kuppelwieser, V.G., 2014. Partial least squares structural equation modeling (PLS-SEM). Eur. Bus. Rev. 26 (2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128.
Henseler, J., Ringle, C.M., Sinkovics, R.R., 2009. The use of partial least squares path modeling in international marketing. In: New Challenges to International Marketing, 22, pp. 277–320. https://doi.org/10.1108/S1474-7979(2009)0000020014.
Henseler, J., Hubona, G., Ray, P.A., 2016. Using PLS path modeling in new technology research: updated guidelines. Ind. Manag. Data Syst. https://doi.org/10.1108/IMDS-09-2015-0382.
Hew, J.J., Lee, V.H., Ooi, K.B., Wei, J., 2015. What catalyses mobile apps usage intention: an empirical analysis. Ind. Manag. Data Syst. 115 (7), 1269–1291. https://doi.org/10.1108/IMDS-01-2015-0028.
Holdack, E., Lurie-Stoyanov, K., Fromme, H.F., 2020. The role of perceived enjoyment and perceived informativeness in assessing the acceptance of AR wearables. J. Retail. Consum. Serv. 102259 https://doi.org/10.1016/j.jretconser.2020.102259.
Huang, M.H., 2001. The theory of emotions in marketing. J. Bus. Psychol. 16 (2), 239–247. https://doi.org/10.1023/A:1011109200392.
Instituto Nacional de Estadística, INecollab, 2021. Encuesta sobre el uso de TIC y del comercio electrónico en las empresas. available at. https://www.ine.es/prensa/tic_e_2020_2021.pdf. (Accessed 11 March 2023).
iVend Retail, 2019. Global Shopper Trends Report. available at. https://support.ivend.com/userportal?id=doc_view&doc=KB0011245. (Accessed 10 January 2023).
Kim, J., Forsythe, S., 2008. Adoption of virtual try-on technology for online apparel shopping. J. Interact. Mark. 22 (2), 45–59. https://doi.org/10.1002/dir.20113.
Kim, H.Y., Lee, J.Y., Mun, J.M., Johnson, K.K., 2017. Consumer adoption of smart in-store technology: assessing the predictive value of attitude versus beliefs in the technology acceptance model. Int. J. Fash. Des. Technol. Educ. 10 (1), 26–36. https://doi.org/10.1080/17543266.2016.1177737.
Koo, D.M., Ju, S.H., 2010. The interactional effects of atmospherics and perceptual curiosity on emotions and online shopping intention. Comput. Hum. Behav. 26 (3), 377–388. https://doi.org/10.1016/j.chb.2009.11.009.
Kourouthanassis, P., Boletsis, C., Bardaki, C., Chasanidou, D., 2015. Tourists responses to mobile augmented reality travel guides: the role of emotions on adoption behavior. Pervasive Mob. Comput. 18, 71–87. https://doi.org/10.1016/j.pmcj.2014.08.009.
Lee, H., Leonas, K., 2018. Consumer experiences. The key to survive in an omni-channel environment: use of virtual technology. J. Text. Appar. Technol. Manag. 10 (3).
Lim, X.J., Cheah, J.H., Ng, S.I., Basha, N.K., Liu, Y., 2021. Are men from Mars. Women from Venus? Examining gender differences towards continuous use intention of branded apps. J. Retail. Consum. Serv. 60, 102422 https://doi.org/10.1016/j.jretconser.2020.102422.
Loureiro, S.M., 2015. The role of website quality on PAD, attitude and intentions to visit and recommend island destination. Int. J. Tour. Res. 17 (6), 545–554. https://doi.org/10.1002/jtr.2022.
Miniero, G., Codini, A., Bonera, M., Corvi, E., Bertoli, G., 2014. Being green: from attitude to actual consumption. Int. J. Consum. Stud. 38 (5), 521–528. https://doi.org/10.1111/ijcs.12128.
Mosquera, A., Juaneda-Ayensa, E., Olarte-Pascual, C., Pelegrín-Borondo, J., 2018. Key factors for in-store smartphone use in an omnichannel experience: millennials vs. nonmillennials. Complexity 2018, 1057356. https://doi.org/10.1155/2018/1057356.
Natarajan, T., Balasubramanian, S.A., Kasilingam, D.L., 2017. Understanding the intention to use mobile shopping applications and its influence on price sensitivity. J. Retail. Consum. Serv. 37, 8–22. https://doi.org/10.1016/j.jretconser.2017.02.010.
