DETERMINING FACTORS OF CONTINUANCE INTENTION OF USE REGARDING PIX PAYMENT SERVICES ON BRAZIL

Fatores Determinantes da Intenção da Continuidade de Uso dos Serviços Pix no Brasil

Tharcisio Caldeira[1]
ORCID: https://orcid.org/0000-0001-5760-3302
E-mail: tharcisio.caldeira@ifsudestemg.edu.br

Naiara Vidigal[1]
ORCID: https://orcid.org/0000-0001-9939-2910
E-mail: naiaracosta998@gmail.com

Jéssica Vieira[1]
ORCID: https://orcid.org/0000-0001-9317-6301
E-mail: jessicavieira802@gmail.com

[1]*Instituto Federal de Educação, Ciência e Tecnologia do Sudeste de Minas Gerais, Rio Pomba, Brasil*

Abstract
The need to understand consumer behavior regarding technological innovations is essential for companies to develop their strategies to meet the needs of their customers and become more competitive in the market. The main objective of this work was to investigate the main factors that influence the continuance of use of Pix payment service in Brazil. This research used the adapted Expectation-Confirmation Model (ECM), along

Resumo
A necessidade de entender o comportamento do consumidor em relação às inovações tecnológicas é essencial para que as empresas desenvolvam suas estratégias para atender as necessidades de seus clientes e se tornarem mais competitivas no mercado. O objetivo principal deste trabalho foi investigar os principais fatores que influenciam a continuidade do uso dos serviços de pagamentos Pix no Brasil. Esta pesquisa

with Technology Acceptance Model (TAM) and Technology Readiness (TR) and Perceived Risk (PR) constructs. Data was collected through a survey with 467 respondents. These data were analyzed using the Structural Equation Modeling (SEM) technique. The results indicated that consumer satisfaction is a strong predictor of intention to continue, as well as perceived usefulness and ease of use, which has an indirect influence. However, the perceived risk, even being significant in relation to the perceived usefulness, showed little effect in the model.

Keywords: Pix Payment Services; Continuance of Use; Expectation-Confirmation Model; Technology Acceptance Model; Technology Readiness.

utilizou o Modelo de Expectativa-Confirmação (ECM) adaptado, juntamente com os construtos do Modelo de Aceitação de Tecnologias (TAM), Prontidão Para a Tecnologia (TR) e Risco Percebido (PR). Os dados foram coletados por meio de uma survey com 467 respondentes. Esses dados foram analisados por meio da técnica de Modelagem de Equações Estruturais (SEM). Os resultados indicaram que a satisfação do consumidor é um forte preditor da intenção de continuar, assim como a utilidade percebida e a facilidade percebida de uso, que tem influência indireta. No entanto, o risco percebido, mesmo sendo significativo em relação à utilidade percebida, apresentou pouco efeito no modelo.

Palavras-Chave: Serviços Pix; Continuidade de Uso; Modelo de Expectativa-Confirmação; Modelo de Aceitação de Tecnologias; Prontidão para a Tecnologia.

INTRODUCTION

The increasing rate of technological changes imposes, as a direct consequence, changes in people's consumption habits. As a result, companies' actions had to transcend aspects of the product itself to focus on customer needs. Levitt (1960) visualized this scenario in the face of the failure of the railroads and film industries, which served as examples of companies that didn't understand the market and turned themselves only to what they were producing. Therefore, knowing who the customers are, their perceptions about their products and services have become fundamental to a better understanding about the phenomenon of consumption.

In this context, there's a need to understand consumer behavior regarding technological innovations, given that their success depends of acceptance, adoption and continued use after the first trial (Bhattacherjee, 2001). It is important to understand what make customers buy, but it's fundamental to investigate why they keep buying, in order to avoid discontinuity and consequent abandonment of the product/service.

Specifically, in the financial services sector, there are singular aspects that must be investigated, as it involves sensitive factors, such as trustworthiness of service and perception of security and risks involved. In 2020, a financial services innovation was implemented by the Central Bank of Brazil (BCB): an instant payment system called Pix. According to a survey carried out in November 2021 by the Brazilian Federation of Banks – FEBRABAN (2022), one year after the Pix system was implemented, the service was already used by about 71% of Brazilians.

In addition, that survey also revealed that Pix has a 99% approval rate among young people (from 18 to 24 years old) and 65% among people over 60 years old. However, Rogers (2003 [1962]) indicated that the adoption of an innovation itself isn't the end of the adoption decision process, but the confirmation of this adoption, since the use of the innovation may be discontinued after some time. Therefore, in addition to the variables that can influence the adoption of technologies regarding financial services, the continuance intention needs to be investigated as a relevant factor (Chen et al., 2009). So, this research aimed to answer the following question: what are the main factors that influence the continuance intention of the use of Pix service?

