

Assesing the role of risk and trust in consumers' adoption of online payment systems

Evaluación del papel del riesgo y de la confianza en la adopción de los sistemas de pago online por parte de los consumidores

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ABSTRACT. The determinants of the intention to use online payment methods linked to e-commerce have been present in numerous and current studies which shows its importance. The present study aims to study some of its determinants based on the classical variables proposed in the successive acceptance models of the technology and its subsequent modifications, adding the constructs of trust and perceived risk. To achieve our objectives, we designed a self-administered web-based survey of open access to users with different characteristics. The results showed that only attitude determine the intention to use payment systems as opposed to trust and perceived risk. Finally, our research introduces several implications for businesses, focusing on consumers' intent to use these online payment services. The results obtained in this research poses important implications for the adoption of online payment systems.

RESUMEN. Los determinantes de la intención de uso de los métodos de pago online ligados al comercio electrónico han estado presentes en numerosos y actuales estudios lo que denota su importancia. El presente estudio pretende analizar algunos de sus determinantes a partir de las variables clásicas propuestas en los sucesivos modelos de aceptación de la tecnología y sus modificaciones posteriores, añadiendo los constructos de confianza y riesgo percibido. Para alcanzar nuestros objetivos se diseñó una encuesta web auto administrada de acceso abierto a usuarios con diferentes características. Los resultados demostraron que tan solo la actitud determina la intención de uso de los sistemas de pago a diferencia de la confianza y riesgo percibido que no resultaron significativos. Finalmente, nuestra investigación introduce varias implicaciones para las empresas, centrándose en la intención de los consumidores de utilizar estos servicios de pago online. El resultado obtenido en esta investigación plantea importantes implicaciones para la adopción de los sistemas de pago online.

KEYWORDS: TAM, Trust, Risk, Online payment methods, E-Commerce.

PALABRAS CLAVE: TAM, Confianza, Riesgo, Métodos de pago online, Comercio electrónico.

1. Introduction

The evolution of the Internet has favored a large increase in the number of electronic transactions, especially of goods and services (Oliveira et al., 2017). E-commerce centred on relations of exchange between companies and consumers (B2C) increased in Spain, in absolute terms, from EUR 16,259 million in 2014 to EUR 20,754 million in 2015, increasing by 27.6% compared to 11.3% in the previous year (ONTSI, 2016). This growing trend continues with a significant acceleration from one year to the next, corroborated by data from the Cetelem Observatory (2016) revealing an increase in average expenditure per user from EUR 1,354/year in 2015 to EUR 1,413/year in 2016. However, although 79% of Spain's population is using Internet (ONTSI, 2016), the percentage of users who have made online purchases is 50.1% (e-Commerce and Digital Transformation Observatory, 2017). In this sense, the growth potential of e-commerce is undeniable.

Gallego et al. (2016) consider that some of the main causes hindering the growth of electronic commerce in Spain are related to logistical problems, the security of the different payment methods and the offer of a catalogue of products that is difficult to market effectively over the Internet. Purchases are increasingly easier to make as online payment methods (OPM) become available. E-payments are used to carry out online transactions that do not require physical money (Sumanjeet, 2009) and they are especially relevant in e-commerce with thousands of daily transactions performed worldwide. In fact, the relationship between this type of trade and OPMs is significant enough for some authors to claim that one could not exist without the other (Rodríguez, 2015).

New Internet-based payment platforms have been created in recent years, although some of the pioneering efforts disappeared after not gaining sufficient traction and acceptance. According to the Cetelem Observatory (2016), the most widely used form of online payment in 2016 was the debit card (61%), with a considerable increase of eleven points followed by PayPal which reduced its penetration by 21 points falling to 51%. Some of the must-have characteristics of online payments are: ease of use; universality, i.e., that the payment method is accepted everywhere, and that it can be used to pay for any product; liquidity, defined as the ease with which the payment can be used immediately by those who receive in order to make other purchases; fractionation, which can make exact payments, which allows large or small amounts to be paid; privacy, which can privately preserve the identity of those who use it, what they use it for, what they bought it for and other private data. With regard to online payment methods, the money is always received by the pertinent beneficiary and not by an unrelated party. Online transactions are cheaper and provide users with a proof of payment and a proper receipt (García, 2016). The main advantages of OPS in the literature are the usefulness of the payment systems (Glajchen, 2011) and their ease of use (Mallat et al., 2009) among others. On the other hand, in terms of flaws and drawbacks, the literature reports users' perceived security (Yazdanifard et al., 2011), the cost of implementing the new technology (Islam et al., 2010) and the low penetration rate in some countries (Zhou & Lu, 2011).

