

# Customer adoption of p2p mobile payment systems: The role of perceived risk

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## ABSTRACT

Peer-to-peer (P2P) payments are experiencing strong growth due to the notable interest in mobile payments and the effect of the COVID-19 pandemic on individuals' behaviours. This research analyses the success factors in customers' adoption of Bizum, a prototypical P2P mobile payment system already used by almost half of the Spanish population. Using data from real Bizum users and structural equation modelling, it was confirmed that: (1) customers' attitudes and perceptions of control over the mobile app increased use and WOM intentions; (2) the subjective norm (i.e., social approval) is not important for the adoption of this P2P service; (3) the direct effect of perceived risk on behavioural intentions is not significant and that perceived risk is moderated by perceived security, such that its negative effects are significant when users perceive lower levels of security; (4) age and gender do not significantly influence adoption, which suggests that the service might be used by a wide spectrum. Finally, from a practical viewpoint, this research contributes to the understanding of the success factors underlying P2P platforms, which can help managers better develop their market penetration strategies in a highly competitive sector.

## 1. Introduction

The financial sector, undoubtedly, has been one of the first adopters of new technological advances. Examples are its implementation of CRM systems, the digitalisation of its business processes (e.g., online banking services) and, more recently, the introduction of mobile technologies. Mobile apps have created various opportunities, such as improvements in the provision of advice and customer service, access to almost any financial service and an increase in the number of POS terminals due to the use of smartphones incorporating NFC technologies. Among these innovations the growth in P2P payments, that is, immediate interpersonal transactions carried out at little (or no) cost, stands out.

The COVID-19 pandemic has accelerated the adoption of mobile payments (Abdullah et al., 2021) to the extent that P2P systems now seriously threaten the use of cards and cash for everyday purchases (Toplin, 2021a). Although this change has been most observed among younger generations (e.g., about 70% of NFC app users in the USA belong to Generation Z), the switch is so widespread that it is now also seen among older people (Toplin, 2021b). It is estimated that in the USA by the end of 2023 P2P transactions will exceed one trillion dollars (Kats, 2021). Globally, the P2P payment market size was valued at \$1,889.16 billion in 2020 and is projected to reach \$9,097.06 billion by 2030 (Borasi et al., 2021). Similarly, forecasts indicate that the greatest growth in P2P payments in the coming years will take place in the Asia-Pacific region and in sectors such as hospitality, transportation, retail and media-entertainment (Borasi

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et al., 2021).

This study examines the Spanish fintech application Bizum, one of the most pioneering and internationally successful P2P payment services, its success mirroring that of Venmo in the USA (Acker and Murthy, 2020). The payment system claims to have >20 million active users in Spain (almost half of the population) and to have transferred since its 2016 launch >50,558 million euros (Bizum, 2022). The service, offered by 33 affiliated banks, almost all the Spanish banks, is used by customers of all ages (Acosta, 2021). In addition, its expansion as an online payment method is undoubted, being used in 31,000 associated online stores and purchases to the value, to date, of 558 million euros. Already, >6,000 NGO partners have received €33,3 million in donations through the system. In summary, Bizum is threatening cash and card payments in Spain and is a paradigmatic case which may demonstrate what may happen in other countries.

Given that P2P payments are becoming widespread, and that fintech companies are trying to exploit their potential, it is essential to examine the factors that contribute to their success. It is a highly competitive market with great growth and potential. Due to the intensive use of technology and the networking effects among users, the various competitors are trying to win the race to dominate this “winners-take-all” market (Wirtz et al., 2018). Thus, further research is needed to help fintech managers identify the competitive advantages that will allow them to lead P2P services in their markets. From a scientific viewpoint, as Liébana-Cabanillas et al. (2021) indicated, previous works on mobile payment have focussed on other technologies, for example, smart card payment systems, mobile point of sale payments and mobile wallets; but, in reality, P2P systems have well-differentiated characteristics and are significantly different from mobile payments in general (Li et al., 2021). P2P payments are usually simpler, faster, more convenient and feature a social component that other systems lack. Liébana-Cabanillas et al. (2021) found that the precursors and barriers to the adoption of P2P payments differ from those of smartphone-based payment systems. These arguments point to the need to make a specific analysis of the adoption of P2P payments. In the present study the authors propose an attitudinal-behavioural model, based on the theory of planned behaviour (TPB), that analyses the acceptance of P2P payments.

This research makes several contributions. First, a contribution is made to the scarce literature on the acceptance of P2P payments. In fact, it is one of the first empirical investigations carried out into one of the most successful P2P payment applications (Bizum), as other recent works (e.g., Visconti-Caparrós and Campos-Blázquez, 2021) have opted for more qualitative and case-based analyses. Second, the proposed model offers interesting results that confirm that P2P payments have differentiated characteristics. Thus, as discussed later, some of the relationships traditionally proposed in TPB models have been shown to be invalid in the P2P field.

In addition, to complement the traditional TPB model, the variable perceived risk is integrated into the model proposed in the present study, as it has been shown to be particularly important in this context (Al-Saedi and Al-Emran, 2021; Kalinić et al., 2020). In some of the few empirical studies on the adoption of Bizum, Lara-Rubio et al. (2016), Liébana-Cabanillas et al. (2021) and Kalinić et al. (2020) highlighted the need to include, among other variables, perceived risk, given it is the main barrier to the adoption of P2P payments. Specifically, Liébana-Cabanillas et al. (2021) developed a model, based on the theory of reasoned action (TRA), which differentiated between drivers (among which usefulness, subjective norms, and personal innovativeness stand out) and barriers (perceived risk) to the use of Bizum. Lara-Rubio et al. (2016) used logistic regression (LR) analysis and neural networks to predict mobile payment adoption. These authors concluded that six variables influence adoption (ease of use, perceived risk, personal innovativeness, perceived usefulness, subjective norms and perceived enjoyment). Finally, Kalinić et al. (2020) developed an adoption model based on the TAM. Their results showed that men and women use Bizum differently. Men are especially influenced by their social environment, whereas personal innovativeness particularly influences women. Kalinić et al. (2020) concluded that men are less affected by risk.

