Does privacy and ease of use influence user trust in digital banking applications in Spain and Portugal?

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Abstract

The growth of technology in recent years and the increased use of digital platforms has boosted e-commerce, where digital banking stands out in this research. The present study aims to analyze the impact of the variables privacy, ease of use and trust in digital banking. In addition, it studies whether this impact is affected by the nationality of the users. The study was conducted through a literature review and the dissemination of an online questionnaire using PLS software. The analysis validated the measurement scale and analyzed the structural model at different stages, which confirmed its validity and reliability. The research concludes that privacy positively influences trust and perceived ease of use by users. Moreover, it confirms that the higher the perceived ease of use, the higher the consumer trust. However, the research does not show significant results to support that the difference in nationality positively and directly influences the sense of trust, privacy and ease of use of the surveyed users.

Keywords Privacy · Ease of use · Digital bank · Trust · Students · Spanish · Portuguese

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Introduction

The growth and development of technology in recent times and the increased use of digital platforms by companies have set a new course in the work and personal lives of workers and users (Fernández-Fernández et al., 2021). This digital shift has revolutionized consumer behaviour and commercial exchanges, where e-commerce is positioned at its peak (Agyapong, Agyapong et al., 2017; Alkhouli, 2018).

In the banking sector, it is worth noting how commercial banks and financial institutions have been implementing Internet e-banking services in the last decade. However, digital banking does not involve direct contact with the individual, there-foree-banks must offer a higher quality of service in order to compete (Abreu et al., 2015; Davis et al., 1989). Banking customers' aspirations and interests in relation to service are expanding as technology progresses and evolves (Shankar & Jebarajakir-thy, 2019). In this regard, security and speed of transactions, ease of use, trust, and privacy issues are some of the main factors that customers consider when choosing a bank (Akinci et al., 2004; Hasandoust & Saravi, 2017).

However, while existing literature has advanced considerably, there is still a lack of studies in which the context of analysis is positioned in the relationships between consumers and digital banks. Partly because of this, the main aim of this research is to propose an analytical model that studies the relationship between perceived ease of use, privacy, and consumer trust in the context of online banking, to investigate how the variables influence consumers and whether this is affected by the nationality of the user.

E-privacy is understood as the degree of security of an electronic space and the protection of information provided to customers, ensuring that the data used is not shared or used for other purposes (Masoud & AbuTaqa, 2017; Zeithaml et al., 2000). Furthermore, ease of use is known as the extent to which the understanding of technology leads to adaptation of the innovative service/product by customers (Agyapong et al., 2017; Davis et al., 1989; Masoud & AbuTaqa, 2017). Regarding trust, it can be defined as the belief that a party's word or promise is reliable and that a party will fulfil its obligations in a relationship of exchange.

In order to carry out the study and answer the research questions, an online questionnaire was developed and disseminated through social networks. The questionnaire, which collected a sample of 616 university students from the Spanish Rey Juan Carlos University and the Coimbra Business School in Portugal, was divided into three parts: classification of the respondent, the digital banking variable and the analysis of the measurement scales of the remaining variables.

Once the sample was collected, the variables of the questionnaire were quantified so as to ease the analysis which was carried out with the PLS-SEM computer program. Significantly enough, this model facilitates the development of a statistical analysis of the proposed hypotheses by predicting the dependent variables and facilitating the calculation of their direct and indirect effects (Palos-Sanchez et al., 2019; Reyes-Menendez et al., 2019). The choice of this model was based on the fact that the sample was not large and thus, this model is highly recommended to carry out an exploratory approach (Henseler et al., 2009; Palos-Sanchez et al., 2019).

The analysis was carried out in two main stages: the first was mainly aimed at proving the measurement scale whereas the second intended to analyze the structural model. It should be noted that the measurement scale was validated in two different situations through first- and second-order models due to the multidimensional aspect of this model (Hair et al., 2014). Lastly, in order to analyze the last three hypotheses, a multigroup moderation analysis was performed to examine if there are substantial differences in the different relationships under analysis taking into account if they were Spanish or Portuguese students. Remarkably enough, both models confirmed the effectiveness and reliability of three of the six hypotheses and rejected those hypotheses that differentiated the model by nationality due to the lack of significance (Hair, Risher et al., 2019).

Thanks to this study it can be concluded that there is a high and clear relationship between the constructs ease of use, trust, privacy, and digital banking. Thus, the greater the perceived ease of use, the greater the user's trust. Similarly, the greater the privacy, the greater the consumer's trust, and in turn, the greater the perceived ease of use. As for the multigroup study where it is studied whether there are significant differences between Portuguese and Spanish students, it has been concluded that in this sample there are no significant differences.

In order to carry out this research, a bibliographic study of the literature on the most important concepts that are part of this project will be conducted. Terms such as digital banking will be detailed and the relationship with privacy, trust and ease of use in electronic banking will be analyzed. Afterwards, the methodology used will be described, and the results of the questionnaire will be analyzed. Finally, the conclusions and implications of the research will be presented and future lines of research will be identified.

Theoretical framework

In recent years, the use of the Internet has caused a major transformation in the development of the retail market. This digital shift has revolutionized consumer behaviour and commercial exchanges from those established during the Industrial Revolution (Nisar & Prabhakar, 2017). As a consequence, e-commerce is today at its peak, where online services have transformed into the third most used Internet activity by customers after email, instant messaging and web browsing (Agyapong et al., 2017). Thus, e-commerce is shaping global retail businesses and is redefining the performance of several industries (Alkhouli, 2018).