The purpose of this study is to assess the determinants of users' intention to use of OPS through a modification of the Technological Acceptance Model (TAM) that incorporates trust and risk as additional variables. These two constructs are central to overcome the uncertainty surrounding online payments (Mayer et al., 1995; Liébana-Cabanillas et al., 2017).

2. Theoretical framework and formulation of hypotheses

2.1. Extensions of the TAM model in e-commerce

Among the most widely used models in the scientific literature to measure the acceptance of technology, the most relevant model is the Technology Acceptance Model (TAM), proposed by Davis (1989) and Davis et al. (1989), and subsequently expanded (TAM 2 by Venkatesh and Davis, 2000; Unified Theory of Acceptance and Use of Technology -UTAUT- by Venkatesh et al., 2003; TAM 3 by Venkatesh et al., 2008, etc.).

These models have been used in numerous studies to predict the use of various technologies, such as:



social networks (Romero et al., 2011; Casalo et al., 2012), tourism-related applications (Muñoz-Leiva et al., 2012; Freitas & Santos, 2017), mobile commerce (Bailey et al., 2017), mobile payments (Liébana et al., 2017), information technologies within companies (Rodríguez & Herrero, 2008), education (Akman & Turhan, 2017) and, certainly, e-commerce (Tavera & Londoño, 2014) and electronic payments (McCloskey, 2004). In addition, TAM has great expansion potential through the introduction or modification of different constructs (King & He, 2006).

In addition to the established constructs (ease of use and usefulness) of the TAM model, this research approaches trust and perceived risk since both constructs are essential when uncertainty is present in the model (Mayer et al., 1995), as is the case with online environments (Romero et al., 2011). In addition, the literature has revealed that both trust and perceived risk are the two variables that affect the adoption and acceptance of technologies the most (e.g. Miranda et al. 2014).

2.2. Perceived ease of use

Ease of use refers to the individual's perception that using a particular system is effortless or simply comfortable (Davis, 1989). As a consequence of its self-efficacy and instrumentality, the perceived ease of use has a double impact on attitude (Muñoz, 2008). Firstly, efficiency or effectiveness is one of the factors driving the intrinsic motivation of consumers (Bandura, 1982). In this sense, ease of use is directly related to attitude. Secondly, ease of use can also be instrumental as it helps to improve task performance by saving time and effort. With an enhanced ease of use results are also improved with the same amount of effort (Davis et al., 1992). This significant effect on attitude is achieved through the perceived usefulness, as postulated by the TAM (Muñoz, 2008). In addition, the latter effect of perceived ease of use on perceived usefulness has been extensively proven by empirical studies (Davis, 1989, 1993; Davis et al., 1989; Shih, 2004; Muñoz-Leiva et al., 2012; Ramos de Luna et al., 2018). In this regard, the following hypotheses are put forward:

- H1: Perceived ease of use has a positive and significant influence on perceived usefulness.
- H2: Perceived ease of use has a positive and significant influence on attitude.

On the other hand, ease of use was identified as an antecedent of trust in e-commerce (Pennington et al., 2003; Malhotra et al., 2004). In this sense, the way in which the consumer perceives ease of use makes it possible to consider it as the main factor that affects trust (Kim & Peterson, 2017). Based on this approach, the following research hypothesis is put forward:

- H3: Perceived ease of use has a positive and significant influence on trust.

2.3. Perceived profit

In the TAM model, perceived usefulness constitutes a belief that is postulated a priori as a common determinant of attitude (Davis et al., 1989). This assertion is based on the foundations of the Theory of Reasoned Action (TRA) which establishes that attitudes toward a behavior are influenced by significant beliefs (Fishbein & Ajzen, 1975; Davis, 1989; Davis et al., 1989). In addition, numerous studies have found empirical evidence between usefulness and intention (Romero et al., 2011; Pham & Ho, 2015). On the other hand, it has been argued that trust has a positive relationship with perceived usefulness, but the influence of that relationship is uncertain. Gefen and Straub (2000) and Chircu et al. (2000) showed how perceived usefulness has a positive effect on trust, so the following research hypotheses are put forward:

- H4: Perceived usefulness has a positive and significant effect on attitude.
- H5: Perceived usefulness has a positive and significant effect on perceived trust.

2.4. Attitude

The relationship between the attitude toward the technology, goods or services and the intention to use is clear and significant with regard to this type of behavioral model (Romero et al., 2011). In addition, it has been

corroborated by numerous researchers in various contexts: the adoption of information technologies and information systems (Orantes, 2011), social networks (Romero et al., 2011), e-commerce (Tavera & Londoño, 2014), website traffic checking (Pavlou & Fygenson, 2006), mobile payment applications (Muñoz-Leiva et al., 2017), and so on. Therefore, it is evident that attitude has a direct effect on intention to use and the following hypothesis is put forward:

H6: Attitude has a positive and significant influence on intention to use.