Nizar, N.N., Rahmat, M.K., Maaruf, S.Z., Damio, S.M., 2019. Examining the use behaviour of augmented reality technology through MARLCardio: adapting the UTAUT model. Asian J. Univ. Educ. 15 (3), 198–210. https://doi.org/10.24191/ajue.v15i3.7799.
Nunnally, J.C., Bernstein, I.H., 1994. Validity. Psychom. Theory 3, 99–132.
Ogunjimi, A., Rahman, M., Islam, N., Hasan, R., 2021. Smart mirror fashion technology for the retail chain transformation. Technol. Forecast. Soc. Chang. 173, 121118 https://doi.org/10.1016/j.techfore.2021.121118.
Or, C.K., Karsh, B.T., Severtson, D.J., Burke, L.J., Brown, R.L., Brennan, P.F., 2011. Factors affecting home care patients' acceptance of a web-based interactive self-management technology. J. Am. Med. Inform. Assoc. 18 (1), 51–59. https://doi.org/10.1136/jamia.2010.007336.
Pantano, E., Priporas, C.V., 2016. The effect of mobile retailing on consumers' purchasing experiences: a dynamic perspective. Comput. Hum. Behav. 61, 548–555. https://doi.org/10.1016/j.chb.2016.03.071.
Paulo, M.M., Rita, P., Oliveira, T., Moro, S., 2018. Understanding mobile augmented reality adoption in a consumer context. J. Hosp. Tour. Technol. 9 (2), 142–157. https://doi.org/10.1108/JHTT-01-2017-0006.
Pelegrín-Borondo, J., Reinares-Lara, E., Olarte-Pascual, C., Garcia-Sierra, M., 2016. Assessing the moderating effect of the end user in consumer behavior: the acceptance of technological implants to increase innate human capacities. Front. Psychol. 7, 132. https://doi.org/10.3389/fpsyg.2016.00132.
Pelegrín-Borondo, J., Reinares-Lara, E., Olarte-Pascual, C., 2017. Assessing the acceptance of technological implants (the cyborg): evidences and challenges. Comput. Hum. Behav. 70, 104–112. https://doi.org/10.1016/j.chb.2016.12.063.
Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. J. Appl. Psychol. 88 (5), 879–903.
Poushneh, A., 2018. Augmented reality in retail: a trade-off between user's control of access to personal information and augmentation quality. J. Retail. Consum. Serv. 41, 169–176. https://doi.org/10.1016/j.jretconser.2017.12.010.
Pwc, 2019. Seeing is believing: how virtual reality and augmented reality are transforming business and the economy. available at. https://www.pwc.com/gx/en/technology/publications/assets/how-virtual-reality-and-augmented-reality.pdf.
Qin, H., Peak, D.A., Prybutok, V., 2021. A virtual market in your pocket: how does mobile augmented reality (MAR) influence consumer decision making? J. Retail. Consum. Serv. 58, 102337 https://doi.org/10.1016/j.jretconser.2020.102337.
Reinares-Lara, E., Olarte-Pascual, C., Pelegrín-Borondo, J., 2018. Do you want to be a cyborg? The moderating effect of ethics on neural implant acceptance. Comput. Hum. Behav. 85, 43–53. https://doi.org/10.1016/j.chb.2018.03.032.
Rese, A., Baier, D., Geyer-Schulz, A., Schreiber, S., 2017. How augmented reality apps are accepted by consumers: a comparative analysis using scales and opinions. Technol. Forecast. Soc. Chang. 124, 306–319. https://doi.org/10.1016/j.techfore.2016.10.010.
Rodrigues, J.M., Ramos, C.M., Pereira, J.A., Sardo, J.D., Cardoso, P.J., 2019. Mobile five senses augmented reality system: technology acceptance study. IEEE Access 7, 163022–163033. https://doi.org/10.1109/ACCESS.2019.2953003.
Roldán, J.L., Sánchez-Franco, M.J., 2012. Variance-based structural equation modeling: guidelines for using partial least squares in information systems research. In: Research Methodologies, Innovations and Philosophies in Software Systems Engineering and Information Systems, 193-221. IGI global. https://doi.org/10.4018/978-1-4666-0179-6.ch01.
Russell, J.A., 1979. Affective space is bipolar. J. Pers. Soc. Psychol. 37 (3), 345. https://doi.org/10.1037/0022-3514.37.3.345.