As a direct consequence of the importance of customer loyalty to increase productivity, profit and prosperity of organizations, managers are constantly inquiring into the main reasons to build a long-lasting relationship with their customers (Anderson & Srinivasan, 2003; Nugroho, Dharmesti et al., 2015). With the rapid evolution of e-commerce, it is essential for companies to diversify their services between offline and online, seeking through both channels to create and establish strong and lasting relationships with customers (Al Dmour et al., 2019; Christodoulides & Michaelidou, 2010; Ghane et al., 2011).

Digital banking

In the banking sector, it is worth noting how commercial banks and financial institutions have been implementing Internet e-banking services over the last decade. In this regard, compared to traditional over-the-counter banking, Internet e-banking does not involve face-to-face contact or a service relationship with the individual. For this reason, electronic banks must offer a higher quality of service in order to compete. Thus, there are many problems that hinder the acceptance of Internet banking (Abreu et al., 2015; Davis et al., 1989). Therefore, it is of vital importance that managers detect which are the determinants of service quality and its impacts (Abreu et al., 2015; Liao & Cheung, 2005).

The launch of the first automated teller machine (ATM) in Finland determined the beginning of a new banking system which transformed Finland into the leading country in electronic banking (Sharma, 2011; Sharma et al., 2017). Thereafter, e-banking, or the provision of financial services through electronic systems, has become widespread among customers due to improved information technology and competition among banks (Shankar & Jebarajakirthy, 2019).

Some researchers define e-banking services as a class of electronic channels for establishing banking exchanges through electronic environments such as Internet, telephone, television, mobile and computer (Lustsik, 2004; Yaghoobi et al., 2011). E-banking manifests itself as the prerequisite of e-commerce and at the same time, e-commerce progresses further with the growth of e-banking. By employing electronic payment method, monetary, and credit resources can be exchanged electronically without the need to transfer them physically (Hasandoust & Saravi, 2017).

On the other hand, it is important to keep in mind that one of the fundamental objectives of banks' financial management is to increase resources and this can be judged as one of the tasks of marketing management in banking. Among them, and one of the most important principles of marketing, is to be aware of customer demands. Knowing the interests of potential customers can be of great importance, as they are the result of the attitudes that they have towards a product or service with a certain characteristic. In today's complex societies, customers seek to reduce their costs, save their time and obtain ease in performing their daily banking activities (Florian & Al Sajjan, 2009).

The aspirations and interests of banking customers in relation to service are expanding as technology progresses and evolves (Shankar & Jebarajakirthy, 2019). Nowadays, customers want to carry out their banking transactions anywhere and anytime without going to the bank branch or being conditioned by the bank's working hours, and do all their transactions in a quick and easy way. That is why the quality of financial services must be characterized by autonomy, flexibility, independence and security, to meet these expectations (Hammoud, Bizri, & El Baba, 2018).

The need to understand and decipher the factors affecting the adoption of online banking is central to the directive of banks, IT service providers and researchers. In fact, the implementation or use of online banking has been a matter of special attention in academic research in recent years to study the causes that project and drive the adoption of online banking services (Davis et al., 1989; Masoud & AbuTaqa, 2017). It follows that customers' experiences with e-banking can influence their expecta-

tions and perceptions (Masoud & AbuTaqa, 2017; Mittal & Gera, 2012). Significantly enough, customers' judgment of banking services is based on the degree of the bank's ability to solve problems and foster sustainable commerce. Apart from this, security and speed of transactions, ease of use, trust and privacy issues are also some of the main factors that customers consider when choosing a bank (Akinci et al., 2004; Hasandoust & Saravi, 2017).

E-privacy

E-privacy is defined as the degree of security of an electronic space and the protection of information provided to customers, ensuring that the data used is not shared or used for other purposes (Masoud & AbuTaqa, 2017; Zeithaml et al., 2000). Interestingly, this variable plays a critical place in e-banking services, as customers perceive a significant threat or exposure in the virtual environment through the use of this online service. This is due to the possibility of misuse of their financial and personal data (Kusyanti & Prastanti, 2017).

Other authors define the term privacy as customers' apprehension about intimidation towards their online privacy (Xu et al., 2013). Most customers are uninformed about how their information or data will be cared for or used (Li et al., 2021). This type of uncertainty is associated with privacy and information security, considered as the risks associated with e-commerce (Zaman et al., 2013). Not coincidentally, security and privacy are considered the most important aspects of e-service quality (Hernandez & Mazzon, 2007; Jahangir & Begum, 2008). It should be noted that in the present study, we combine these two concepts and use them as a single concept as other marketing researchers have done (Al-dweeri et al., 2017; Bressoles et al., 2014).

Broadly, security is defined in terms of physical security, financial security, and privacy (Parasuraman et al., 1988) and the protection of data against unauthorized disclosure or unauthorized modification or destruction, while privacy is defined in terms of rights of individuals and organizations to the extent that personal information is to be transmitted to others (Abreu et al., 2015; Liao & Cheung, 2005).

The risk of customers losing privacy and the security of personal information is one of the main obstacles to e-commerce (Chen & Barnes, 2007; Ghali, 2021). This risk is much more critical when talking about electronic banking services. Indeed, "consumer privacy ensures that all personal information linked to that exchange should be confidential to other parties" (Nugroho et al., 2015). Therefore, customers have to feel safe when transacting online with a bank since this assurance of security represents a fundamental role in building customer trust in e-commerce (Casaló et al., 2007; Chatterjee et al., 2020; Jahangir & Begum, 2008).