2.5. Extensions of the TAM model: Perceived risk and trust

The concept of perceived risk was originally proposed by Bauer (1964) while assessing consumer behavior. Due to the difficulty of measurement as an objective reality, the notion of perceived risk has been predominantly addressed and defined as a relevant and specific dimension by researchers in the study of e-commerce (Bélanger & Carter, 2008; Rodríguez & Herrero, 2008). In the context of online payment, Featherman and Pavlou (2003) define risk as "the potential for loss in the search for the desired outcome of using an electronic service" (p. 454). It is known that the risk perceived by consumers influences their decisions. It is also common for a customer who is making an online transaction to be reluctant to buy through a website because the sense of risk can be overwhelming as opposed to the traditional purchasing process (Kim et al., 2008).

Mayer et al. (1995) state that one should not risk anything to trust. According to their research study on the relationship between trust and risk, it is not definitively apparent whether risk is a legacy of trust or, on the other hand, risk is a result of trust since both dimensions are connected. In turn, Kim and Prabhakar (2000) argue that there may be a negligible cause-effect relationship between perceived risk and trust. On the other hand, some authors point out that the relationship between trust and risk is parallel, so both variables influence the willingness to make a purchase through e-commerce. In this sense, Kim et al. (2008) verified the impact of trust and perceived risk on online purchasing decisions using a PLS model. In addition, they found that variables such as consumer willingness to trust, reputation, privacy concerns, security concerns, quality of website information, and company reputation have a significant influence with regard to building consumer trust in the Internet.

Other researchers report that the relationship between trust and perceived risk might not be parallel but serial, so trust would affect consumer intent through perceived risk (relationship proposed by Muñoz-Leiva et al., 2017). In this sense, it has been found that trusted personalities have a negative influence on the common belief that risk is significant, in addition to the privacy concerns with regard to e-commerce (Malhotra et al., 2004) and the vendor community (Pavlou & Gefen, 2004). In this line, Pavlou (2003) considered risk as a function of trust.

In addition, the initial degree of consumer trust can change over time and through purchasing experiences (McKnight & Chervany, 2002). In general, in the initial stage of adoption of online payment methods, consumers may not trust without the protection provided by proper regulations and modern technologies such as online authentication and public key encryption. Reliable mechanisms are needed in the first place to facilitate service success, such as third party payment platforms or certification authorities (Yang et al., 2015). Trust in online transactions helps mitigate the drawbacks related to potential security and privacy breaches with regard to such online commercial transactions (Blut et al., 2015). Therefore, the risks of online payment systems affect trust during the early phase of e-commerce adoption. In this sense, the level of trust can change over time. Perceived risk can also affect trust in online payment methods especially as users become familiar with the transactional environment at a mature stage of the service. Transactional risk, in particular, may become a more important factor related to trust (Jarvenpaa et al., 2000). Research by Corbitt et al. (2003) supported that web users' experiences positively influenced perceived trust while their perceived risk negatively influenced trust. This means that perceived risk constitutes an important antecedent of trust in the final stage of e-commerce adoption. In practice, the initial consumer trust in organizations and institutions can help mitigate their total perceived risk while improving trust in order to use it repeatedly (Yang et al., 2015).



In a recent meta-analysis, Kim and Peterson (2017) examined the main antecedents of trust and reported risk as a key moderator, allowing to reinforce the line of research of the present study. Finally, the use of the Internet, due to its nature, also adds a layer of uncertainty and insecurity (Featherman & Fuller, 2003). Various studies have shown that perceived risk reduces the level of perceived usefulness (Featherman & Fuller, 2003; Shin, 2008b). Therefore, according to the above arguments, the following research hypotheses are put forward:

H7: Perceived risk has a significant negative influence on perceived trust.

H8: Perceived risk has a significant negative influence on perceived usefulness.

H9: Perceived risk has a significant negative influence on intention to use.

The process of building trust is affected by the perceived level of risk related to the environment and the transaction itself. In the online conceptual model with regard to trust in electronic banking proposed by Yousafzai et al. (2003), competition, security and privacy are perceived as antecedents of trust. On the other hand, these dimensions were also reported as the perceptions of the Internet environment (McKnight & Chervany, 2002) or even included in the foundations of trust (Li et al. 2008). In this sense, Kim and Benbasat (2006) pose that risks related to privacy, security, price of products and customer service were factors associated with trust. In this line, Dinev and Hart (2006) establish that perceived privacy risk also has a negative impact on trust in electronic transactions. These factors may increase perceived risk to the point of causing loss of customers (Yang et al., 2015).

