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PROPOSTA DE DESENVOLVIMENTO DE CAMISAS ESPORTIVAS PARA PRÁTICA DE GOALBALL

UMA AVALIAÇÃO DA EXPERIÊNCIA DA CARTEIRA DIGITAL USANDO UM MÉTODO BASEADO NO AUTOCONCEITO

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Abstract:

This exploratory study introduces an innovative self-concept-based methodology for evaluating user experience with digital wallets, distinguishing itself by measuring the gap between users' ideal and actual expectations rather than solely focusing on traditional usability assessments. By analyzing three digital wallet application prototypes through the System Usability Scale (SUS) and the self-concept-based methodology, we identified perceptions and feelings that qualify user experiences with digital wallets, enabling the evaluation of successive prototype versions. The insights derived demonstrate that aligning the actual user experience more closely with their ideal expectations significantly enhances product acceptance. This work not only advances our understanding of the applicability of the self-concept method in prototype evaluation but also illustrates its effectiveness in generating valuable insights from user experiences, offering a significant contribution to the Design and development of digital products.

Keywords: Self-concept, Design Process, Usability Test, Digital Artefact Evaluation, Digital Wallets.

Resumo

Este estudo exploratório apresenta uma metodologia inovadora baseada no autoconceito para avaliar a experiência do usuário com carteiras digitais, distinguindo-se por medir a lacuna entre as expectativas ideais e reais dos usuários, em vez de focar apenas nas avaliações tradicionais de usabilidade. Ao analisar três protótipos de aplicativos de carteira digital por meio da Escala de Usabilidade de Sistemas (SUS) e da metodologia baseada em autoconceito, identifica-se percepções e sentimentos que qualificam as experiências dos usuários com carteiras digitais, possibilitando a avaliação de sucessivas versões de protótipos. Os insights obtidos demonstram que alinhar mais estreitamente a experiência real do usuário com suas expectativas ideais aumenta significativamente a aceitação do produto. Este trabalho não só avança a nossa compreensão sobre a aplicabilidade do método de autoconceito na avaliação de protótipos, mas também ilustra a sua eficácia na geração de insights valiosos a partir das experiências do utilizador, oferecendo uma contribuição significativa para o design e desenvolvimento de produtos digitais.

Palavras-chave: Autoconceito, Processo de Design, Teste de Usabilidade, Avaliação de Artefatos Digitais, Carteiras Digitais.

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1 INTRODUÇÃO

When it comes to artefact evaluation, the methodologies used still tend to be limited to usability heuristics. The case of SUS (System Usability Scale) questionnaire evaluates the artefact through statements about the users' interactions with a given artefact. However, it ends up limited to evaluating only how usable the artefact is and if it has a "good interface." The need to evaluate artefacts in terms of usability is undeniable; however, there is no certainty that if the artefact has good usability and interface, it will also have market success (MIRANDA, LI and DARIN, 2021).

Teng and Khong (2021) affirm that considering the promising future of digital means of payment, there is remissible research and study of these methods by new approaches. Traditional usability methods evaluate artefacts at a given score when the attributes of the artefact are measured (NORMAN, NIELSEN, 2016), obtaining a score for the quality of the artefact. Comparative ethnographic studies often guide the Design of digital artefacts (MAINWARING, ANDERSON, CHANG, 2005). Although, recent studies have shown that the quality of the artefact does not have a direct and strong correlation with its potential for adoption or success (JAMAL, GOODE, 2001; IBRAHIM; NAJJAR, 2007; BIRDWELL, 1968; KRESSMANN et al., 2004; ABDALLAT, 2012; STERN et al., 1977; LEE, 2004; HUGHES; GUERRERO, 1971; GRUBB; STERN, 1971; BIRDWELL, 1968; BELLENGER; STEINBERG; STANTON, 1976; SIRGY, 1980; ROSS, 1971; BELCH, 1978; DOLICH, 1969; SOLOMON, 2006; HAWKINS; MOTHERSBAUGH; BEST, 2007).

Self-concept methodology was proposed by Rosenberg (1979) and has been studied as a construct from a multidimensional perspective (BURNS, 1979; ROSENBERG, 1979). The marketing area uses this method to understand the buying behaviour of users. Self-concept has been used in marketing studies since the '60s (GRUBB; GRATHWOHL, 1967). They hypothesize that the self-concept scales and evaluation methods can be helpful in the design area in characterizing users, evaluating various artefacts, and encapsulating the user experience. Self-concept measures the distance between what is expected from an IDEAL situation and what is experienced in an ACTUAL situation. This distance shows a strong correlation with the market artefact's potential for adoption or success. It is a method that could break the paradigm that the better evaluated an artefact is, the more quickly it will be adopted. Additionally, it moves to a paradigm where the important thing is to get artefacts close to the users' expectations.