In this context, three objectives were evident for establishing e-commerce privacy protection policy: minimizing intrusiveness, maximizing of fairness, and creating legally enforceable privacy expectations (Ghali, 2021). These three objectives are paramount for establishing customers' e-trust and e-satisfaction. This implies that if a website can successfully manage personal information, it can reinforce customers' e-satisfaction and e-trust (Ghali, 2021; Nugroho et al., 2015; Shin, Chung et al., 2013).

Ease of use

That ease of use is referred to as the extent to which understanding of the technology leads to adaptation of the innovative service/product by customers (Agyapong et al., 2017; Davis et al., 1989; Masoud & AbuTaqa, 2017). Perceived ease of use is a term therefore understood as the degree to which an innovation is perceived as not difficult to understand, learn or use (Masoud & AbuTaqa, 2017). Similarly, Zeithaml et al. (2000) stated that the degree to which an innovation is easy to understand or use could be considered as Perceived E-Ease of Use.

Therefore, these digital platforms of digital banking must possess features that make it easy for customers to find what they are looking for without difficulty, have a good search system and allow the customer to act easily and quickly forward and backward through the pages. The ease of access to available information is one of the crucial reasons for consumers to decide to buy through the Internet (Masoud & AbuTaqa, 2017). In addition, the literature has confirmed that the drivers of e-banking growth are determined by perceived ease of use, which is a combination of the convenience provided to those with easy access to the Internet, the availability of secure and high-level e-banking functionality, and the need for banking services (Chatterjee et al., 2020; Chen & Barnes, 2007; Hernandez & Mazzon, 2007; Jahangir & Begum, 2008).

Among the characteristics of ease of use related to electronic banking, the ease of reading and understanding the concepts of digital platforms stand out, as well as having an intuitive operating system that is easy to operate and navigate (Masoud & AbuTaqa, 2017). Therefore, it is important to note that to measure ease of use in digital or electronic banking, four dimensions of particular relevance have been identified: ease of recognition, ease of navigation, ease of obtaining information and ease of purchase (Ghali, 2021; Liao & Cheung, 2005).

E-trust

Trust was first defined as "the belief that a party's word or promise is reliable and that a party will fulfil its obligations in an exchange relationship" (Rotter, 1967). Many researchers have claimed that trust is crucial to understanding interpersonal behaviour and economic exchanges (Yousafzai et al., 2003). However, although the importance of trust is widely recognized in management, marketing, communication, IT, etc., there is some ambiguity about its definition, characteristics, and outcomes (Hasandoust & Saravi, 2017; Mayer et al., 1995; Rotter, 1967; Rousseau et al., 1998) have identified the following five issues that summarize the root of this disagreement (Yousafzai et al., 2003):

1. The difficulty of defining trust,
2. The confusion between trust and its antecedents and results,
3. The misunderstanding of the relationship between trust and risk,
4. Confusion of the levels of analysis due to the lack of specificity of trust referents,
5. Failure to consider both the party that trusts and the party that is trusted.

Despite the ambiguity discussed above, recent research is moving toward a definition that reflects all of these aspects of trust. The literature on trust spans a wide variety of disciplines. While customer trust has been studied extensively by marketing and management researchers and psychologists, it has also become relevant to researchers studying e-commerce (Bitkina et al., 2022; Yousafzai et al., 2003).

Specifically, the open nature of the Internet as an exchange platform and its global composition and infrastructure has made trust a crucial component of e-commerce. In this sense, digital banking, lacking the physical presence of a bank branch and a physical relationship and exchange between bank staff and the customer makes for a unique environment in which trust is of paramount importance (Bitkina et al., 2022; Yousafzai et al., 2003).

It is also important to note that the lack of consumer trust is a major obstacle to the faster development of digital exchanges and e-commerce relationships (Casaló et al., 2007; Chatterjee et al., 2020). Some claim that shopping over the Internet requires consumer trust as consumers have to provide their credit card numbers and other personal data. This distrust is a consequence of the particular characteristics of the Internet compared to exchanges and actions performed from traditional channels (Casaló et al., 2007; Chatterjee et al., 2020; Kusyanti & Prastanti, 2017). This is why the term trust is considered a fundamental variable to take into account when studying e-commerce and digital banking.

It is worth highlighting that in spite of the exhaustive research how trust can be earned and the impact it has on digital banking outcomes is still unknown. Trust in e-banking is a new and emerging area of interest in the field of financial services marketing research. As a consequence, the existing literature on trust related to e-banking is sparse and focuses on more general aspects of e-commerce (Bitkina et al., 2022; Yousafzai et al., 2003).

Mayer et al. (1995) identified and validated three main elements of trustworthiness: honesty, benevolence and competence (Bitkina et al., 2022). For the purpose of this research, perceived trustworthiness is defined as customers' perception of the bank's competence, honesty and benevolence when offering banking and financial services online. Belief in the bank's benevolence, competence and honesty will positively influence customers' intention to share personal information with the bank, leading to high trust and a high perception of privacy. This is because these beliefs embody the assurance that the bank will not abuse the information (Bitkina et al., 2022; Kim et al., 2008; Yousafzai et al., 2003; Zhang et al., 2022).

The literature has also shown that perceptions of trust directly or indirectly influence the purchase intentions of e-consumers. Trust beliefs will therefore have a positive effect on customers' intention to engage in online banking transactions as they provide the customer with confidence that the bank is able (competence) and willing (benevolence and honesty) to deliver the services according to their expectations (Bitkina et al., 2022; Masoud & AbuTaqa, 2017; Wu et al., 2010; Yousafzai et al., 2003; Zaman et al., 2013).