Taking these results as a reference, the current study aims to expand the knowledge about the adoption of Bizum as a prototypical P2P payment system, and to delve into the role of perceived risk. This examination of the effects of perceived risk seeks to identify if it is a key variable in the adoption of P2P services; to do so an analysis of two underexplored factors (i.e., amount transferred and perceived security) is undertaken to assess their roles as moderators of the effects of perceived risk on intention to use and to create WOM.

It is noteworthy that bibliometric studies (e.g., Abdullah and Naved Khan (2021) have identified that few studies into mobile payments and moderating effects have been carried out. The amount that can be transferred is a crucial factor for the scalability and diffusion of these kinds of services (e.g., some businesses need to transfer large amounts); we propose that risk may be more relevant for customers making large payments than for those making small payments.

Moreover, this research proposes that the negative impact of risk perceptions towards P2P on behavioural intentions may be lessened when customers perceive that the mobile app is secure; providing support for this relationship would link our research with the online security literature and provide practical proposals to managers in the field. An additional contribution of this research is that we analyse not only predictors of intention to use Bizum, but also the effect on intention to recommend its use, which is especially new in the literature.

The remainder of this study is structured as follows. First, an explanation of the Bizum P2P service and its main features is given. Second, the research model and working hypotheses are proposed. Third, the study methodology used, and its results, are presented. Finally, the study's main conclusions, recommendations for management, limitations and future research lines are laid out.

## 2. Bizum

Bizum is an online payment service provider created in 2016 by a consortium of Spanish banks. According to the latest available data (Bizum, 2022), already it has >20 million users, 1,000 million operations have been carried out and 50.558 billion euros transferred. Bizum's growth has been spectacular, in general, since its launch in 2016, but it has, in the last two years, benefited

particularly from the COVID-19 pandemic, as many consumers have opted for a more intensive use of card payments and digital media. Before the pandemic 62.79% of the population had used Bizum, but now >75% of the population say they have used the app (Carbó-Valverde et al., 2021).

To access this P2P payment solution users need only have an account with one of the associated banks, and a mobile telephone. The platform allows its users to make interpersonal payments, payments to participating shops and donations to NGOs. Recent data indicate that 64% of bank users in Spain use Bizum at least once a month, and that almost a third use it to buy online (Europa Press, 2021). The service is free to use, with certain limitations. However, each banking partner sets its own conditions.

Bizum’s operation is very simple. First, one must access the Bizum app, or one’s bank app (if it is affiliated with the platform). Once the user accesses the app, (s)he identifies the mobile phone of the recipient of the money and enters the amount to be sent. If the recipient is a Bizum user, the transfer arrives in seconds. If the recipient is not a Bizum user, they will receive an SMS with instructions on how to access the money.

All Spanish financial institutions, with minor exceptions, collaborate with Bizum (for details see <https://bizum.es/en/banks-bizum>). The facts that almost all Spanish financial institutions support Bizum, and that the user needs only a mobile phone and an account with one of the entities are, without a doubt, key pillars of its enormous success. It has other key advantages that should be highlighted. First, it is a very secure app, given that it is backed by traditional banks that authenticate its users and make the transfers. Second, because it is available through almost all Spanish financial institutions it has become a true standard used by millions, which has generated a networking effect that has aided its rapid adoption.

Despite its clear dominant position, Bizum faces strong competition. Bizum’s main competitors in Spain are the following. Verse (<https://verse.me/en/>) is, without a doubt, the biggest competitor in terms of small payments made between friends. It has a function that both allows individuals to make payments to, and request payments from, their friends; when the friends have provided their approvals the payments are very quickly made, and the money is deducted from their accounts. Second, Twyp (<https://www.twyp.com/>) is offered by ING Direct, although to use it one does not need to be a customer of the bank. This service was one of the first to appear and, like Verse, offers facilities for group payments. Twyp is also distinctive in that it allows its users to withdraw money in various shops, such as supermarkets and department stores. Third, there is the well-known PayPal (<https://www.paypal.com/>). With >200 million users, it is the undisputed leader in online payments, and among its functionalities it allows users to send money to their contacts. Users can also withdraw money from their banks, from their credit cards and their available PayPal balances, and send it to any other user of the service, or directly to a bank account, in >90 countries. Finally, Wise (<https://wise.com/>), with 10 million users, specialises in international transfers and offers much lower commissions than do traditional banks.

These facts suggest that Bizum is one of the most, if not the most, resounding market penetration success stories among the initiatives in the P2P payments field. This, together with its daily use by millions of people, makes it a paradigmatic example through which to assess the determining factors of the acceptance of this type of payment system.

### 3. Literature review and hypotheses formulation

Various theoretical frameworks have been used to explain mobile payment adoption (Patil et al., 2020), such as the theory of

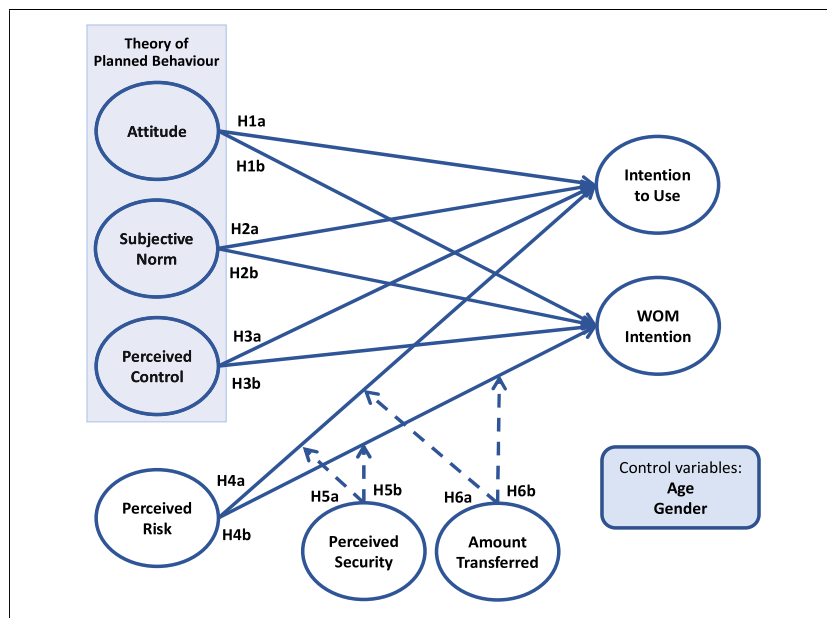


Fig. 1. Research Framework.

reasoned action (TRA), the technology acceptance model (TAM), innovation diffusion theory (IDT), the unified theory of acceptance and use of technology (UTAUT) and the extended UTAUT (UTAUT2). The present study applies the TPB as, despite its simplicity, it has been widely used in mobile payment adoption (e.g., Srivastava and Singh; 2002; Sun et al., 2020, 2022; Tian and Dong, 2013).