This study is justified by the intensification of digital financial services in the country, as well as by the disuse of traditional means of payment such as paper money, checks and even debit cards. In addition, this study aims to contribute to the literature about acceptance and continuance of use of innovations on financial services sector.

Finally, the present study aimed to contribute to a better understanding of different dimensions of the marketing mix in services, exploring intrinsic and extrinsic aspects regarding technology acceptance. Specifically, in financial services, there's a need to provide further information in order to cooperate with the managerial decisions and benefit users.

LITERATURE REVIEW

Pix and the Digital Payment Services on Brazil

In the recent years – specially on Covid-19 pandemic context – new technologies have emerged aiming to enhance electronic financial services. The search for incremental or disruptive innovations on financial sector multiplied the number of companies specialized in financial technologies in Brazil– the "fintechs" – which provide apps, processes, products or business models (Borges et al., 2021).

There are 242 million of smartphones in use in Brazil, implying that there are more than one smartphone per capita, in that way that these devices dominated digital services in this country – like shopping, social media and financial services (Meirelles, 2022). In this scenario, 56% of financial transactions were made by mobile banking, involving 67.1 billion of transactions in 2022 (Federação Brasileira de Bancos - FEBRABAN, 2022).

Since 2013, Central Bank of Brazil – BCB – had competence to regulate retail payments aiming to improve financial inclusion of households and SME's. In 2020, BCB launched his own instant payment system, called Pix (Duarte et al., 2022). According to BCB (2022), Pix allows users to transfer funds between different financial institutions and it's free for individuals. This system can handle any type of payment or transfer in Brazil and its design is focused to mobile users (smartphone) with a simple and intuitive way to register the security keys.

Because of its ease of use, from 2020 until February 2022, Pix were used by 67% of Brazilian adult population and more than 60% of companies with a relationship in the national financial system, totaling more than 12 billion transactions on a total value higher than R$ 6.7 trillion (Duarte et al., 2022). Pix were responsible for the fastest adoption of a payment system per capita of the world (Sutto, 2021).

Regarding to adoption of new technologies, previous studies showed that the Brazilian population with higher education level are more predisposed to adopt mobile banking to financial transactions (Braga et al., 2017; R. de M. Ferreira & Prearo, 2018; Santos et al., 2020). Furthermore, despite the fact the millennials have more predisposition to use digital services, nowadays other generational groups have access to many companies providing digital services, establishing daily relationships and influencing positively adoption rate of financial technologies (Silva et al., 2018).

Despite the fact there are plenty of previous studies about the adoption of financial services, it is necessary additional research about the continuance of use of these services. The following sections will show the main concepts and constructs used in this research's model.

Expectation-Confirmation Model (ECM)

Rogers (2003 [1962]) Diffusion of Innovations (DOI) Theory showed that the adoption isn't the final stage of decision making involving an innovation. Individuals may reject it after some time using it – a late rejection – as well as individuals that can adopt an innovation after an initial rejection – a late adoption. Continuance Intention (CI) literature is based on investigations about the two main paths of "Confirmation" stage of DOI Theory – Confirmed Adoption and Late Rejection. These stages are usually called Continuance of Use and Discontinuance of Use in CI literature.

Because most part of studies in this research area discuss adoption and acceptance of new technologies both in other countries and in Brazil, there's still a need to do further investigations about continuance or discontinuance of a new technology which was initially adopted. "Long-term

viability of an IS and its eventual success depend on its continued use rather than first-time use" (Bhattacherjee, 2001, p. 351–352).

In order to investigate the determinants of continuance intention, Bhattacherjee (2001) adapted Oliver's (1980) Expectation-Confirmation Theory (ECT) into IS context, creating the Expectation-Confirmation Model (ECM). His work proposed that CI is directly and positively affected by Perceived Usefulness and Customer Satisfaction (which is also affected directly and positively by Perceived Usefulness). These factors, in their turn, were affected directly and positively by Confirmation of customers' expectations.

On the original ECT, Oliver (1980) posited satisfaction as a function of expectation level and perceived confirmation/disconfirmation, in a way that satisfaction experiences can influence both future purchase intention and post-purchase attitude. Bhattacherjee (2001, p. 354) refined these concept and defined satisfaction as "a psychological or affective state related to and resulting from a cognitive appraisal of the expectation-performance discrepancy (confirmation)". According to this author, satisfaction is the main antecedent of continuance intention and the main factor to be considered in strategies aiming for customer loyalty.