As alluded to in the literature, trust is a multidimensional construct, consisting of three different dimensions: benevolence, honesty and competence (Bitkina et al., 2022; Casaló et al., 2007; Flavián & Guinalíu, 2006; Mayer et al., 1995). Benevolence is related to the customer's or consumer's conviction that the other party is

interested in his or her well-being, driven by the pursuit of a mutually beneficial relationship and without pretense of opportunistic behavior (Flavián & Guinalíu, 2006). This means that such a digital platform cares about the present and future interests, aspirations and needs of its consumers and offers them an appropriate and cost-effective service.

Honesty is the consumer's belief that the other party will keep their word, keep their promises and be truthful (Casaló et al., 2007; Mayer et al., 1995; Seckler et al., 2015). In the case of online commerce and digital platforms, this means that there are no misrepresentations and that the information is sincere and honest. Finally, competence assumes that the e-commerce digital platform has the resources (whether technical, financial or human) and capabilities necessary for the exchange or transaction to be successful and to be maintained for the completion of the transaction and the continuity of the relationship (Casaló et al., 2007).

In recent years, much research has been done on the importance of trust in an online context. In e-commerce, trust has been shown to have an important positive influence on the intention to buy a product (Seckler et al., 2015; Zhang et al., 2022). This is why the concept of trust, together with its three dimensions, has been considered a variable of vital importance when studying digital banking.

Hypothesis

As discussed, e-services are, in essence, information systems oriented to digital exchanges, so it is interesting to examine the risk to privacy, security and reliability issues for consumers. The technology acceptance model (TAM) supported by the literature is a model of evaluation and intentions initially specified for information systems research (Davis et al., 1989). It theorizes that consumer intention to adopt a technology is primarily based on the rational evaluation of the outcomes of using the technology, based on the belief in the usefulness and ease of use of the technology (Abreu et al., 2015; Agyapong et al., 2017; Davis et al., 1989; Masoud & AbuTaqa, 2017).

Perceived ease of use is a key factor in the TAM, as it is the degree to which an individual believes that using a given technology is effortless for the user (Agyapong et al., 2017; Davis et al., 1989; Masoud & AbuTaqa, 2017). In the pre-purchase evaluation process, an e-service that appears easy to learn, understand, and use should mitigate consumer uncertainty and overall risk. Although initial support for this general risk-reducing effect has been found in the context of e-services (Featherman et al., 2010), it is still unknown whether privacy and assessed levels of risk affect users' perceived ease of use. That said, the following hypothesis is proposed:

Hypothesis H1a *Privacy directly and positively affects ease of use.*

Several authors have argued that security and privacy are two fundamental requirements for online trust (Flavián & Guinalíu, 2006). However, most research that has studied the relationship between these concepts in the online context has been conducted at the conceptual level. Moreover, although the literature has advanced con-

siderably, there is still a lack of studies in which the context of analysis is positioned in the relationship between consumers and digital banks. Thus, with the aim of delving deeper into this topic, this study proposes a model to analyze the relationship between perceived website security, privacy and consumer trust in the context of online banking. In addition, due to the importance of trust noted above, we also aim to characterize consumer trust in a financial services website in great detail. Next, based on an in-depth review of the relevant literature, we consider that privacy can also be considered as a primary variable of consumer trust (Casaló et al., 2007; Chatterjee et al., 2020). That said, the following hypothesis is put forward:

Hypothesis H2a *Privacy directly and positively affects trust.*

Based on the results of the analysis and discussion on perceived ease of use, service quality, price fairness, and consumer trust (Ayunda et al., 2019), it can be concluded that perceived ease of use, service quality, price fairness, and trust are closely related variables. The literature review conducted points to a multitude of factors that relate the importance of the trust variable to technology. As previously discussed, in TAMs and in a world marked by uncertainty of future events, trust in technology plays a critical role in the acceptance process (Davis et al., 1989; Ejdys, 2018).

The TAM model was established to assess technology acceptance from the perspective of potential users, as well as their attitudes and behaviors. However, it seems important to use the model to assess trust in technology in the context of its use and to indicate the extent to which ease of use and usefulness determine this trust (Davis et al., 1989; Ejdys, 2018; Medyawati et al., 2011).

The connection between perceived ease of use and trust has been discussed in extended TAMs, demonstrating that perceived ease of use during users' interactions with a technology improves their level of trust (Ejdys, 2018). The impact of the ease of use variable on technology trust demonstrates that the ease of use of a newly implemented technology has a positive effect on the level of trust in the technology during its use (Featherman et al., 2010; Tseng, 2022), thus the following hypothesis is proposed:

Hypothesis H3a *Ease of use directly and positively affects trust.*

Studies on nationality differences are common among young people and students. Considering the ease of access and familiarity of new generations with new technologies, it remains to analyze usage preferences depending on the nationality of consumers (Bacete et al., 2021; Gómez et al., 2022; Trindade & Duarte, 2019).

The present study aims to find out whether there are differences between the behavior or perceptions of Portuguese and Spanish users on the use of digital banking and its relationship with trust, privacy and ease of use. These studies also consider the effects of nationality differences. Based on the above considerations, the following hypotheses were formulated:

Hypothesis H1b There are significant differences between Spanish and Portuguese students in hypothesis H1a: Privacy directly and positively affects ease of use.
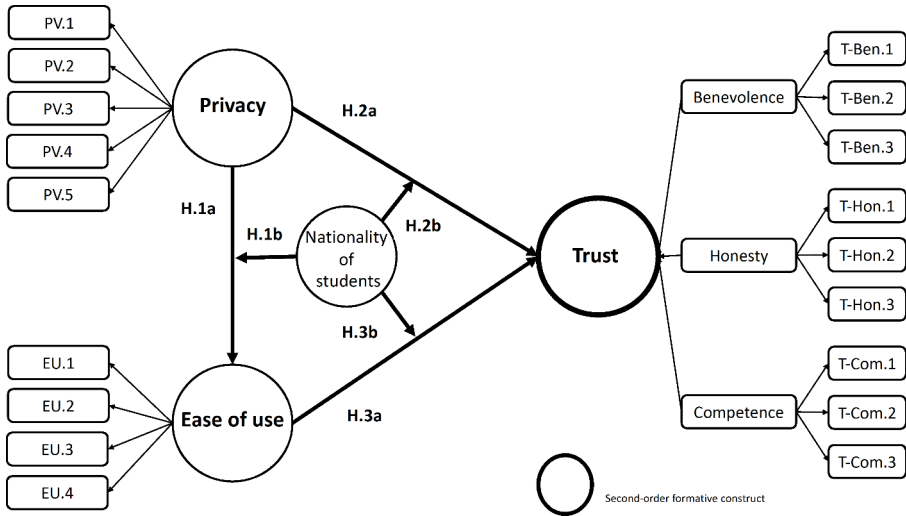
Fig. 1 Research model. (*Source: Compiled by the authors from the model obtained in PLS.*)

Hypothesis H2b There are significant differences between Spanish and Portuguese students in hypothesis H2a: Privacy directly and positively affects trust.

Hypothesis H3b There are significant differences between Spanish and Portuguese students in hypothesis H3a: Ease of use directly and positively affects trust.

Once the theoretical studies for the formulation of the hypotheses and their justification had been carried out. The final approach of the study model has been developed, where all the hypotheses proposed and the measurement scales used can be seen (Fig. 1).

Methodology

Data

In order to test the hypotheses and achieve the objectives set out in this study, a sample of Spanish and Portuguese university students was obtained. The questions were focused on the analysis of the use of the banking app. Respondents were asked to answer with reference to the bank they use the most. For this purpose, they were provided with a questionnaire in their language and with the main banks of the two countries. The sample is composed of university students from two public institutions of higher education that use an app for their banking management. The institutions where the data was collected were the Universidad Rey Juan Carlos (URJC) in Spain and the Coimbra Business School (ISCAC) in Portugal.

Data collection used a self-administered questionnaire managed through a digital platform. The anonymity of the respondents was respected at all times, and they

	Classification variable	Variable	Frequency	Percentage
Table 1 Sample Characteristics (n=616)	Gender	Female	378	61.36%
		Male	238	38.63%
	Size of city of residence	<5000	99	16.07%
		5000–40,000	155	25.16%
		40,000–500,000	205	33.28%
		>500,000	157	25.49%
	Occupation	Student	311	50.49%
		Student and employee	277	44.97%
		Student and self-employed	28	4.55%
	Age	18–25	435	70.62%
		26–45	139	22.56%
		46–55	32	5.19%
		56–65	10	1.62%
	Studies in progress	Degree	458	74.35%
		Master's degree	147	23.86%
		Own degree	11	1.79%
	Study location	In Spain	303	49.18%
		In Portugal	313	50.81%
	Studies in progress by country	Degree in Spain	202	32.79%
		Master's degree in Spain	83	13.47%
		Own degree in Spain	18	2.92%
		Degree in Portugal	233	37.82%
		Master's degree in Portugal	76	12.33%
		Own degree in Portugal	4	0.01%

Source: Own elaboration based on the results of the questionnaire.

were informed that answering the survey implied authorization for the analysis of the data collected. Different measurement scales previously studied in the bibliographic analysis were applied in the elaboration of the questionnaire. These scales have been analyzed separately, since there are few studies where they are analyzed in the same model.

Regarding the structure of the questionnaire, it should be noted that it is divided into three parts. In the first part, the respondent is classified by means of classificatory questions. In the second part, questions related to the banking app are asked. In the third part, the analysis of the measurement scales of the variables is carried out.

The type of measurement scale used for the study is the Likert scale. This measurement scale is the most commonly used in social science studies. It allows to collect the individual's feeling, i.e., it allows to measure more accurately the respondents' answers. The measurement interval ranges from strongly agree "5" to strongly disagree "0" (Alismail & Zhang, 2020).

The sample obtained in the study consists of 303 students from the Universidad Rey Juan Carlos and 313 from the Coimbra Business School. Previously, a sample of 310 and 318 respectively was obtained, but once the database was cleaned, the total

sample of respondents was 616. The criterion for database cleaning was to eliminate all the questionnaires that do not have all the items answered.

The descriptive analysis of the sample shows that the number of female respondents is higher than the number of male respondents. The sample contains 61.36% of women compared to 38.31% of men with a difference of 23.05%. With regard to the size of the city of residence of the individuals, the majority of the respondents are residents of cities with between 40,000 and 500,000 inhabitants. Being 75% of the sample residents in cities with less than 500,000 inhabitants. Another noteworthy fact is the occupation of the students surveyed. It can be seen how 50% of the sample only studies and the other 50% of the sample also works.

On the other hand, of those surveyed who work, it should be noted that 44.97%, i.e. the vast majority of working students, are employed, compared to only 4.55% who are students and self-employed. As for the average age of the respondents, we find that 70.62% are between 18 and 25 years old, followed by students between 26 and 45 years old who account for 22.56%. Finally, 74.35% of the respondents are undergraduate students, followed by Master's students with 23.86%. In terms of nationality 50.81% are Portuguese, with the number of students being very similar in each of the study categories if the sample is differentiated according to the country of study (Table 1).