However, while the predictive power of the TPB has been demonstrated on numerous occasions, some authors have warned that there are very important elements in the adoption of mobile payments which are not included in the classic models. Al-Saedi and Al-Emran (2021) found that perceived risk (and trust) are the main predictors of mobile payment adoption. Liébana-Cabanillas et al., (2021a) proposed that incorporating perceived risk creates a model with greater predictive capacity than alternative frameworks. The reason they advance for this is that there are risks inherent in adopting mobile banking and P2P services due to errors users make in operating the systems, and within the systems themselves, which can cause monetary losses, and which act, therefore, as barriers to adoption. In addition, the influence of perceived risk might vary based on the context of use and the characteristics of the consumers. Therefore, our proposed model integrates perceived risk, and two moderators that we consider of great interest, into the model (as we explain later). In addition, a further behavioural consequence has been included –WOM intention– given that the success of an application that sends money between peers depends largely on its diffusion, that is, on its viralisation and the consequent networking effect. The sociodemographic factors age and gender are included in the model as control variables.

Fig. 1 presents the research model, and the associated hypotheses are detailed below.

### 3.1. Effects of attitude on intention to use and recommend Bizum

As well as being a key element in the literature on consumer behaviour, attitude plays a fundamental role in the TPB model (Ajzen, 1991) as it is one of the three precursor constructs of behavioural intention. Specifically, attitude relates to the degree to which a person evaluates a certain behaviour positively or negatively, in our case, the use of Bizum. For some authors (e.g., de Luna et al., 2019) attitude combines cognitive (the individual's beliefs, experiences and opinions about Bizum), affective (emotions felt towards Bizum) and behavioural (behavioural predisposition towards the use of Bizum) elements.

The positive relationship between attitude and behavioural intention has been widely demonstrated in many contexts, including in that closest to the focus of the present study, mobile payments (e.g., de Luna et al., 2017; Kaitawarn, 2015; Lerner, 2013; Liébana-Cabanillas et al., 2015; Upadhyay et al., 2022; Phonthanukitithaworn et al., 2016). Similarly, some authors have emphasised the importance of attitude when consumers recommend mobile payments to others (e.g., Srivastava and Singh, 2022). As previously noted, Bizum has become very popular because of its accessibility and its ability to link almost all banking operators. It is, therefore, attractive and valuable to its users, which leads them to employ, and recommend, it to others. Based on these arguments, the following hypotheses are formulated:

**H1a.** Attitude towards the use of Bizum directly and positively influences intention to use Bizum.

**H1b.** Attitude towards the use of Bizum directly and positively influences intention to recommend Bizum to others.

### 3.2. Effects of the subjective norm on intention to use and recommend Bizum.

A second key component of the TPB model is the subjective norm, a concept similar to the “social influence” used in other models, such as the UTAUT (Souiden et al., 2021). The subjective norm is based on the proposition that human behaviour is largely determined by the beliefs, attitudes and opinions of others about that behaviour. It is a pressure that influences individuals to carry out, or not carry out, behaviours (Ajzen, 1991; Teo et al., 2012). It must not be forgotten that this “social pressure” is no longer exerted only by proximate social spheres (family, friends, co-workers, etc.). In a globalised world, social influence is globalised. In the banking and mobile payments field, and more specifically in the case of Bizum, behaviour must be “approved” by others. In fact, it is likely that much of Bizum's success is due to its large number of users, as this volume is a sign of their approval of the platform. Finally, the opinions of others not only influence intention to use a specific product; there is evidence that they are also decisive in recommending it, as this makes the recommender be seen in a positive light by others (Belanche et al., 2020). The subjective norm has been shown to be a precursor of the adoption of mobile payments (e.g., Kalinić et al., 2019; Lara-Rubio et al., 2021; Liébana-Cabanillas et al., 2015, 2021a, 2021b; Phonthanukitithaworn et al., 2016; Schierz et al., 2010) and intention to recommend (e.g., Srivastava and Singh, 2022). Based on these arguments, the following hypotheses are proposed:

**H2a.** The subjective norm related to the use of Bizum directly and positively influences intention to use the system.

**H2b.** The subjective norm related to the use of Bizum directly and positively influences intention to recommend it to others.

### 3.3. Effects of perceived control on intention to use and recommend Bizum.

The third and final precursor of intention proposed in the TPB is “perceived behavioural control”. Perceived control refers to the degree to which people believe they have sufficient resources (e.g., time, finances), opportunities and skills to perform a certain behaviour (Tucker et al., 2020). Its origin is in the work of Bandura (1977) and self-efficacy theory, and it has been proposed as a predictor of intention to adopt mobile payments (e.g., Cao et al., 2016). In the present study, perceived control is understood to be the degree to which a consumer feels “prepared” to use Bizum as a means of payment because (s)he considers (s)he has sufficient technological skills and resources. Similarly, Verkijika and Neneh (2021) proposed that when consumers perceive that mobile payments are simple, safe and reliable they will be more likely to recommend them to others. Thus, it is reasonable to conclude that if the

consumer has high perceived control (s)he will not only feel secure in using Bizum, but also in recommending it to others. Thus, the following hypotheses are proposed:

**H3a.** Perceived control over the use of Bizum directly and positively influences intention to use the system.

**H3b.** Perceived control over the use of Bizum directly and positively influences intention to recommend it to others.

### 3.4. *Effects of perceived risk on intention to use and recommend Bizum.*

As previously noted, some authors (e.g., Liébana-Cabanillas et al., 2021a; Kalinić et al., 2020) have argued that the classic models of the adoption of different forms of mobile payment (e.g., TAM, TPB) do not explicitly include perceived risk as a barrier to their adoption. Nonetheless, there is no doubt that perceived risk is one of the biggest predictors of the adoption of mobile payments (Al-Saedi and Al-Emran, 2021; Kalinić et al., 2019; Lara-Rubio et al., 2021; Liébana-Cabanillas et al., 2015, 2020, 2021a, 2021b; Yang et al., 2015).