Customer satisfaction is pointed out as a strong determinant of continuance intention of using different technologies, like self-service technologies (Chen et al., 2009), mobile instant messages (Deng et al., 2010), mobile payments (Franque et al., 2021; Zhou, 2013, 2014) and mobile wallets (Kumar et al., 2018) etc. Franque et al. (2020) confirmed, in their meta-analysis, that satisfaction is the strongest predictor of continuance intention. Based on those previous studies, this research proposed the following hypothesis:

H1: Consumer Satisfaction (CS) has a direct and positive effect over Continuance Intention (CI) to use Pix service.

Technology Acceptance Model (TAM)

In their meta-analysis, Franque et al. (2020) showed that Expectation-Confirmation Model (ECM) was the most used theory to explain continuance intention (CI), followed by Technology Acceptance Model (TAM). TAM was developed by Davis (1986) and later refined by Davis, Bagozzi and Warshall (1989) and Davis (1989). Specifically designed to investigate the behavior regarding computer usage, its main objective is "to provide a basis for tracing the impact of external factors on internal beliefs, attitudes, and intentions" (Davis et al., 1989, p. 985).

According to TAM, the attitude/behavior to accept a new technology is positively influenced by two main factors: Perceived Usefulness and Perceived Ease of Use. Perceived Usefulness (PU) is defined as "the degree to which an individual believes that using a particular system would enhance his or her job performance", while Perceived Ease of Use (PEU) is defined as "the degree to which an individual believes that using a particular system would be free of physical and mental effort" (Davis, 1986, p. 26).

So, if a person perceive that a new technology is easier to use, he tends to do a positive evaluation about it. In the same way, if that new technology appears to be more useful than the actual technology, this person also tends to do a positive evaluation about it. Furthermore, the perceived ease of use can affect indirectly the perceived usefulness (Davis, 1986).

Despite the fact of TAM is originally designed to explain acceptance of new technologies, its constructs were largely used on CI studies, i.e., on post-adoption context. Hossain, Hossain and Jahan (2018) identified that Perceived Usefulness and Perceived Ease of Use have an indirect effect over Continuance Intention, by a positive influence over Satisfaction regarding mobile payment services in Bangladesh. In their turn, Foroughi, Iranmanesh and Hyun (2019) found a direct and positive effect from Perceived Usefulness over Satisfaction and Continuance Intention of using mobile banking on Malaysia, but didn't find evidences of the influence of Perceived Ease of Use over these constructs. In India, Continuance Intention to use mobile wallets was positively and directly influenced by Perceived Usefulness, but this construct didn't affect Satisfaction (Gupta et al., 2020). Similar results were found by Rahi, Khan and Alghizzawi (2021), regarding the continuance of using e-banking services in

Pakistan. However, these authors found a direct and positive effect from Perceived Ease of Use over Perceived Usefulness. So, based on these previous studies, this research proposed the following hypothesis:

H2a: Perceived Ease of Use (PEU) has a direct and positive effect over Consumer Satisfaction (CS) regarding to Pix service.

H2b: Perceived Usefulness (PU) has a direct and positive effect over Consumer Satisfaction (CS) regarding to Pix service.

H2c: Perceived Ease of Use (PEU) has a direct and positive effect over Perceived Usefulness (PU) regarding to Pix service.

Perceived Risk (PR)

Perceived risk reflects the perception of danger that users identify when using a new technology. In the context of mobile payment, the risk is related to the undue leakage of customers' personal data, which can lead to financial losses. Thus, perceived risk is considered a primary factor and studies point to its negative influence on customers' continuance intention in the context of digital financial services (Shao et al., 2019).

Previous studies in the literature used perceived risk (Almeida et al., 2020; Mangini et al., 2020) and safety aspects (Luna et al., 2017; Ramos et al., 2018) to predict behavioral intention. Therefore, it is important to identify whether the same is true of the intention to continue using financial services.

Nurlaily et al. (2021) investigated the aspects that determine the continuity of use of the services offered by Fintechs in Indonesia. They concluded that the perceived risk did not impact the continuity of use by the users. However, the general perceived risk is more affected by legal risk then by financial and security risk. The authors claim that the inadequacies of government regulations and legal uncertainties of Fintech users in Indonesia justify the result. Therefore, it is critical that the government has appropriate regulations and oversight for the security of financial transactions.

In India, Raman and Aashish (2021) analyzed the antecedents that affect users' desire to continue using the mobile payment system. The results of the study showed that the perceived risk acts as a critical barrier and users considered that there is a considerable safety problem when using it. Considering Perceived Risk as one of External Variables that may affect Perceived Usefulness, this research proposed the following hypothesis:

H3: Perceived Risk (PR) has a direct and negative effect over Perceived Usefulness (PU) regarding Pix service.