Method of data analysis

Once the descriptive analysis of the sample has been performed and the procedure for obtaining data for the study has been explained, we proceeded to analyze the model proposed. The partial least squares technique (Calvo-Mora et al., 2020) was chosen for this purpose. This method of structural equation analysis is based on variance. Its analysis capacity facilitates the analysis and estimation of the measurement model taking into account the dependent and independent variables of the model. It is important to note that the technique also makes it possible to quantify the size of the indirect and direct effects between the different variables.

The software used for this analysis is SmartPLS (Roldán & Cepeda, 2016). This software allows us to evaluate the reliability and validity of the measurement scales proposed and to proceed to the measurement of the structural model (Hair et al., 2020). Other analyses it can perform are the study of multigroup moderations. In order to perform the analysis of the model previously proposed, it is necessary to proceed to the validation of the measurement scale (Gelashvili et al., 2021).

Results

Measurement model

In order to carry out the analysis of the results of this study, several important points must be taken into account. The particularities of the model make it necessary to outline the analysis process for this study. First, the analysis of the scale of measurement of the model is carried out. Since there are multidimensional variables, this process

must be divided into two parts. Multidimensional variables first require a validation of the items that make up their dimensions. This analysis is performed on the first-order model. Subsequently, once the items of the dimensions have been validated, they are grouped together. The resulting model is called the second-order model.

After grouping the dimensions as variable items, a new analysis of the measurement scale is carried out. Once the measurement scale has been validated in its two processes, the structural analysis of the model is developed. Three of the six hypotheses (H1a, H2a and H3a) are analyzed. Finally, to analyze the last three hypotheses (H1b, H2b and H3b), a multigroup moderation analysis is performed to verify whether there are significant differences in the relationships studied, taking into account whether the students are Spanish or Portuguese.

In the validation of the measurement scale of the first-order model, the following analyses are performed: individual reliability, composite reliability, convergent validity and discriminant validity, analyses necessary for the validation of reflective variables. In the case of the second-order model, the same analyses are again applied to the reflective variables, while for the formative (trust) the analysis of the weights and the variance inflation factor (VIF) is applied.

The first analysis performed for the validation of the measurement scale is that of individual reliability. In this analysis, the loadings (λ) of the items are analyzed. According to Hair et al. (2014), these loadings must be greater than 0.7. In this study all the loadings meet this criterion.

Secondly, the composite reliability analysis is performed; in this examination the Cronbach's Alpha is analyzed. Hair et al. (2019) point out that the alphas must exceed 0.7 as indicated by the criteria of Nunnally and Bernstein (1994). In this study, all Cronbach's Alpha meet this criterion. To give more robustness to the study, we analyzed the ratio (rho_A) which sets the cut-off criterion at 0.7 set by Dijkstra & Henseler (2015) (Gelashvili et al., 2021). In this study all variables meet the criterion.

Thirdly, the convergent validity analysis was performed. This analysis studies the average variance extracted (AVE). Hair et al. (2020) indicate that all AVE equal to or greater than 0.5 should be accepted. In this study all the variables exceed the cut-off index (Table 2).

To complete the validation of the measurement scale of the reflective variables, the discriminant validity analysis remains to be applied. This analysis will be performed using the Heterotrait-Monotrait ratio (HTMT) criterion (Cachón Rodríguez et al., 2019). Said criterion is quite rigorous and indicates that confidence intervals should not exceed 0.9 (Dijkstra & Henseler, 2015). In order to comply with this criterion, the items T-Com.1, T-Com.2, T-Hon.3 and PV.2 had to be removed. This implies that the first order model is validated (Table 3).

For the validation of the second-order model, we performed the analyses for the validation of the measurement scale of the reflective variables and then the analyses for the formative variables. In the first case, all the reflective variables have been re-validated. In the case of the formative variables, the collinearity and weights analysis is performed (Table 4). The collinearity analysis examines the multicollinearity that may exist between the items of the variables. This analysis explores the internal relationships that exist between two or more formative indicators (Hair et al.,

Table 2 Measurement items first order

Constructs	Items	Correlation loading	CA	rho_A	CR	AVE
Privacy	(PV.1) When I use my bank's mobile banking application my information is protected.	0.906***	0.917	0.918	0.942	0.801
	(PV.3) I feel that when I use my bank's mobile banking application my data privacy is secure.	0.928***				
	(PV.4) When I use my bank's mobile banking application I feel that my personal information will not be disclosed to third parties.	0.885***				
	(PV.5) I trust that my bank's mobile banking application is secure.	0.86***				
Ease of use	(EU.1) My bank's mobile banking application is easy to use.	0.936***	0.915	0.922	0.941	0.80
	(EU.2) The interaction with my bank's mobile banking application is clear and understandable.	0.930***				
	(EU.3) My bank's mobile banking application is adapted to my needs.	0.904***				
	(EU.4) Using my bank's mobile banking application does not require mental effort.	0.801***				
Trust						
Benevolence	(T-Ben.1) My bank's digital banking mobile app offers beneficial advice and recommendations.	0.884***	0.880	0.885	0.926	0.807
	(T-Ben.2) My bank's digital banking mobile application cares about the interests and needs of its stakeholders (customers, employees, etc.).	0.926***				
	(T-Ben.3) My bank's digital banking mobile application develops actions taking into account that they will have an impact on its stakeholders.	0.885***				
Honesty	(T-Hon.1) My bank's digital banking mobile application delivers as promised.	0.948***	0.871	0.881	0.939	0.885
	(T-Hon.2) My bank's digital banking mobile app, when offering its services, is transparent.	0.933***				
Competence	(T-Com.2) My bank's digital banking mobile application shows the necessary technological capacity to be able to perform its function correctly.	1***	1	1	1	1

Note: CA=Cronbach's alpha; CR=Composite Reliability; AVE=Average Variance Extracted;

***p-valor<0,001

Source: Table compiled by the authors from PLS.