Since Bauer (1967) first conceptualised “perceived risk”, very many works have highlighted the importance of the construct in human behaviour. In general, consumers perceive risk when two circumstances converge, uncertainty and possible negative consequences (Cunningham, 1967).

First, potential users of Bizum may perceive risk because they consider that there is uncertainty in using a platform that offers a disruptive and innovative service. Mitchell (1999) argued that this lack of certainty may have its origins in: (1) the individual’s ignorance of his/her own needs and objectives (e.g., not being clear whether Bizum suits his/her usual way of making payments); (2) uncertainty about the alternatives available and the importance of their attributes (e.g., P2P applications being very new forms of payment, consumers may not be aware of the alternatives and their functionalities such that, when using Bizum, they may feel that if they had sought more information they would have perhaps found a more appropriate mechanism); (3) uncertainty about the predictive validity of the attributes that the individual evaluates with respect to future outcomes (e.g., as P2P payments are not well known, the consumer may feel uncertainty about which aspects should be evaluated when using Bizum or its alternatives); (4) uncertainty about one’s ability to assess the validity of the results due to lack of previous experience (e.g., as Bizum is new, the consumer will probably not have used it much, and this limited experience may generate greater risk); (5) the difficulty the consumer may face in carrying out an overall evaluation of the brand (e.g., Bizum is new, and misunderstandings might occur between the brand and its supporting banks); and (6) the probability that situations experienced in the past will not be the same as experiences that might be faced in the future (e.g., derived from the consumer’s limited experience of Bizum).

Second, risk may be generated through the consequences of using and/or recommending Bizum (Lee, 2009). Users might ask themselves what will happen if there is a massive hack into the system and the hackers make illicit use of their Bizum accounts. In what position will I be with my social group if I recommend they use Bizum, and the results are not satisfactory?

As can be clearly seen, using and recommending Bizum creates uncertainty in the individual given that these behaviours may have negative consequences. Therefore, we propose the following hypotheses:

**H4a.** The perceived risk associated with using Bizum directly and negatively influences intention to use the system.

**H4b.** The perceived risk associated with using Bizum directly and negatively influences intention to recommend it to others.

### 3.5. *The moderating effects of perceived security and the amount of money to be transferred on the impact of perceived risk on intention to use and recommend Bizum.*

As previously noted, the mobile payments literature has limitations because the perceived risk variable has been little taken into account in the proposed models. Specifically, the influence of perceived risk on intentions to use and recommend may not be the same for all consumers, but may vary based on the perceptions of, and type of transactions made by, consumers. To overcome these limitations, the perceived risk variable has been introduced into our model and, moreover, we assess the moderating role of two additional variables – perceived security and the amount of money to be transferred – in the impact of perceived risk.

Perceived security in the online and digital realm has been defined as “the extent to which a consumer believes that making payments online is secure” (Vijayarathy, 2004, p. 751). This variable has been shown to be one of the most determinant factors in the success of electronic commerce (Flavián and Guinalú, 2006). Perceived security has been proposed as a fundamental construct for increasing trust in, and the adoption of, mobile banking (Souiden et al., 2021). It should be noted that perceived security helps dissipate perceived risks. Lim (2003) argued that the main source of perceived risk in online shopping relates to its technological aspects (e.g., computer security failures). Lim (2003) and Zhuang et al., (2018) showed that consumers who make online purchases are exposed to technology-related risks, such as fraud, computer failures and privacy problems. In a complementary way, Wu et al., (2020), Lin et al., (2019) and Park et al., (2019) highlighted that perceived security is as a key element in addressing the perceived risks inherent in online transactions. In the Bizum case, the effect of perceived risk on intentions should be moderated by the degree of perceived security of the operation. The perceived risk caused by the consumer’s ignorance of P2P payment services, and consequent uncertainty, will have a particularly negative effect when perceived security is low (Flavián and Guinalú, 2006; Moriuchi, 2021), as the combination of perceptions of risk and lack of security will contribute to his/her indecisiveness and demotivation. However, although the consumer might perceive this type of service has risks, the perception that the application contains elements that ensure its security can nullify the possible negative effects of perceived risk. Thus, lower levels of perceived security will reinforce the negative effect of perceived risk on consumers’ intentions to use and spread WOM about the app, while higher levels of perceived security will

weaken the negative impact of perceived risk on these intentions.

Based on these factors, the following hypotheses are proposed:

**H5a.** The negative impact of perceived risk on intention to use Bizum decreases as perceived security increases.

**H5b.** The negative impact of perceived risk on intention to recommend Bizum decreases as perceived security increases.

On the other hand, the amount of money transferred is a common element of examinations into perceived risk, particularly in financial operations, as it is directly associated with the financial risk dimension discussed in the classic literature (e.g., Cox, 1967; Jacoby and Kaplan, 1972; Mitchell, 1998). The consumer's fears of the problems that may arise in an uncertain purchase scenario, such as on the Internet, are usually related to the volume of the transaction. Thus, the consumer is observed to show progressively greater reluctance to undertake higher volume transactions. Some authors have shown that perceived risk can reduce the online purchase intentions even of high-spending consumers by increasing their uncertainty about the possible outcomes of transactions (Forsythe and Shi, 2003).