Technology Readiness (TR)

Technology Readiness (TR)is a construct that measures people's predisposition to adopt and use new technologies for personal and professional purposes (Parasuraman, 2000). This construct is multifaceted, having four subdivisions – optimism, innovativeness, discomfort, and insecurity. This construct that can be used as an antecedent of other factors. In addition, its ramifications can be used as psychographic variables (Parasuraman & Colby, 2014; Priananda et al., 2020).

According to Parasuraman (2000), optimism can be defined as a positive view of technology that permeates people's lifestyles, offering them greater control, flexibility and efficiency. Innovativeness, on the other hand, refers to the person being one of the first to try a certain technology, expressing an opinion about its effects. These first two dimensions are classified as stimulants.

Regarding the inhibiting factors, discomfort is linked to people's lack of control over technology and being dominated by it. Insecurity, in their turn, is the lack of certainty regarding technology because of its distrust of its ability to function properly and the possible consequences of its use (Parasuraman, 2000).

In this context, it is important to understand customers, their lifestyle and opinion about a product and/or service in order to formulate strategies that speak to their interests and needs. In addition, technological products have different characteristics from conventional ones and, therefore, can awaken perceptions that require greater considerations and connections with aspects inherent to the product/service. In this sense, Lin, Shih and Sher (2007) proposed the Integrated Technology Readiness and Acceptance Model (TRAM), that expands the explanatory power of technology adoption, adding technology readiness as an antecedent of the main constructs of the TAM model – ease of use and perceived usefulness.

Humbani and Wiese (2019) combined the TRI and the extended ECM model to explain the adoption and intention to continue using mobile payment. Although the variables optimism, innovativeness and discomfort were not related to adoption, the variables convenience, compatibility, insecurity, and risk were significant as predictors of adoption. According to the authors, the presence of drivers seems to be a stronger indicator of the adoption of payment applications than the absence of inhibitors. Regarding the extended ECM, adoption, usefulness, and perceived ease were positive predictors of consumer satisfaction and this emerged as the strongest predictor of intention to continue using mobile payment, although perceived ease and usefulness did not impact continuity of use.

Priananda et al. (2020) found that optimism and innovativeness are stimulating factors in the continuity of use, while only discomfort is a significant inhibiting factor. In turn, Blut and Wang (2020) showed, in their meta-analysis, that technology readiness is best conceptualized as a two-dimensional construct, differentiating between motivators (innovation, optimism) and inhibitors (insecurity, discomfort).

Given that technology readiness and its dimensions precede the perception of usefulness, ease of use (Rafdinal & Senalasari, 2021; Shin & Lee, 2014) and perceived risk (Liljander et al., 2006), the following hypotheses are proposed:

H4a: Optimism (TRO) has a direct and positive effect over Perceived Ease of Use (PEU) regarding the Pix service.
H4b: Optimism (TRO) has a direct and positive effect over Perceived Usefulness (PU) regarding the Pix service.
H4c: Optimism (TRO) has a direct and negative effect over Perceived Risk (PR) regarding the Pix service.
H5a: Innovativeness (TRI) has a direct and positive effect over Perceived Ease of Use (PEU) regarding the Pix service.
H5b: Innovativeness (TRI) has a direct and positive effect over Perceived Usefulness (PU) regarding the Pix service.
H5c: Innovativeness (TRInn) has a direct and negative effect over Perceived Risk (PR) regarding the Pix service.
H6a: Disconfort (TRD) has a direct and negative effect over Perceived Ease of Use (PEU) regarding the Pix service.
H6b: Disconfort (TRD) has a direct and negative effect over Perceived Usefulness (PU) regarding the Pix service.
H6c: Disconfort (TRD) has a direct and positive effect over Perceived Risk (PR) regarding the Pix service.
H7a: Insecurity (TRIns) has a direct and negative effect over Perceived Ease of Use (PEU) regarding the Pix service.
H7b: Insecurity (TRIns) has a direct and negative effect over Perceived Usefulness (PU) regarding the Pix service.
H7c: Insecurity (TRIns) has a direct and positive effect over Perceived Risk (PR) regarding the Pix service.