Table 3 Measurement discriminant validity

	Heterotrait-Monotrait ratio (HTMT)				
Constructs	Trust Competence	Trust Benevolence	Trust Honesty	Ease of use	Privacy
Trust Competence					
Trust Benevolence	0.768				
Trust Honesty	0.874	0.853			
Ease of use	0.808	0.747	0.895		
Privacy	0.738	0.821	0.868	0.806	

Source: Table compiled by the authors from PLS

Table 4 Second-order measurement model of the formative construct

Construct	Dimensions	Correlation weights	VIF
Trust	Benevolence	0.234***	2.466
	Honesty	0.565***	3.574
	Competence	0.278***	3.283

***p-valor<0,001

Source: Table compiled by the authors from PLS.

2019, 2020). For this purpose, the VIF is analyzed (Diamantopoulos & Siguaw, 2006; Gelashvili et al., 2021).

Diamantopoulos and Siguaw (2006) point out that indicators with a value of less than 5 are valid and Hair et al. (2020) that are close to 3 are valid. The second criterion to be applied is the weight criterion. In this case, since there are 3 items in the formative variables, the cut-off index is set at 0.578 (Hair et al., 2019). Observing the results of the model, the criterion of the weights is also met and therefore the validation of the total measurement scale of this model.

Structural model analysis

Once the measurement scale of this multidimensional model has been validated, we analyzed the model and measure the relationships. To do this, the multicollinearity of the model must first be explored, a necessary study to be able to affirm that the variables do not overlap (Roldán & Cepeda, 2016). In this study all VIF indicators comply by being below 5 (Hair et al., 2018).

Another important issue before starting with the analysis is to examine the model fit index. This criterion measures the difference between the matrix of implied correlations and the matrix of observed correlations (Henseler, 2017). The criterion sets that the Standardized Root Mean Squared Residual (SRMR) should be less than 0.10 (Williams et al., 2009). In this study the SRMR is 0.048 so it meets the criterion.

After analyzing the structural VIF and the SRMR, a bootstrapping of 50,000 samples is performed. This yields the t-statistics and standard errors (Vera Gelashvili et al., 2021). These will allow us to study the model and validate or not the hypotheses proposed. Of the hypotheses put forward in the study, H1a / H2a / H3a are analyzed (Table 5) since the hypotheses H1b/ H2b / H3b will be analyzed later with the mul-

Table 5 Comparison of hypotheses

	Path coeff (β)	Statistics t (β/ STDEV)	f^2	Confidence interval	
				5.0%	95.0%
H.1a. Privacy → Ease of use	0.743***	25.555	1.232	0.689	0.785
H.2a. Privacy → Trust	0.436***	8.293	0.371	0.345	0.519
H.3a. Ease of use → Trust	0.504***	9.361	0.494	0.417	0.595
R^2: Trust=0.77; Ease of use=0.552					
Q^2: Trust=0.633; Ease of use=0.436					

Notes: For n=50,000 subsamples. ***p<0,001.

Source: Table compiled by the authors from PLS.

tigroup moderator analysis. This moderating effect will analyze whether there are significant differences between Spanish and Portuguese students.

Table 5 shows how the first three hypotheses are fulfilled. Privacy directly and positively influences ease of use, privacy directly and positively influences trust, and ease of use directly and positively influences trust. The three hypotheses are fulfilled by the three criteria applied. It is also observed that the Path coefficients of the relationships are high.

Then we analyzed the explained variance (R2) and the size of the effect (f2). The variance analysis shows that Trust has a high predictive power and Ease of use has a moderate predictive power (Hair et al., 2014). The size of the effect shows how an exogenous variable contributes to explaining an endogenous variable (Hair et al., 2019). In our hypotheses the effect is great in three variables studied. In the same line the predictive relevance of the model (Q2) is set with a large size for confidence and a moderate size for Ease of use.

Multi-Group moderating Effect

Once the validation of measurement scale has been studied and the analysis of the different relationships carried out, we examined the effect of the moderating multigroup. This exploration studies whether there are significant differences in the measurement model taking into account if students are from Spanish public universities or Portuguese ones. The hypotheses under validation are H1b / H2b / H3b. Prior to the moderation analysis, it should be carried out a measurement invariance tests of the different variables using MICOM analysis (Hair et al., 2019; Henseler et al., 2016; Rasoolimanesh et al., 2017).

Table 6 shows that "Trust" and "Ease of use" have complete invariance, while "Privacy" has unbiased invariance. These results allow us to perform the multigroup moderator analysis (Gelashvili et al., 2021). The permutations criterion was used to perform the moderator analysis, as it is the most current criterion and the one with the highest level of enforceability.

Table 7 shows that hypotheses H1b /H2b /H3b are not satisfied and should be rejected. The permutations analysis shows that there is no moderating effect between Spanish or Portuguese students. There is no significant difference between the two groups and therefore the sample can be pooled without making a difference (Fig. 2).

Table 6 Results of Invariance Measurement Testing Using Permutation (MICOM)

Constructs	Configural Invariance	Compositional Invarience		Partial Measurement Invariance Established	Equal Mean Assessment			Equal variance assessment			Full Measurement Invariance Established
		C=1	Confidence Interval		Differences	Confidence Interval	Equal	Differences	Confidence Interval	Equal	
Trust	SI	0.991	(0.990/1.000)	SI	-0.142	(-0.151/0.164)	SI	-0.005	(-0.294/0.288)	SI	SI
Ease of use	SI	1.000	(1.000/1.000)	SI	0.002	(-0.155/0.161)	SI	-0.006	(-0.325/0.313)	SI	SI
Privacy	SI	1.000	(1.000/1.000)	SI	-0.175	(-0.153/0.162)	NO	-0.009	(-0.259/0.229)	SI	NO

Source: Table compiled by the authors from PLS.