By applying this knowledge to the present study context, it can be seen that, if the Bizum transaction fails, the user may lose the amount transferred and face associated problems from the social perspective (e.g., disappointment, delay in the payment). In addition, given that Bizum is a new technology, the amount to be transferred may have a moderating effect on the consumer's adoption and recommendation of the service. Specifically, the perceived risk associated with this type of service would be of little importance for users carrying out small transactions; on the other hand, as the amount of money to be transferred increases, the negative effect of perceived risk would increase and the consumer might avoid using an uncertain service in a large transaction, as the loss of a substantial sum of money would have more negative consequences. It is, thus, reasonable to conclude that the impact of perceived risk on intention to use and recommend will be moderated by the amount to be transferred. Specifically, as the amount to be transferred increases, the risk inherent in the operation will be greater, so the negative impact of perceived risk on the consumer's intentions will be reinforced.

Thus, the following hypotheses are proposed:

**H6a.** The negative impact of perceived risk on intention to use Bizum will be greater as the amount to be transferred increases.

**H6b.** The negative impact of perceived risk on the consumer's intention to recommend Bizum will be greater as the amount to be transferred increases.

### 3.6. Control variables

To complete the model, it is proposed that consumers' intentions to use and spread WOM may vary based on their sociodemographic profiles (Belanche et al., 2020; Cheng et al., 2011). In particular, it is proposed that gender and age might have direct effects on intentions to use, and spread WOM about, Bizum. Similarly, for the sake of completeness, and to clarify their role in the research model, the possible direct effects of the moderating variables, that is, perceived security and the size of the transaction, on the consumer's intention to use and recommend Bizum, are also examined.

## 4. Methodology

### 4.1. Data collection

To test the model's hypotheses we conducted a survey among Bizum users. The questionnaire was distributed online through links in popular social media, such as Twitter, Instagram, WhatsApp, Facebook and LinkedIn, following a non-probabilistic convenience sampling method. The data collection took place during three weeks in May 2021; 240 responses were received. The survey was

**Table 1**  
Demographic characteristics.

		Survey respondents Percentage	Bizum users Percentage <sup>a</sup>	Smartphone users Percentage <sup>b</sup>
Gender	Female	56.8	N.A.	49.1
	Male	43.2	N.A.	50.9
Age (years)	<24	37.8	20.0	16.6
	25–34	32.0	28.0	19.6
	35–44	16.7	25.0	23.2
	45–54	10.4	16.0	22.0
	55–64	2.3	11.0 (>54)	12.9
	>64	0.9	N.A.	5.7
Occupation	Full time employee	50.5	N.A.	N.A.
	Part time employee	8.6	N.A.	N.A.
	Student	32.8	N.A.	N.A.
	Other categories	8.6	N.A.	N.A.

Notes: Spanish users based on <sup>a</sup> Acosta (2021), <sup>b</sup> INE (2020).

described as a university study about the P2P mobile app Bizum. A condition of answering the questionnaire was that the participants had to have used the service at least once in the previous year. Several control questions were included to ensure the reliability of the responses. After removing incomplete and inconsistent responses, the sample consisted of 222 valid questionnaires. Table 1 depicts the sociodemographic information of the sample and compares it with the distribution of the available sociodemographic information of Bizum and smartphone users in Spain. We conclude that these latter characteristics are similar to those of the participants in the present study, with younger users overrepresented.

#### 4.2. Research instrument and measurement validation

To ensure the content validity of the scales used to measure the research model's variables they were borrowed from the previous technology adoption and online banking literature (see Table 2). Each of the scales consists of three items measured on 7-point Likert-type scales (1 being "totally disagree", 7 being "totally agree"). Finally, following Mundel et al., (2018), the average amount of money transferred in each Bizum operation by each participant was measured on an interval scale ranging from 1 to 9: <1€, between 1€ and 4.99€, between 5€ and 9.99€, between 10€ and 14.99€, between 15€ and 19.99€, between 20€ and 29.99€, between 30€ and 49.99€, between 50€ and 99.99€, and 100€, or more, per transaction. Table 2 presents the items of the reflective scales employed to measure the constructs and the factor loadings of each item, and their significance.

To assess measurement validity (see Table 2) we first confirmed that all item loading scores were above the recommended benchmark of 0.7 (Henseler et al., 2009). One item of the perceived risk scale was excluded based on this criterion. The composite reliabilities of all the constructs were above 0.8, confirming their internal consistency. An additional indicator of convergent validity was that the average variance extracted (AVE) values were also higher than 0.7 for all constructs (again above the 0.5 benchmark, Fornell and Larcker, 1981).

To verify discriminant validity, we assessed whether the values of the square roots of the AVEs were higher than the inter-construct correlations (Fornell and Larcker, 1981). All construct pairs satisfied this criterion, which supports the discriminant validity of the measures (Table 3). In addition, the heterotrait-monotrait ratios (HTMT) of the correlations between the variables were below the 0.85 threshold in all cases (Henseler et al., 2015). Table 3 shows the square roots of the AVE values for the reflective constructs in the framework, and the correlations and HTMT values of all the study measures.

The variance inflation factors (VIFs) were calculated to assess whether the structural model had any collinearity problems. All VIF values were lower than 2, clearly below the threshold value of 5 proposed in the literature (Hair et al., 2017).

Finally, we analysed the global model fit. The normed fit index (NFI) of the research model is 0.88, which is close to the recommended value of 0.90 (Hu and Bentler, 1998). The standardised root-mean-square residual (SRMR) of the research model is 0.04, which is below 0.08, indicating good model fit (Hu and Bentler, 1998).