Saprikis, V., Avlogiaris, G., Katarachia, A., 2021. Determinants of the intention to adopt Mobile augmented reality apps in shopping malls among university students. J. Theor. Appl. Electron. Commer. Res. 16 (3), 491–512. https://doi.org/10.3390/jtaer16030030.
Sarstedt, M., Hair, J.F., Ringle, C.M., Thiele, K.O., Gudergan, S.P., 2016. Estimation issues with PLS and CBSEM: where the bias lies. J. Bus. Res. 69 (10), 3398–4010. https://doi.org/10.1016/j.jbusres.2016.06.007.
Schneider, P.J., Zielke, S., 2020. Searching offline and buying online–an analysis of showrooming forms and segments. J. Retail. Consum. Serv. 52, 101919 https://doi.org/10.1016/j.jretconser.2019.101919.
Shang, L., Siang, T.G., Zakaria, M., Emran, M., 2017. Mobile augmented reality applications for heritage preservation in UNESCO world heritage sites through adopting the UTAUT model. April. In: AIP Conference Proceedings (1830 (1) 030003). AIP Publishing LLC.
Shao, Z., Zhang, L., Li, X., Guo, Y., 2019. Antecedents of trust and continuance intention in mobile payment platforms: the moderating effect of gender. Electron. Commer. Res. Appl. 33, 100823 https://doi.org/10.1016/j.elerap.2018.100823.
Sit, J.K., Hoang, A., Inversini, A., 2018. Showrooming and retail opportunities: a qualitative investigation via a consumer-experience lens. J. Retail. Consum. Serv. 40, 163–174. https://doi.org/10.1016/j.jretconser.2017.10.004.
Subero-Navarro, Á., Pelegrín-Borondo, J., Reinares-Lara, E., Olarte-Pascual, C., 2022. Proposal for modeling social robot acceptance by retail customers: CAN model + technophobia. J. Retail. Consum. Serv. 64, 102813 https://doi.org/10.1016/j.jretconser.2021.102813.
Taylor, S., Todd, P., 1995a. Decomposition and crossover effects in the theory of planned behavior: a study of consumer adoption intentions. Int. J. Res. Mark. 12 (2), 137–155. https://doi.org/10.1016/0167-8116(94)00019-K.
Taylor, S., Todd, P.A., 1995b. Understanding information technology usage: a test of competing models. Inf. Syst. Res. 6 (2), 144–176. https://doi.org/10.1287/isre.6.2.144.
Tehseen, S., Ramayah, T., Sajilan, S., 2017. Testing and controlling for common method variance: a review of available methods. J. Manag. Sci. 4 (2), 142–168. https://doi.org/10.20547/jms.2014.1704202.
Venkatesh, V., Bala, H., 2008. Technology acceptance model 3 and a research agenda on interventions. Decis. Sci. 39, 273–315. https://doi.org/10.1111/j.1540-5915.2008.00192.x.
Venkatesh, V., Davis, F.D., 2000. A theoretical extension of the technology acceptance model: four longitudinal field studies, Manage. Sci 46, 86–204. https://doi.org/10.1287/mnsc.46.2.186.11926.
Venkatesh, V., Morris, M.G., 2000. Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. MIS Q. 24 (1), 115–139. https://doi.org/10.2307/3250981.
Venkatesh, V., Thong, J., Xu, X., 2012. Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Q. 36, 157–178. https://doi.org/10.2307/41410412.
Venkatesh, V., Morris, M.G., Davis, G.B., Davis, F.D., 2003. User acceptance of information technology: toward a unified view. MIS Q. 27 (3), 425–478. https://doi.org/10.2307/30036540.
Verkijika, S.F., 2020. Assessing the role of simplicity in the continuous use of mobile apps. J. Organ. End User Comput. 32 (4), 26–42. https://doi.org/10.4018/JOEUC.2020100102.
Viejo Fernández, N., Sanzo Pérez, M.J., Vázquez-Casielles, R., 2020. Is showrooming really so terrible? Start understanding showroomers. J. Retail. Consum. Serv. 54, 102048 https://doi.org/10.1016/j.jretconser.2020.102048.
Von Briel, F., 2018. The future of omnichannel retail: a four-stage Delphi study. Technol. Forecast. Soc. Chang. 132, 217–229. https://doi.org/10.1016/j.techfore.2018.02.004.