Conclusion

It can be highlighted, therefore, the importance of studying the variables of trust, privacy and ease of use when researching digital banking. This is because the more privacy and security the consumer feels in the use of digital platforms in banking e-commerce, the greater their trust in it and, in turn, the easier it will seem to use them, so the greater their ease of use.

On the other hand, as discussed after the methodology applied and, in the results, obtained, ease of use directly and positively affects trust, so the easier they perceive the use of digital platforms, the more trust they will feel with the responsible company. It should also be noted that the nationality variable has been rejected by the methodology which implies that there are no significant differences between Portuguese and Spanish students or users. This suggests that nationality in this sense is not a differentiating factor that marks diverse directions in terms of users' feeling of privacy, ease of use and trust with the use of digital platforms in digital banking.

In addition, this study offers as an added value, the validation of a measurement scale that encompasses the three variables (ease of use, trust and privacy) to the field of digital banking, a booming concept today in the research world. This relationship of three variables has not been previously analyzed jointly, so the validation of the measurement scale can serve to analyze technostress in a broader and more complete way for future research.

It is important to bear in mind that the results obtained project very relevant data that must be taken into account when implementing digital platforms or mobile or web applications as a modality in digital banking. The benefits that companies can obtain from technology will depend, to a large extent, on the quality of its use and, therefore, on the satisfaction of users with it. For this reason, it is vitally important to pay special attention to the ease of use of these applications and the users' feelings of trust and privacy with them.

Taking all the above mentioned into consideration, for digital banking organizations to be successful in the implementation of their mobile applications or digital platforms, they must be concerned about meeting a number of requirements. The first of them is to take care to create and establish simple and intuitive computer systems, which do not generate difficulty for users. This will generate confidence in the user with the digital banking software application, and therefore in the company that runs it. In addition, it is also important that the digital banking guarantees its users that their data will be protected and that their personal information and banking data will not be shared. This will provide security to the user and, therefore, will also have a positive influence on the user's confidence and ease of use.

As for the limitations of the research, it should be noted that the sample is not fully representative of all Portuguese and Spanish students, since the number of responses corresponds to only two university institutions. It would be interesting, as a future line of research, to include a larger sample of the Spanish and Portuguese university population.

Moreover, after having studied and surveyed Spanish and Portuguese users, as future lines of research it would be interesting to use the measurement scale to study how privacy, trust and ease of use of digital banking affects different countries, in

Table 7 Multigroup hypothesis testing

	Path Coefficient			Confidence Interval	P-value	
Relationship	Spanish	Portuguese	Difference	(2,5% ; 97,5%)		Supported
H.1b. Privacy → Ease of use	0.724	0,769	-0.045	(-0.195 ; 0.217)	0.439	NO
H.2b. Privacy → Trust	0.474	0.390	0.084	(-0.216 ; 0,208)	0.459	NO
H.3b. Ease of use → Trust	0.418	0.585	-0.167	(-0.195 ; 0.217)	0.135	NO

Source: Table compiled by the authors from PLS.
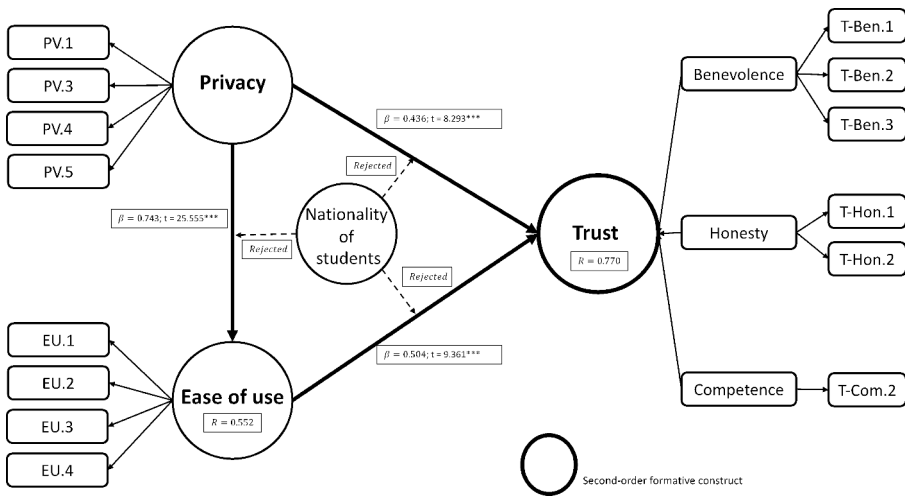
Fig. 2 Proposed research model. (*Source: Compiled by the authors from the model obtained in PLS*)

terms of age or gender, or the level of education or work activity they perform. It could be noteworthy if the countries to study in future research have more cultural differences and /or a different high education system. Furthermore, it would be specially interesting to study how these privacy and ease-of-use variables in digital banking affect other variables such as satisfaction.

This study can serve as a basis for investigating a clearly important aspect given the evolution of society and the importance of technology in its day-to-day life, since well-implemented and well-directed technological innovation can be a great competitive advantage. A good management of privacy and a system that provides ease of use perceived by users, in addition to a feeling of trust, could generate very good results in the organization. It is therefore recommended to continue researching this aspect to try to maximize the use of technology, while enhancing the quality of service perceived by its users.

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