In general, the total perceived risk is commonly regarded as representative of the uncertainty with regard to possible negative consequences derived from the use of a service. In this sense, predicting the prospect or degree of loss based on experiences when making transactions using online payment methods can mitigate users' concerns and uncertainties about the platform while improving their acceptance of electronic services (Yang et al., 2015).

On the other hand, trust has been explained as the willingness to rely on the exchange of information, goods and/or services with regard to other party (or partner) in whom one believes (Moorman et al., 1993). This is a definition shared by many researchers, although it is true that some authors have preferred to consider trust from the perspective of consumer's attitude toward the brand rather than other person involved in the relationship. In this line, Chaudhuri and Holbrook (2001) consider that trust can be described as the consumer's desire to rely on the ability of the brand to perform its expected function. In this sense, these authors clearly establish that trust is not necessarily an attitude toward a person as it can also be directed toward an object, such as in this case a brand or organization.

According to Moraga and Blanco et al., (2007), it should be recognized that relationships of trust with a company are especially intense, varying according to the market sector involved. Service companies represent one of the sectors in which trust relationships are particularly strong (Gómez et al., 2000). According to Berry and Parasuraman (1991), this level of trust can be observed in transactions where the client buys a service without a prior, direct experience with it. From this perspective, trust is crucial, because without it most people would not dare to approach and adopt new technologies and services.

Blank and Dutton (2012) state that consumers' trust on websites such as Walmart.com, BestBuy.com, etc., tends to be built over a sustained period of time through their own experiences with those companies or through word-of-mouth communication from other customers. In contrast, consumers' initial trust in e-commerce (in C2C relationships) is established during the first interaction with merchants without prior experience. For example, when a consumer wants to buy a certain product from an unknown seller, such as eBay.com or craigslist.org, etc., for the first time, they can develop a certain level of initial trust (Yoon & Occeña, 2015). In this case, customers may face the risk of buying counterfeit or poor quality products. The product being sold can only be seen in an image that may not be an exact representation of the actual product. There is no prior experience and relationship with the seller and many of the non-textual signs that people can

use to judge the merchant's honesty, such as tone of voice, facial expressions and body gestures, are also absent. The lack of these indicators can make trust more difficult to achieve. On the other hand, in B2C e-commerce, business providers have reassured customers who are dissatisfied with their products or services by providing a solid policy, such as a money-back guarantee. In addition, companies have provided online customer care services which are available to help customers 24 hours a day, 7 days a week. When comparing trust in C2C commerce with that generated in B2C commerce, it appears that in C2C commerce it is more difficult to build trust than in B2C (Yoon & Occeña, 2015). Therefore, regarding the impact of trust, it is increasingly important for making a transaction over the Internet (Azam et al., 2013) and also affects customers' willingness to make a purchase (Akhlaq & Ahmed, 2013). According to Ba and Pavlou (2002), e-commerce customers tend to pay a higher premium when they trust retailers. Lee and Lee (2005) found that both store trust and product trust are correlated with customers' intention to buy on websites.

Considering all of the above, this study found that the importance of the effects of trust increases in situations of higher perceived risk such as those characterized by the absence of physical contact (Metzger, 2006). Thus, in situations where a high level of uncertainty is present, such as online environments, the effect of trust on intention to use is significantly greater (Pavlou, 2002b). Therefore, trust in a website is important to attract new users, which will in turn impact acceptance and subsequent use, both in economic and social environments (Gefen et al., 2003). Furthermore, as Gefen et al. (2003) and Muñoz (2008) argue, trust has a direct effect through attitude, this relationship being empirically demonstrated by several authors (e.g. Shin, 2008a). In this line, the following hypotheses are put forward:

H10: Perceived trust has a positive and significant influence on attitude.

H11: Perceived trust has a positive and significant influence on intention to use.

Considering the different approaches of the theoretical framework, Figure 1 presents the theoretical model proposed for this research. The model includes the hypotheses put forward above.

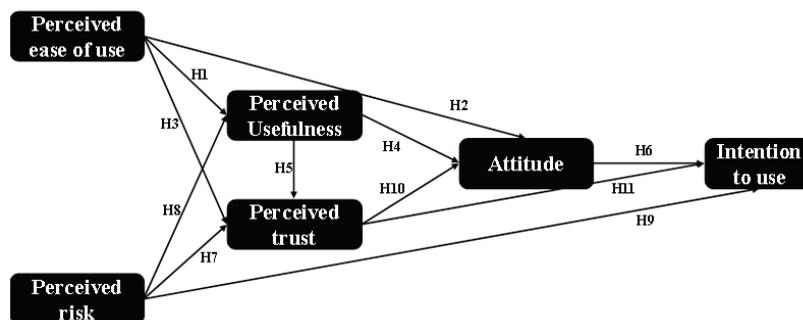


Figure 1. Structural model proposed for research. Source: Self made.