Wang, Y.S., Wu, M.C., Wang, H.Y., 2009. Investigating the determinants and age and gender differences in the acceptance of mobile learning. Br. J. Educ. Technol. 40 (1), 92–118. https://doi.org/10.1111/j.1467-8535.2007.00809.x.

Wang, H.Y., Wang, S.H., 2010. User acceptance of mobile internet based on the unified theory of acceptance and use of technology: investigating the determinants and gender differences. Soc. Behav. Personal. Int. J. 38 (3), 415–426. https://doi.org/10.2224/sbp.2010.38.3.415.

Watson, A., Alexander, B., Salavati, L., 2018. The impact of experiential augmented reality applications on fashion purchase intention. Int. J. Retail Distrib. Manag. 48 (5), 433–451. https://doi.org/10.1108/IJRDM-06-2017-0117.

Willems, K., Smolders, A., Brengman, M., Luyten, K., Schöning, J., 2017. The path-to-purchase is paved with digital opportunities: an inventory of shopper-oriented retail technologies. Technol. Forecast. Soc. Chang. 124, 228–242. https://doi.org/10.1016/j.techfore.2016.10.066.

Yuan, S., Liu, Y., Yao, R., Liu, J., 2016. An investigation of users' continuance intention towards mobile banking in China. Inf. Dev. 32 (1), 20–34. https://doi.org/10.1177/0266666914522140.

María Alesanco-Llorente holds a master's degree in Business Administration. She is currently a Ph.D. candidate and an associate professor and researcher in the Faculty of Business Administration at the University of La Rioja (Spain). Her research interests include mobile marketing, consumer behavior, and new technology adoption. She is also a researcher at the Chair in Commerce at the University of La Rioja. She has participated in research projects and international conferences and published her research in books with major publishers such as ESIC. ORCID: 0000-0001-9142-1203.

Eva Reinares-Lara holds a Ph.D. in Economics and Management and a master's degree in Strategic Marketing. She is a professor of marketing at Rey Juan Carlos University of Spain. Her main research interests include consumer behavior and advertising. She has participated in many research projects and international conferences and published widely in books and international journals, including Telematics and Informatics, Computers in Human Behavior, Journalism, Communications, the Journal of Advertising Research, and Business Research Quarterly, among others. ORCID: 0000-0002-5320-9268.

Jorge Pelegrín-Borondo, holds a Ph.D. in business and is a professor of marketing and Director of Studies for a bachelor's degree program at the University of La Rioja (Spain). He has conducted several studies on consumer behavior, technology acceptance, mobile marketing, e-commerce, and tourism. He has published in a variety of leading international journals, including, Computers in Human Behavior, Journal of Business Ethics, Journal of Vacation Marketing, and Psychology and Marketing, among others. He is the author of textbooks published by major publishers such as ESIC, McGraw Hill, Pirámide, and Paraninfo. ORCID: 0000-0003-2720-1788.

Cristina Olarte-Pascual is a professor in the Department of Marketing at the University of La Rioja (Spain). She holds a Ph.D. in Economics and Management, and she is also Director of the Chair in Commerce at the University of La Rioja. She has participated in many research projects and international conferences. Her main research interests include consumer behavior, mobile marketing and marketing innovation. She has published in a wide range of books and international journals, including Psychology and Marketing, Computers in Human Behavior, Tourism Management, Journal of Business & Industrial Marketing, Telematics and Informatics, among others. ORCID: 0000-0002-9853-0266.