Research Conceptual Model

Based on theoretical framework presented, this research adopted the following conceptual model showed on Figure 1.
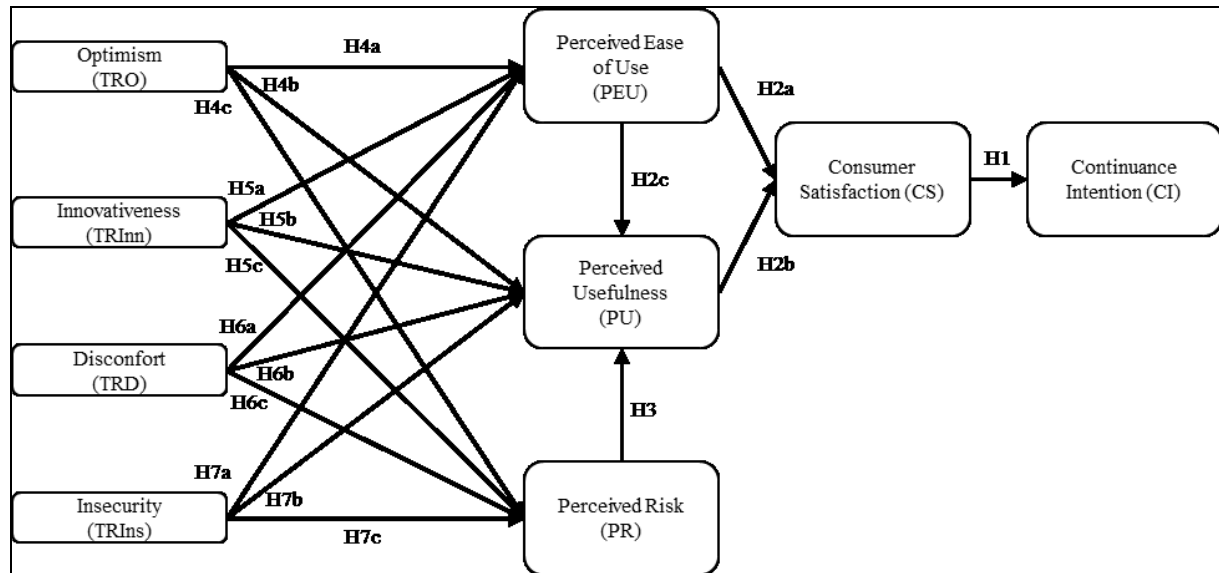

Figure 1. Proposed Research Model

METHODS

Survey Development

This research developed a cross-sectional survey whose variables were taken from previous studies and adapted to the context of continuance intention to use Pix service. Therefore, the survey was composed by 45 questions: 09 sociodemographic questions, 01 filter question (which indicates if the respondent already used the Pix service) and 35 questions representing the constructs of this study's model.

The construct-related items were measured by five-point Likert-type scales, anchored at (1) "Strongly disagree" to (5) "Strongly Agree". Continuance Intention (CI) was measured by four items adapted from Huang and Lee (2022). Consumer Satisfaction (CS) was measured by three items adapted from Mainardes, Costa and Nossa (2022). Perceived Usefulness (PU) and Perceived Ease of Use (PEU) were measured by four items each also adapted from Mainardes et al. (2022). Perceived Risk (PR) was measured by four items adapted from Wei et al. (2021). The four dimensions of Technology Readiness – Optimism, Innovativeness, Disconfort and Insecurity – were measured by four items each adapted from Parasuraman and Colby (2014).

Sampling and Data Collection

This study applied a cross-sectional survey to a non-probabilistic sample. Since payments services are normally exploited by usually active population, this research defined that Brazilian people over 18 years old, that already used Pix services at least once time, should be considered population of interest.

The survey was electronic applied by Google Forms between June 01 and July 04, 2022. Initially, 495 answers were collected. However, 29 answers were considered incomplete and/or didn't belong to population of interest. Table 1 displays sociodemographic data related to 467 respondents selected to data treatment.

Table 1
Sample description (total=467)

Variables	Categories	Absolute Frequency	Relative Frequency (%)
Gender	Female	239	51%
	Male	228	49%
Age	18 | — | 26	105	22%
	27 | — | 35	139	30%
	36 | — | 44	117	25%
	45 | — | 53	66	14%
	54 | — | 62	32	7%
	63 | — | 70	8	2%
Study/Employment Status	Don't Study; Employed	240	51%
	Student; Unemployed	31	7%
	Student; Employed	174	37%
	Don't Study; Unemployed	9	2%
	Retired	7	1%
	Working After Retirement	6	1%
Educational Level	Incomplete Primary School	2	0,4%
	Complete Primary School	1	0,2%
	Incomplete High School	2	0,4%
	Complete High School	58	12%
	Incomplete Graduation	89	19%
	Complete Graduation	59	13%
	Incomplete Postgraduation	22	5%
	Complete Postgraduation	234	50%
Family Income	Lesser than R$ 1808,79	59	13%
	Between R$ 1808,80 and R$ 2702,88	78	17%
	Between R$ 2702,89 and R$ 4506,47	77	16%
	Between R$ 4506,48 and R$ 8956,26	119	25%
	Between R$ 8956,27 and R$ 17764,49	97	21%
	Higher than R$ 17764,49	37	8%

Source: Research Data.