3. Methodological aspects

3.1. Sample design and data collection

An online questionnaire was designed in order to collect data using Google Drive (<https://goo.gl/forms/9HMZKSh5O1XdHCN93>). Therefore, a convenience sampling (non-probability) method was approached distributing the link through social networks and email lists. The initial sample was comprised of 201 individuals, 20 of them were discarded since they had never used any type of OPS. 66.7% of respondents in this study are women and 33.3% are men. The majority of respondents are under 30 years of age (67.7% of the sample), followed by individuals over 50 years of age (18.9%).

3.2. Measuring scales

The measuring instrument used in this research was adapted from previous studies (see Annex 1). In

particular, the user-friendliness scale was adapted from Davis et al. (1989), Muñoz (2008) and Shin (2008a, b). Perceived usefulness was adapted from Moon and Kim (2001) and Rodríguez et al. (2009), attitude was adapted from Moon and Kim (2001) and Rodríguez et al. (2009). Perceived risk was measured by adapting the scales proposed by Jarvenpaa et al. (2000), Flavián and Guinalíu (2007) and Muñoz (2008). In addition, trust was adapted from the scales introduced by Pavlou (2002a, 2003), Flavián and Guinalíu (2007) and Muñoz (2008). Finally, intention to use was adapted from the scales introduced by Davis (1989), Castañeda (2005), Muñoz (2008) and Willis (2008). In all cases, a 5-point Likert scale was used, with 1 being "totally disagreeable" and 5 meaning "totally agreeable".

3.3. Evaluation of the quality of the approached measurement scales

In order to check whether the measurement scales used in this research were valid and reliable, different exploratory analyses of reliability and validity (for which the statistical package SPSS 24.0 was used) and confirmatory type (AMOS 22) were carried out. Measuring instruments are considered valid when they actually measure what they are supposed to. On the other hand, they are considered reliable when they provide stable and consistent scores with regard to similar measurement methods.

Factor loadings were analyzed first since they measure the direct relationship between the latent variable and the observed variable. The obtained results must be significant and their standardized value greater than 0.7. In this sense, variables with lower values must be removed from the model, except when the indicators that do not comply with this requirement contribute to the validity of the content (Hair et al., 2011). Some authors set a threshold value of 0.6, such as Bagozzi and Yi (1988). In the present study, the items Ease of Use 1, Perceived usefulness 1, Risk 2 and Risk 3 have been removed from the analysis since they do not present a standardized load value equal to or higher than the threshold values proposed in the literature. The rest of the items have factorial loadings higher than 0.6, and in most cases higher than 0.7 (see Table 1).

Reliability was measured through a composite reliability analysis (CF) and Cronbach's α was approached to measure internal consistency. In addition to reliability, convergent and discriminant validity were also measured through the average variance extracted (AVE) and the correlations between constructs. With regard to Cronbach's α , the literature establishes values higher than 0.7 as optimal (Hair et al., 2011). In this research all variables meet this criterion. The CF analysis allows to measure the internal consistency of the block of indicators of each latent variable (Lévy-Mangin & Varela-Mallou, 2003), being the degree to which the latent variable explains the variance of its indicators. In this sense, values above 0.70 are recommended (Del Barrio & Luque, 2012). On the other hand, the AVE represents the part of the variability shared by the items as a whole with regard to the latent variable. In this case, it is recommended that the values exceed the threshold of 0.50 (Del Barrio & Luque, 2012). As Table 1 shows, all variables meet the reliability and AVE criteria proposed in the literature.

Finally, discriminant validity was also tested, for which the correlations between each of the variables and their construct were verified. According to the criterion of the confidence interval test, none of the 95% confidence intervals regarding the individual elements of the latent factors should contain the unit (1) (Anderson & Gerbing, 1988). The value obtained in the correlation between risk and ease of use was -0.219, this being a low but appropriate value for this type of validity. The confidence interval obtained was (-0.406; -0.050), it does not contain the unit, proving that the scale has discriminant validity.

According to the results of the analysis, it can be stated that the scale has convergent and discriminant validity; therefore, it can be considered as a scale with construction or concept validity.

Variable	Item	Standard Coefficient	Cronbach's α	Composite reliability	Variance explained
Perceived ease of use	EU2	0.86	0.91	0.92	0.85
	EU3	0.98			
Perceived usefulness	PU2	0.98	0.93	0.94	0.88
	PU3	0.89			
Attitude	A1	0.66	0.81	0.83	0.62
	A2	0.87			
	A3	0.82			
Perceived risk	RP1	0.75	0.77	0.79	0.65
	RP4	0.86			
Perceived trust	T1	0.69	0.76	0.76	0.52
	T2	0.80			
	IU1	0.74			
Intention to use	IU1	0.74	0.85	0.85	0.65
	IU2	0.80			
	IU3	0.86			

Table 1. Convergent validity and internal consistency reliability. Source: Self made.