**Table 2**  
Measurement instrument and construct reliability.

Constructs and measurement items	Standard Loadings
<b>Attitude</b> (Cronbach's $\alpha = 0.959$ ; CR = 0.973; AVE = 0.924; adapted from Belanche et al., 2012)	
I like the idea of using Bizum	0.975
Using Bizum is pleasant	0.955
I have a good opinion about using Bizum	0.953
<b>Subjective Norm</b> (Cronbach's $\alpha = 0.969$ ; CR = 0.979; AVE = 0.941; adapted from Taylor and Todd, 1995; Belanche et al., 2011)	
People who are important to me think that I should use Bizum	0.969
People whose opinions I value prefer that I use Bizum when carrying out transactions	0.981
People who influence my behaviour think that I should use Bizum	0.959
<b>Perceived Control</b> (Cronbach's $\alpha = 0.851$ ; CR = 0.910; AVE = 0.771; adapted from Taylor and Todd, 1995)	
When I use Bizum I feel that I have control over the things I do	0.852
The use of Bizum is under my control	0.911
When using Bizum I do not feel confused	0.870
<b>Perceived Risk</b> (Cronbach's $\alpha = 0.678$ ; CR = 0.846; AVE = 0.736; adapted from Kim et al., 2009; Xu et al., 2010)	
I am cautious when using new services such as Bizum	0.946
I prefer alternative options because using Bizum may be risky	0.490
I avoid using Bizum because it involves unexpected risks	0.752
<b>Security</b> (Cronbach's $\alpha = 0.964$ ; CR = 0.975; AVE = 0.930; adapted from Belanche et al., 2015)	
I think Bizum has mechanisms to ensure the safe transmission of its users' information	0.971
Bizum allows me to undertake transactions with security	0.973
I feel safe using Bizum for undertaking transactions	0.948
<b>Intention to Use</b> (Cronbach's $\alpha = 0.973$ ; CR = 0.982; AVE = 0.949; adapted from Belanche et al., 2012)	
I intend to use this service	0.988
I think I will use this service	0.983
I predict I will use this service	0.951
<b>WOM Intention</b> (Cronbach's $\alpha = 0.931$ ; CR = 0.956; AVE = 0.879; adapted from Harrison-Walker, 2001)	
If someone asked me about Bizum, I would give a positive opinion	0.956
If I had the opportunity, I would highlight the advantages of Bizum	0.893
I would recommend Bizum	0.963

Note: All standard loadings are significant at 0.01.

**Table 3**  
Correlations and discriminant validity.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Attitude	<b>0.961</b>	<i>0.356</i>	<i>0.660</i>	<i>0.220</i>	<i>0.544</i>	<i>0.764</i>	<i>0.772</i>	<i>0.124</i>	<i>0.076</i>	<i>0.118</i>
2. Subjective Norm	0.343	<b>0.970</b>	<i>0.429</i>	<i>0.358</i>	<i>0.276</i>	<i>0.331</i>	<i>0.388</i>	<i>0.147</i>	<i>0.010</i>	<i>0.035</i>
3. Perceived Control	0.600	0.388	<b>0.878</b>	<i>0.277</i>	<i>0.593</i>	<i>0.686</i>	<i>0.738</i>	<i>0.081</i>	<i>0.119</i>	<i>0.108</i>
4. Perceived Risk	0.194	0.300	0.214	<b>0.858</b>	<i>0.382</i>	<i>0.292</i>	<i>0.312</i>	<i>0.063</i>	<i>0.024</i>	<i>0.065</i>
5. Perceived Security	0.524	0.266	0.538	0.336	<b>0.964</b>	<i>0.566</i>	<i>0.604</i>	<i>0.093</i>	<i>0.032</i>	<i>0.030</i>
6. Intention to Use	0.739	0.321	0.626	0.271	0.550	<b>0.974</b>	<i>0.763</i>	<i>0.115</i>	<i>0.018</i>	<i>0.176</i>
7. WOM Intention	0.733	0.366	0.663	0.270	0.575	0.731	<b>0.938</b>	<i>0.084</i>	<i>0.026</i>	<i>0.144</i>
8. Age	-0.122	-0.146	0.049	-0.065	-0.091	-0.113	-0.081	NA	<i>0.001</i>	<i>0.292</i>
9. Gender	-0.075	-0.003	0.108	0.005	-0.031	0.004	-0.004	0.001	NA	<i>0.071</i>
10. Amount transferred	0.116	-0.035	0.092	-0.047	0.030	0.173	0.143	0.292	-0.071	NA

Notes: NA: not available. The diagonal elements (in bold) are the square roots of the AVEs (variance shared between constructs and their measures); the below-diagonal elements are the inter-construct correlations. The above-diagonal elements (in italics) are the HTMT values.

**5. Results**

To test the proposed hypotheses we employed SmartPLS3.0 software, which is based on the PLS algorithm, followed by a bootstrapping technique using 5,000 subsamples (Hair et al., 2011). The results and hypotheses tests are presented in Table 4.

The study’s results confirmed that customers’ attitudes towards Bizum positively influence their intention to use the service ( $\beta = 0.490, p < 0.01$ ) and their WOM intention ( $\beta = 0.431, p < 0.01$ ), which supports H1a and H1b, respectively. Contrary to our predictions, the subjective norm did not significantly influence intention to use the service ( $\beta = 0.018, p > 0.05$ ) nor WOM intention ( $\beta = 0.070, p > 0.05$ ); thus, H2a and H2b are not supported. Customers’ perceptions of control of the service significantly influenced their intentions to use it ( $\beta = 0.193, p < 0.05$ ) and to recommend it to others (WOM intention) ( $\beta = 0.241, p < 0.01$ ), supporting H3a and H3b. Perceived risk did not significantly influence intention to use the service ( $\beta = 0.018, p > 0.10$ ) nor WOM intentions, thus H4a is not supported. Nevertheless, that perceived risk had no significant effect might be explained by moderation effects. That is, perceived risk may not directly influence behavioural intentions, which may, instead, be affected by moderating factors.

In particular, perceived security was shown to significantly moderate the influence of perceived risk on both intention ( $\beta = -0.081, p < 0.05$ ) to use and WOM intention ( $\beta = -0.102, p < 0.05$ ), supporting H5a and H5b, respectively. The negative sign of this effect indicates that the variables interact negatively, that is, the influence of perceived risk on behavioural intentions is increased when perceived security is low and weakened when perceived security is high. In contrast, the average amount transferred by the users did not moderate the effect of perceived risk on intention to use ( $\beta = -0.092, p > 0.05$ ) and WOM intention ( $\beta = 0.076, p > 0.05$ ); thus, H6a and H6b are not supported.