According to the valid answers, 77% of respondents are under 44 years old; 51% are currently employed, but not studying; 68% has graduation or higher level of educational degree, and 54% has family income above R$4506,48 – US$ 858.39 according to September 06, 2022 exchange rate.

Data Treatment

The construct-related items were treated by Structural Equation Modelling (SEM). This technique analyses the inter-relationship between many constructs by combining dependent and interdependent techniques (Hair Jr. et al., 2009). SEM process can be described in six stages: (i) Definition of individual constructs; (ii) development of overall measurement model; (iii) study design to produce empirical results; (iv) assess measurement model validity; (v) specification of structural model; and (vi) assess structural model validity (Hair Jr. et al., 2009).

The first stage was defined by theoretical framework, so as second stage – with the proposed research model. Third stage involved the operationalization of variables and preliminary verification of data (missing data and possible sampling issues). Fourth stage involved the validation of measurement model, which was made by Convergence Validity Analysis (Average Variance Extracted – AVE), Discriminant Validity Analysis, Face Validity Analysis and Nomological Validity Analysis. Fifth stage involved the specification of structural model, which define the existent relationships between constructs and the nature between these relationships. The final stage – validation of structural model – considered the following indicators: $\chi^2/d.f.$ index inferior than 3; TLI and CFI superior than 0.9; RMSEA inferior than 0.8 (Hair Jr. et al., 2009).

RESULTS

Measurement model

Initially, this research analyzed Technology Readiness (TR) as a single construct. However, its AVE indicators didn't reach the minimum required to allow the analysis to proceed. So, following the suggestions of Grohmann et al. (2014) and Priananda et al. (2020), this study divided TR into its four dimensions – optimism, innovativeness, discomfort and insecurity.

After dividing TR, the adjustment of measurement model showed improvement. Despite some constructs didn't reach the minimum required, their values were near the requirements, in a way that these results allowed the remaining analysis. Hair Jr. et al. (2009) pointed that these reference values are recommended but not mandatory, once estimates are made by maximum likelihood. Table 2 shows the indicators of measurement model.

Table 2

AVE and adjustment indicators of measurement model

Construct		AVE
TRO – Optimism		0.5003
TRInn – Innovativeness		0.4897
TRD – Disconfort		0.3888
TRIns – Insecurity		0.2893
PEU – Perceived Ease of Use		0.5735
PU – Perceived Usefulness		0.6353
PR – Perceived Risk		0.6988
CS – Consumer Satisfaction		0.6361
CI – Continuance Intention		0.5094
Adjustment Indicators	Observed Values	Reference Values
$\chi^2/d.f.$	2.569	< 3.0
TLI	0.878	> 0.9
CFI	0.892	> 0.9
RMSEA	0.058	< 0.08

Source: Research Data.

Structural Model and Hypothesis Test

Like measurement model, structural model's adjustment indicators were near to minimum requirements, as shown by Table 3.

Table 3

Adjustment indicators of structural model

| Adjustment Indicators	Observed Values	Reference Values
$\chi^2/d.f.$	2.558	< 3.0
TLI	0.880	> 0.9
CFI	0.890	> 0.9
RMSEA	0.058	< 0.08

Source: Research Data.

In their turn, hypothesis test consisted in verifying the statistic and theoretical significance of the relationships proposed on research model. Results showed that most part of proposed hypothesis were considered significative, except H4c, H5b, H5c and H6b. Furthermore, H7a and H7b didn't shown the theoretical direction suggested by previous literature and were considered insignificant too. Table 4 showed the hypothesis tests results.

Table 4
Hypothesis tests results

Hypothesis	Coefficient	p-value	Supported?
H1: CS → CI	0,791	< 0,000	**Yes**
H2a: PEU → CS	0,194	0,003	**Yes**
H2b: PU → CS	0,929	< 0,000	**Yes**
H2c: PEU → PU	0,592	< 0,000	**Yes**
H3: PR → PU	-0,045	0,005	**Yes**
H4a: TRO → PEU	0,090	< 0,000	**Yes**
H4b: TRO → PU	0,164	< 0,000	**Yes**
H4c: TRO → PR	0,065	0,390	No
H5a: TRInn → PEU	0,127	< 0,000	**Yes**
H5b: TRInn → PU	0,007	0,727	No
H5c: TRInn → PR	0,011	0,859	No
H6a: TRD → PEU	-0,066	0,002	**Yes**
H6b: TRD → PU	0,015	0,514	No
H6c: TRD → PR	0,441	< 0,000	**Yes**
H7a: TRIns → PEU	0,123	0,027	No
H7b: TRIns → PU	0,119	0,035	No
H7c: TRIns → PR	0,369	0,042	**Yes**

Source: Research Data.