4. Analysis of results

4.1. Analysis of the fit of the model

In order to test the multivariate normal distribution of the sample data, a normality analysis was carried out to verify the linearity assumptions with regard to the relationships and identification of the model. Initial results reveal the non-compliance of the normality assumption; this could be explained by the small sample size affecting the Chi-square value. The model was also measured to check whether both the matrix reproduced by the model used in the study and the observation matrix were adequate. In this sense, there are different types of measurement methods to check the fit of the proposed model. Table 2 shows the main adjustment coefficients, in addition to the thresholds recommended in the scientific literature (Hair et al. 2011). The RMSEA index is close to the accepted threshold with a result of 0.08, especially affected by the size of the sample. This limitation also affects obtained values for the rest of the indicators. On the other hand, to measure the incremental adjustment of the model, the IFI, CFI and TLI indicators have been approached. As Table 2 shows, this research obtained optimal values above the threshold of 0.9 recommended by Hair et al. (2011).

Coefficients	RMSEA	GFI	AGFI	NFI	CFI	IFI	TLI
Values estimated	0.08	0.89	0.83	0.89	0.93	0.94	0.91
Recommended values	<0.08	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9

Note: RMSEA, root mean square error of approximation; RFI, relative fit index; GFI, goodness-of-fit index; AGFI, adjusted goodness-of-fit index; NFI, normed fit index; CFI, comparative goodness of fit; IFI, incremental fit index; TLI, Tucker-Lewis Index.

Table 2. Goodness-of-fit indicators in the structural model. Source: Self made.

4.2. Discussion of results. Analysis of structural relationships

In order to carry out the analysis of the proposed structural model, the ability to predict the values of the dependent latent variables of the model was evaluated in the first place, considering two key aspects (Hair et al., 2011): the R2 value of the dependent latent variables and the significance level of the structural relationships of the model. First, assessing the percentage of variability of an endogenous variable that is explained through other exogenous variables (R2) reveals that the constructs of the model show a weak, moderate or strong level of explanation, depending on the case (see Table 3). In particular, the explanatory capacity of the main independent variable of the model, intention to use, is strong (0.76).

The estimation procedure approached to evaluate the relevance of the structural relationships of the model was a bootstrapping technique (Hair et al., 2011) with the option to allow individual sign changes (Hair et al., 2014), including a number of sub-samples equal to 5000 and a significance level of 5%.

Firstly, results revealed that the hypotheses derived from ease of use cannot be rejected in their entirety. On the other hand, the influence of ease of use on usefulness, attitude and trust was verified. Hypothesis 1, which relates the ease of use variable to perceived usefulness, was also confirmed ($\beta=0.29$; $p\text{-value}<0.01$), a result which is in line with results from previous studies (e.g. Liébana-Cabanillas et al., 2017). Hypothesis 2 was also confirmed after finding empirical evidence of the existence of a positive and significant relationship between ease of use and attitude ($\beta=0.18$; $p\text{-value}<0.05$), as recent research also reported (Muñoz-Leiva et al., 2017). Finally, hypothesis 3, which proposes that trust is positively and significantly influenced by ease of use, cannot be rejected in the context of this research either ($\beta=0.20$; $p\text{-value}<0.05$), which is congruent with previous studies by other authors (Yang et al., 2015).

In addition, this research found sufficient evidence to confirm the hypotheses suggesting the impact of usefulness on trust and attitude. In this sense, the relationship between trust and usefulness (hypothesis 4) is empirically supported ($\beta=0.21$; $p\text{-value}<0.1$), a result which falls in line with previous research (Gefen & Straub, 2000; Chircu et al., 2000). Hypothesis 5, which proposes the positive and significant influence on attitude, cannot be rejected either ($\beta=0.52$; $p\text{-value}<0.01$), which is consistent with the scientific literature initially approached (Romero et al., 2011; Tavera et al., 2011; Miranda et al.; 2014; Bailey et al., 2017).

On the other hand, hypothesis 6, examining the relationship between attitude and intention to use, has also been confirmed ($\beta=0.67$; $p\text{-value}<0.01$). Therefore, this study concludes that attitude has a direct effect on intention of use, as the scientific literature already suggests (Rodríguez & Herrero, 2008; Romero et al., 2011; Lorenzo-Romero et al., 2011; Miranda et al., 2014; Tavera & Londoño, 2014; Bailey et al., 2017).