Finally, we analysed the influence exerted by the control variables on the dependent variables. The customer’s age did not significantly influence intention to use ( $\beta = -0.044, p > 0.05$ ), nor WOM intention ( $\beta = 0.006, p > 0.05$ ). The customer’s gender also had no significant influence on his/her intention to use the service ( $\beta = 0.016, p > 0.05$ ), nor his/her WOM intentions ( $\beta = -0.005, p > 0.05$ ). Perceived security was not shown to have a significant effect on intention to use ( $\beta = 0.109, p > 0.05$ ), but it did significantly increase WOM intention ( $\beta = 0.134, p < 0.05$ ), which suggests that users will recommend the service to others when they perceive that it is secure. In turn, the average amount transferred was shown to have a positive influence on intention to use the service ( $\beta = 0.106, p < 0.05$ ), but not on WOM intention ( $\beta = 0.063, p > 0.05$ ), which indicates that customers who use Bizum to make larger transactions are more willing to continue using the service in the future than are customers who undertake smaller transactions.

To assess the predictive capacity of the structural model two indicators were considered. The explained variance for both, intention to use the service ( $R^2 = 0.648$ ) and WOM intention ( $R^2 = 0.665$ ), were shown to be high. Thus, the study framework has greater predictive capacity than previous studies that addressed behavioural intentions towards technology-based services, which usually

**Table 4**  
Results and hypotheses tests.

Hypothesis	Relationship	$\beta$	p-value	Result
H1a	Attitude → Intention to Use	0.490	0.000**	Supported
H1b	Attitude → WOM Intention	0.431	0.000**	Supported
H2a	Subjective Norm → Intention to Use	0.018	0.725	Not supported
H2b	Subjective Norm → WOM Intention	0.070	0.200	Not supported
H3a	Perceived Control → Intention to Use	0.193	0.017*	Supported
H3b	Perceived Control → WOM Intention	0.241	0.001**	Supported
H4a	Perceived Risk → Intention to Use	0.036	0.450	Not supported
H4b	Perceived Risk → WOM Intention	0.006	0.905	Not supported
H5a	Perceived Risk × Perceived Security → Intention to Use	-0.081	0.049*	Supported
H5b	Perceived Risk × Perceived Security → WOM Intention	-0.102	0.034*	Supported
H6a	Perceived Risk × Amount transferred → Intention to Use	-0.092	0.325	Not supported
H6b	Perceived Risk × Amount transferred → WOM Intention	0.076	0.294	Not supported

Notes: \*  $p < 0.05$ , \*\*  $p < 0.01$ .



returned results around  $R^2 = 0.4$  (Venkatesh and Davis, 2000). In addition, we analysed Stone-Geisser's Q2 (Stone, 1974; Geisser, 1975), which evaluates the model's capability to predict endogenous latent variable indicators, using the blindfolding technique (Tenenhaus et al., 2005). In our framework, the Q2 indicator returned a value of 0.543 for intention to use, and 0.524 for WOM intention. As both Q2 values are well above zero, we conclude that the observed values are well reconstructed (Henseler et al., 2009), which indicates the suitability of our research model in terms of predictive relevance.

## 6. Discussion

The COVID-19 pandemic that began in the first quarter of 2021 accelerated digitalisation in all productive sectors and caused important changes in consumer behaviours. The present study analyses the adoption of P2P payment systems, given the growing interest shown in them and the scarcity of previous studies. To do so, an undoubtedly successful innovation was chosen as a reference, that is, Bizum.

The results obtained partially confirmed the validity of the TPB for assessing the adoption of this new payment form. Thus, the positive impacts of attitude and perceived control on intentions, expressed in our model as intentions to use and to recommend, were tested. It was confirmed that the attitude that users have towards Bizum is the main determinant of their adoption of the service. This relationship confirms that users' evaluations of the service are fundamental in their decisions to use and recommend it to others. Its users highly value Bizum's functionality, and this positive opinion encourages them to use it and spread WOM about it among their peers. In turn, their perceived control over the application also exerts a positive influence on their intentions to use and spread WOM about it. The degree of control that users experience when using the application is important for its adoption. Therefore, the results suggest that among Bizum's success factors are its simplicity and the ease with which its users can undertake transactions on their mobile phones (e.g., in comparison to traditional offline and online banking alternatives), which encourages them to use it and recommend it to others.

However, the results of the study did not show that the subjective norm, one of the main TPB factors, exerted a significant influence on intentions to use and recommend. Previous studies in the field of mobile payment adoption have found that the subjective norm does influence intentions (e.g., Ramos de Luna et al., 2017; Lara-Rubio et al., 2021; Liébana-Cabanillas et al., 2021a). It is, therefore, possible that Bizum has some differentiating features that makes others' opinions not influential in its adoption. Perhaps its inherent advantages are sufficient for widespread and successful adoption, irrespective of social approval. That is, the fact that it is a very simple, reliable application integrated into the mobile apps and websites of its associated banks and businesses represents sufficient value for its adoption. Indeed, previous research on P2P payment systems has found that subjective norms may actually affect users' judgments (e.g., usefulness perception, Kalinić et al., 2020), thus, indirectly affecting adoption.

An additional contribution of the study is the assessment of the impact of perceived risk on users' intentions in the context of P2P payment services. Contrary to expectations raised by previous research (Kalinić et al., 2019; Lara-Rubio et al., 2021), the results suggested that perceived risk does not directly and negatively affect users' intentions to use or recommend. However, our study found that perceived risk does play an important role when it is moderated by perceived security. Specifically, perceived security moderates the effect of perceived risk on intention to use and on WOM intention. That is, perceived risk has a significant negative effect when users perceive that Bizum's security levels are lower, an effect which disappears when its users perceive Bizum to be secure. Thus, the results of the research suggest that the uncertainty generated in users if they consider mobile payment services to be insecure is a barrier to their adoption, and to WOM intention; however, perceived risk ceases to be a barrier if users perceive that the tool is secure. In addition, an analysis of the direct effect of perceived security, as a control variable, showed that it increases WOM intentions. Thus, users who perceive that the system's security levels are low prefer not to recommend it to others, probably to avoid harming them; however, users will be more willing to recommend Bizum to others if they perceive it is secure.

On the other hand, the second proposed moderator, the size of the transaction, was not shown to be significant. That is, the effect of perceived risk did not vary based on the amount of money to be transferred. However, the size of the transaction did have a direct positive effect on intention to use Bizum. Thus, users who make bigger transactions intend to use Bizum in the future, while users who make smaller transactions have lower intention to use the system. Although most Bizum users make relatively small transactions, 51.46 euros on average (Xatakamovil, 2021), the application allows transactions of up to 1,000 euros, and some of its users employ it repeatedly as a means of payment even in their usual shops. Thus, users who value Bizum as a means of carrying out large transactions intend to continue using the service repeatedly in the future, but it is less important for users who carry out smaller transactions.