In face of these results, Figure 2 showed the final research model, with the significative relationships.
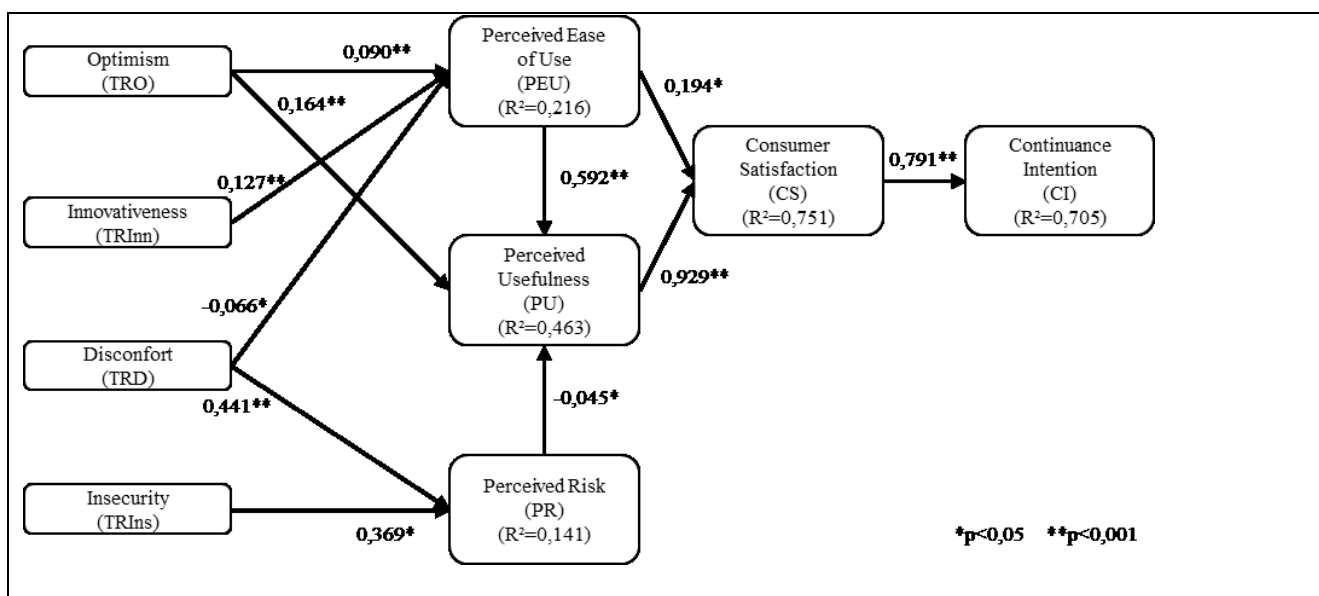
Figure 2. Final Research model

Analyzing the results, it's possible to evidence that consumer satisfaction, in relation to the Pix service, is a strong predictor of the continuance intention regarding the referred service, since approximately 70% of continuance intention was explained by satisfaction. This result is consistent with previous research applied to other types of financial services (Rahi et al., 2021; Zhao et al., 2018).

Consumer satisfaction, in turn, had approximately 75% of its behavior explained by Perceived Ease of Use and Perceived Usefulness, the latter having a much greater influence (0.92) when compared to the influence of Perceived Ease of Use (0.19). This can be explained by the fact that people feel more satisfied with the benefits provided by technologies than with the level of effort used. These results are similar to previous research, both in the financial area and in other areas linked to the continued use of innovations (Kumar et al., 2018; Phuong et al., 2020; Roca et al., 2006).

Regarding perceived usefulness, the most influential factor was perceived ease of use (0.59), confirming other studies (Hossain et al., 2018; Rahi et al., 2021). According to Hossain et al. (2018), ease of use increases the predictive power of the intention to continue use by explaining utility and customer satisfaction. However, these results contradict the findings of Foroughi et al. (2019) who didn't find statistical significance of the effect of ease of use over perceived usefulness, but in the authors' research, perceived usefulness had a direct influence over satisfaction and over continuance intention to use mobile banking services.

The perceived risk had a negative influence in relation to the perceived usefulness, however with little intensity (-0.04). This can be explained by the fact that the benefits of technology are more influential than the risk in terms of perception (Ryu, 2018). Regarding the antecedents of perceived risk, they are weak predictors, since only 14% of the behavior was explained by insecurity and discomfort, despite the dismemberment of technology readiness.