The assumptions derived from perceived risk cannot be fully rejected either. In particular, hypothesis 7, which proposes a negative relationship between risk and trust, is confirmed ($\beta=-0.60$; $p\text{-value}<0.01$), in line with obtained results by Yang et al. (2015) and Liébana-Cabanillas et al. (2017). Hypothesis 8, which relates the risk variable to perceived usefulness, also obtained empirical support ($\beta=-0.31$; $p\text{-value}<0.01$), in line with previous research (Romero et al., 2011). Finally, hypothesis 9, suggesting the negative influence of risk on intention to use, is not empirically supported ($\beta=-0.18$; $p\text{-value}>0.1$). Although it is true that the relationship shows a proper correlation, it has no statistical significance, in line with results from Muñoz et al. (2017) but opposing research from other authors (e.g. Romero et al., 2011). The age of the respondents can explain this result, they are mostly individuals under 30 years of age (67.7%). In general, in many contexts young people have less aversion to risk or are not aware of it. Numerous studies reveal this reality: Trocchia and Janda (2000) concluded that younger users have a better experience on the Internet with a greater attention to usefulness and attitude; on the other hand, older users perceive a higher level of risk. In this sense, Lian and Yen (2014) corroborate that risk impacts predisposition to a different degree depending on the age of the user, obtaining significant results in the case of individuals over 35 years old and a non-significant result with regard to users under that particular age.

Finally, hypotheses 10 and 11, relating trust to attitude and intention to use ($\beta=0.04$; $p\text{-value}>0.1$; $\beta=0.21$; $p\text{-value}>0.1$), are rejected. In this sense, the influence of trust on attitude and intention to use cannot be fully confirmed. Results obtained through this research differ from those obtained by the studies initially approached (e.g. Oliveira et al., 2017; Muñoz-Leiva et al., 2017). Again, this may be explained by the age of the sample used, since young people are not especially influenced by trust in the decision-making process with regard to the use of a website, as research from Yoon and Oceaña (2015) revealed.

Hypothesis	Standardized β	S.E.	P value	Empirical support
Ease of use \rightarrow Perceived usefulness	0.291	0.069	***	Yes
Ease of use \rightarrow Attitude	0.176	0.061	**	Yes
Ease of use \rightarrow Perceived trust	0.204	0.055	**	Yes
Perceived usefulness \rightarrow Perceived trust	0.208	0.066	*	Yes
Perceived usefulness \rightarrow Attitude	0.521	0.077	***	Yes
Attitude \rightarrow Intention to use	0.672	0.096	***	Yes
Perceived risk \rightarrow Perceived trust	-0.601	0.091	***	Yes
Perceived risk \rightarrow Perceived usefulness	-0.312	0.099	***	Yes
Perceived risk \rightarrow Intention to use	-0.184	0.116	n.s.	Yes
Perceived trust \rightarrow Attitude	0.042	0.096	n.s.	Yes
Trust \rightarrow Intention to use	0.214	0.149	n.s.	Yes
Variable	R ²		Explanation	
Perceived usefulness	0.22		Weak	
Attitude	0.40		Weak-moderate	
Perceived Trust	0.62		Moderate-strong	
Intention to use	0.76		Strong	

* = $p < 0.1$; ** = $p < 0.05$; *** = $p < 0.01$; ns = non significant.

Table 3. Results of the proposed behavioral model. Source: Self made.

5. Conclusions and managerial implications

The purpose of this study was to understand the influence of trust and risk on the adoption of OPMs through a modification of the TAM model. These constructs proposed as determinants of adoption are some of the main barriers and deterrents hindering the growth of e-commerce in Spain. According to Chaparro-Peláez et al. (2016), the risks are usually associated with the payment system, the management of personal information and the product itself, while the lack of trust is caused by other external agents such as the characteristics of the merchant or the channel (Internet). The level of trust is considered key to the success of online commerce, since mistrust could lead to virtual sites that promote the development of this type of commerce failing to increase sales or retain consumers (Bahmanziari et al., 2009).

Therefore, this research aims to verify the effect of trust and risk as a direct antecedent to the intended use of OPMs and the relationship they have with other determinants of this intent. In this sense, it has been possible to corroborate that risk does influence trust and perceived usefulness. This relationship is one of the factors that largely influences the attitude of consumers and, in turn, impacts intention. The indirect effect can be observed through these variables. On the contrary, it has not been possible to verify that trust is a direct factor to be considered as a determinant of the intention to use OPMs, since none of the hypotheses proposed in this respect could be corroborated. Although there are numerous studies proving that trust is an important factor in e-commerce and payment methods, it has not been possible to confirm these assumptions through this research. This result, although unexpected, matches the findings by Yu, et al. (2005) and Chemingui and Ben lallouna (2013), who did not observe any influence of this construct on intention either with regard to the adoption of commerce in television (t-commerce) and mobile financial services respectively. Therefore, a reasonable doubt is generated around this relationship requiring further research to expand the analysis.