Finally, the sociodemographic control variables age and gender did not have significant effects on intention to use or spread WOM about the system. These findings are consistent with the results of previous research into P2P payment systems (Kalinić et al., 2019). In particular, our results showed that Bizum, like other general P2P payment services, should aim at attracting a wide audience; that is, as men and women of any age can be potential users of these services, these applications should be addressed to all user types to increase their expansion and encourage their widespread use.

In sum, the research findings showed that Bizum users employ and recommend Bizum because of the individual positive opinions (i.e., attitude) they hold about the service and because of the degree of control they experience when using the service. As a reference payment service, Bizum is employed on an individual basis as a mobile application that allows its users to make payments to other users while maintaining control of these payments; this suggests that the individual motivations of its users are important, while social approval for using this type of service is not. In addition, the perceived risk of these services is important only when their users believe they are insecure, but this barrier to adoption and peer-peer dissemination disappears if their users perceive they have a high level of security. Finally, as a mass transfer service, Bizum (and similar services) should be aimed at all potential users, that is, men and women of all ages. In addition, Bizum's future use among users who make larger transactions seems assured, which suggests it has been

adopted as an important payment service that will very likely gradually replace other payment forms (e.g., cash, cards).

## 7. Managerial implications

The initial support of the banking sector contributed to Bizum becoming a mass payment system in Spain. The COVID-19 pandemic only strengthened its position, because of the demand it created for payment methods that do not require physical interaction. It is, therefore, a paradigm that can serve as a reference for the implementation of similar systems in Europe and worldwide.

Our study found that individuals' attitudes are the most important determinant of intention to use and spread WOM about Bizum. It is evident that Bizum has characteristics that have made it an unprecedented success and have led its users to develop a very positive attitude towards it. Nevertheless, the banks supporting the system should use advertising and other communication tools to persuade potential users to start employing this P2P system. These messages should project a positive image of Bizum based on its advantages and popularity, showing it to be a very useful tool for boosting positive attitudes among laggards and reluctant individuals. Since this online payment system is also offered by traditional banks, new users might be reached by both online channels (e.g., through messages in the online banking app) and by in-person contact (e.g., advice proffered by bank employees).

The findings also suggested that users of this P2P system are not affected by social norms, but they need to feel that they are in control of its operation to continue using and recommending it to others. To increase perceived control, the alliance of partners supporting Bizum should ensure that users can operate the system, simply and confidently, by themselves. Training can help users manage and control the system. Videos, short tutorials and demo versions might be employed for this purpose.

From a more technical viewpoint, our study found that customer risk perception of the service reduced intention to use and spread WOM when system security was perceived as low, but this negative influence dissipated if its users consider that Bizum is secure. In addition, this security perception encouraged users to recommend the system to other people. Consequently, the banks that support the system should give paramount importance to investments in security and security perceptions.

This new system should be perceived to be at least as reliable and secure as card and PayPal payments; the partners involved in the development of Bizum should collaborate to create a climate of trust and security in order to attract more risk-averse users.

Finally, the results of the study showed that age and gender do not significantly influence use intention and WOM intention. Thus, to achieve growth in the short term, Bizum and similar platforms should target a broad spectrum of consumers (Cabrerá-Sánchez et al., 2021). While young people are the most common P2P users, the expansion of these services should be based also on their adoption by the older population. The managers of P2P services, and even public administrations, should promote them as an alternative to cash or card payments to facilitate their adoption by older people. For example, making P2P payments an option for payment in online stores would increase their recognition and, therefore, broaden their user base. This type of action could be undertaken in the local retail outlet digitalisation projects, which provide access to online sales channels to small shops, being carried out in different cities, for example, through the creation of proximity-based online marketplaces.

## 8. Limitations and future research lines.

In just 5 years, Bizum has become a Spanish mobile payment phenomenon. Exponential growth based on P2P payments has taken the system beyond interpersonal transactions and it now represents a real threat to the leading online purchase payment modes (mainly cards and PayPal). Although in the present study we argue that Bizum is an ideal candidate through which to assess P2P payment systems and, therefore, it would be reasonable to generalise the results to other systems and countries, they should be treated with caution given that the analysis is of a sample of a specific platform in a specific country. This is a limitation in virtually all research papers and, therefore, it would be interesting to test the proposed theoretical model in other sociocultural contexts and with other P2P payment platforms. It would be interesting to assess, for example, possible differences with other countries, such as China, Japan and South Korea, where mobile payment adoption is more advanced (Migliore et al., 2022). Similarly, the adoption of mobile payment services in specific population groups, for example, among older users, who are habitually suspicious of digital services, should be investigated. The use of quota sampling instead of convenience sampling would help better identify sample representativeness.

In addition, future studies might examine potential users who have shown reluctance to employ these systems, rather than current users. For instance, recent research into P2P payment systems has suggested that levels of personal innovativeness affect use intention (Lara-Rubio et al., 2021; Liébana-Cabanillas et al., 2021a). Further research might analyse whether personal variables related to customers' level of technological readiness (Flavián et al., 2022) may be decisive for early adoption of these initiatives. Practical studies might address how to overcome risks in P2P systems (Kalinić et al., 2019, Kalinić et al., 2020), paying particular attention to improved security and the identification of alternative moderating factors.

Moreover, further research should explore whether these P2P platforms reduce the pain of payment and increase consumers' spending, as sometimes happens with credit cards (Liu and Dewitte, 2021). Finally, given that it is increasingly common for P2P payments to be offered as an online payment option, it is likely that the average size of transactions will increase, so an assessment should be made of how the role of the amount transferred varies in the future as customers become more accustomed to using the system. In turn, it would be interesting to examine, specifically, the growing use of these services in stores, since this business opportunity could represent a threat to hegemonic services such as credit cards and cash.

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The authors declare the following financial interests/personal relationships which may be considered as potential competing

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