Regarding Technology Readiness (TR), The initial proposal of this research would analyze it as a single construct and a single antecedent of the main constructs of the TAM model and perceived risk, because other studies worked this way (Caldeira et al., 2021; J. B. Ferreira et al., 2014). However, investigations about continuance intention used TR dimensions separately as antecedents of CI regarding financial services (Blut & Wang, 2020; Priananda et al., 2020). Thus, these different results evidenced the importance of adjust TR according to each case investigated.

The "optimism" dimension of the TR impacted ease of use (0.09) and perceived usefulness (0.16), while innovativeness only impacted perceived ease of use (0.12) and discomfort had no significant effect on perceived usefulness, but it was significant on perceived ease and perceived risk. These results converged with the findings of Rafdinal and Senalasari (2021) who also didn't find significative effect of discomfort over perceived usefulness. However, these authors were able to prove that the other dimensions of the TR have a significant relationship with perceived usefulness and perceived ease of use, differing from this research.

Regarding Perceived Ease of Use, 21% of its behavior was explained by optimism (0.09), innovativeness (0.12) and discomfort (-0.06). Despite the small values, this demonstrates that Pix users who have a confident perspective about technologies can experience greater ease of use. However, the discomfort negatively impacts this perspective if he loses control of the technology or feels dominated by it.

Insecurity had significant effect just over perceived risk (0.36). Discomfort also influenced perceived risk (0.44). These results reveal that people that have little control and/or have little confidence about technologies have a greater perception of risk. Therefore, companies must work on these aspects in their services, in order to reduce their customers' perception of risk.

Also, the fact that insecurity was not related to the ease of use and perceived usefulness differs from other findings in the literature (Shin & Lee, 2014; Walczuch et al., 2007). However, perceived usefulness was indirectly affected by insecurity (through perceived risk) and by discomfort (through both perceived risk and ease of use).

Results showed the importance of making marketing efforts to minimize the factors that cause discomfort and insecurity, because even if they don't directly stimulate perceived usefulness and ease of use, they can indirectly impact them through the risk perception. Adequate marketing strategies can lead customers to satisfaction and, therefore, to fidelity regarding the financial service.

CONCLUSIONS

This research proposed to investigate the factors that influence the continuance intention to use Pix service in Brazil, using the adapted Expectancy-Confirmation Model (ECM) combined with Technology Acceptance Model (TAM), Perceived Risk (PR) and Technology Readiness (TR). The proposed research model was able to explain 70% of continuance behavior intention, with the satisfaction being a strong predictor of CI, as well as perceived usefulness and perceived ease of use. However, the perceived risk showed little impact on the model. This may have happened due to the overlapping of the concepts of perceived risk and the inhibiting dimensions of technology readiness, causing similar interpretations and, thus, confusing the respondents.

Furthermore, the relationships between technology readiness, TAM constructs and perceived risk weren't all corroborated. However, the relationships that were not confirmed need to be investigated in another financial services contexts or by adding moderators such as gender, age, education, as previous studies have already confirmed these relationships. Demographic factors are rarely added as moderators, so different consumer segments may have different motivations to continue using a technology (Yan et al., 2021).

Regarding management implications, the results suggested that companies should direction their efforts to avoid aspects that make customers insecure and may cause a lack of control, since they can increase risk and reduce the perceived usefulness. It is also important to focus on certain customer segments, targeting optimists and technology pioneers, as they are more predisposed to perceive the ease of use. When marketing strategies aim to raise perceived usefulness and ease of use, customers will be satisfied and, consequently, may be loyal to the service.

This research has limitations regarding the generalization of its results, due to its sampling process. Carrying out a probabilistic sampling process on population of interest would involve an expenditure of time and financial resources that will make this research unviable. In addition, there are limitations regarding the methods used. The respondents may have been confused when answering questions about insecurity and risk perception, so a qualitative approach could have facilitated their understanding. However, carrying out a multi-method approach would also involve time and financial resources that could make the present research unviable.

Future research could focus on a better understanding of risk as a barrier to continuance intention, since many studies used this construct, but there isn't consensus about the scales in the literature, as occurred with TAM, TR and ECM constructs.

Finally, future studies could increase the number factors investigated as antecedents of continuance intention regarding financial services, like "Relative Advantage" from Rogers (2003 [1962]). The addition of this construct may be justified by the fact that an innovation is adopted if it was perceived as better than the previous idea/product/service, improving its adoption rate, which was observed on the case of Pix services in Brazil.

Author contribution statement
Tharcisio Caldeira: writing, data analysis, reviewing, formatting, translation and submission;
Nayara Vidigal: writing, data collection and analysis;
Jéssica Vieira: writing, data collection and analysis.

Availability of Data and Materials
The dataset supporting the conclusions of this study is available in the Open Science Framework repository, in https://osf.io/xhfa6/files (SPSS Dataset Archive).

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The authors declare that they have no competing interests.

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