On the other hand, risk is a variable which can be considered when selecting MPOs to be implemented in order to achieve the success of a website offering e-commerce, since it has a direct and significant influence on usefulness (this being one of the key factors in the adoption of MPOs) and indirectly on intention. Despite this, the relationship between risk and intention could not be verified either. In this respect, this result is in line with recent research applied to different innovations in which the user does not consider the influence of risk on the intention to use them in the future. For example, Ruiz Mafé and Tronch (2007) rejected the influence

of risk in all its analyzed dimensions on intention to buy distance courses (e-learning). Rouibah et al. (2016) also failed to corroborate the impact of risk on the adoption of mobile payments. In this sense, Muñoz-Leiva et al. (2017) also failed to explain this relationship with regard to the use of mobile banking. From the perspective of this study, experience with this type of payment systems should improve intention to use. In this sense, experience helps users perceive the adoption of the new technology as a low-risk decision (Phang et al., 2006).

In addition, it should be noted that the ease of use and perceived usefulness of OPMs are determining factors in the attitude toward them and, therefore, in their adoption. This means that these factors should be considered when developing new OPMs.

In this line, the main contribution of this research is the finding that risk is a factor that exerts a great influence on users only through attitude, given that neither risk nor trust have revealed a significant direct relationship with regard to intention to use. In spite of this, the proposed hypotheses should be considered and using trust-building mechanisms such as trust seals, offering information about the quality of the website and its transactions, or the electronic payment system itself to be used should be instrumental. These mechanisms make it possible to minimize the effect of risk by improving trust.

These conclusions may be useful for management, when e-commerce companies decide to increase the intention to use of some method of payment, they must ensure that it is perceived as safe by consumers. In addition, they should ensure that it is a payment method that is easy to use and perceived as useful, in a way that helps consumers save time and effort in their purchases. This will lead to a more positive attitude toward the payment method in question, and in turn to an increase in consumers' intention to use it. This is important for businesses since the implementation of payment methods that are not suitable for general customers or those who are not experienced with the new technology can lead to lost sales and profits, which can also mark the failure of a business trying to sell over the Internet.

6. Limitations and avenues for future research

This paper has some limitations. Firstly, the sample size is not especially large, which may have a higher, unwelcome influence on the results since it may impact the statistical significance of the different factors. Therefore, it is recommended that future research increases the size of the sample. Secondly, the sampling method is a non-probabilistic, convenience technique. It would have been desirable to approach a probabilistic method to make the sample more representative. Thirdly, the distribution of the sample by age and gender does not present parity across the groups, which may have meant that hypotheses relevant to this research are not significant.

Future research could replicate the model in the context of mobile commerce (m-commerce) and the MPOs offered by this type of commerce, since it is a pioneering and booming sales channel with many unknowns yet to be determined. Finally, it would be convenient to analyze the possible moderating effect of sociodemographic variables (gender, age) and behavioral variables (experience, etc.), as well as contemplating the inclusion of other variables in the model that could influence adoption, such as compatibility with the purchase style, perceived control and consumer commitment with the payment system.

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Annex

Constructs	Items	Source
Ease of use	OPMs are simple for anyone. (EU1) Learning to use an OPM takes little time. (EU2) Learning to handle OPMs is simple. (EU3)	Davis et al., (1989), Muñoz (2008) and Shin (2008a, b)
Perceived usefulness	OPMs are more useful and convenient compared to other payment methods. (PU1) I believe OPMs are useful. (PU2) OPMs make Internet shopping more efficient. (PU3)	Moon and Kim (2001) and Rodríguez et al. (2009)
Attitude	Using OPMs is a good idea. (A1) I agree with the existence of OPM. (A2) It's nice to use OPM. (A3)	Moon and Kim (2001), Rodríguez et al. (2009)
Risk	I don't think OPMs are safe. (PR1). I am afraid that my private information could be exposed when using OPMs. (PR2) It is rare to have unexpected problems when using OPMs. (PR3) I consider using OPMs to be risky. (PR4)	Jarvenpaa et al. (2000), Flavián and Guinaliú (2007) and Muñoz (2008)
Trust	Companies that manage OPMs act responsibly. (T1) I think I can trust most OPMs. (T2) I believe that the companies that manage OPMs would not do anything that could intentionally harm their customers. (T3)	Pavlou (2002a, 2003), Flavián and Guinaliú (2007) and Muñoz (2008)
Intention to use	If there's a chance, I'll use an OPM. (IU1) I would recommend the use of OPMs to others. (IU2) In general, I will continue to use OPMs. (IU3)	Davis (1989), Castañeda (2005), Muñoz (2008) and Willis (2008)

Annex 1. Measurement scales. Source: Self made.