In a space where users have increased the demands for the development of increasingly intuitive products that aim to facilitate everyday activities, this type of concept is essential for a broader understanding of functionalities, use, and even perceived artefact quality. (VAZQUES ET AL., 2016)

This paper aims to advance knowledge about the contributions of the Self-concept method in the evaluation of prototypes and to generate insights based on users' experiences. We present how Self-concept was used in research—bringing a digital wallet application to evaluate and compare versions and showing the results obtained from the data collected. It is organized as follows: conceptualizing the self-concept as a method to evaluate artefacts, bringing concepts from conventional usability methods to justifications that show the need for different methods to generate insights and results beyond the usability tests. With these concepts presented, the method itself and how it was applied will be described and followed by the data analysis and results obtained. Furthermore, ending with the discussions and conclusions.

2 SELF-CONCEPT METHOD FOR THE EVALUATION OF DIGITAL ARTEFACTS

This session presents the theoretical references of the Self-concept method. It is a changeable variable, conceptualized by Rosenberg (1979) as "the totality of thoughts and feelings that a person has about him/herself". Even though it is a concept initially used in the Psychology area, in recent years, studies in the marketing, consumer behaviour, and Design areas have also been using this method.

2.1 Conventional usability methods

Usability is an area of organizational knowledge defined by ISO 9241-11 (1998) technical standard as efficiency, efficiency, and satisfaction with which product audiences achieve objectives in a given environment (ISO, 1998). The definition and practical applicability are classically directed to analyzing how a product meets objective and measurable aspects, seeking to gauge and improve experience under a purely utilitarian perspective of usability. Thus, analysis of the task, heuristic evaluation, direct observation, and conformity inspection, among other methods of analysis and evaluation of usability, are used roughly to measure technical and performance aspects from a functionalist perspective. They often ignore subjective and qualitative aspects of the experience of use, such as feelings and meanings inherent in the process.

In considering the source of usability and its main development area as science (e.g., Engineering and Computer Sciences), it is understandable that the targeting of usability assessment methods is geared towards quantitative and objective data. Thus, methods addressing semantics, meaning, feelings, and sensations during the usability analysis can complement classic and objective methods and enrich and expand the user experience analysis towards a broader view of the user's experience. Furthermore, among these methods, one is the Self-concept, which analyzes the experience provided by the user and their ACTUAL experience in an artefact.

2.2 Self-concept as an evaluation method in the design process of digital artefacts

Self-concept has been shown in recent studies to be able to predict the market success of various artefacts. It measures user experience through two questionnaires. The first questionnaire aims to capture users' IDEAL expectations regarding the use of the artefact, and the second measures the ACTUAL user experience. Thus, going beyond interface and usability evaluation. There is evidence that the closer the ACTUAL experience is to the user's IDEAL expectation, the greater the chance of adherence and market success of the artefact (BOKSBERGER et al., 2011).

Research on adopting new technologies, such as the smartphone, e.g., Ikram, Khan, and Jeong (2018), and digital payments, e.g., Zhou (2015), have already been analyzed from various perspectives, such as usability. In parallel, studies that address aspects more directly related to user satisfaction and experience, e.g., Diallo and Collin-Lachaud (2019) directly related to this theme are also increasingly in evidence.

In this sense, Self-concept is a method that can contribute positively to the state of the art of technology and human interactions by expanding the analysis of the user experience towards methods with a focus on qualitative data. Studies show that the

use of Self-concept to characterize it is standard. It is a variant that can be categorized into seven categories (Ideal, Actual, Ideal Social, Actual Social, Expected, Mandatory, and Extended); however, only two are considered (Actual and Ideal). Whenever Self-concept appears, it comes with the Self-image Congruence hypothesis. The Self-image Congruence hypothesis states that consumers prefer products with an image that matches their self-image (GRAEFF, 1996b; SIRGY, 1982; DOLICH, 1984). Not only do individuals have images, but products, too. So, when the consumer identifies him/herself with the product's image or the possible user, the chances of purchase are more significant once the consumer uses possessions to define and create a self-image (RICHINS, 1994). According to Zinkahm and Hong (1991), the purchase and use of artefacts define, maintain, and potentiate Self-concept. It justifies how Self-concept is already recognized in marketing and consumer behaviour practices as an essential approach to understanding purchasing and usage behaviour.

The Self-concept method generates a score for the artefact, representing the Euclidean distance between the first and second questionnaires. As stated earlier, this method evaluates an artefact by comparing the IDEAL expectation (IDEAL experience) and ACTUAL experience concerning the artefact. So, the shorter the distance, the better the artefact is evaluated. Such a distance is generated by the Square Root of the Sum of the Squares Formula (Figures 2 and 3).

Figure 1- Euclidian Distance: square root of the sum of the squares differences

$$X_{ah}^2 = \sum_{j=l}^{n} (d_{aj} - d_{aj})^2$$

Source: Evans, Jamal and Foxall, 2006.

Figure 2- The Self-concept Distance is an Euclidian Distance formula

$$\text{Self-concept} = \sqrt{\sum (\text{ideal} - \text{actual})^2}$$

Source: The Authors (2023)

Studies have shown that the Self-concept theory and method can provide quantitative and qualitative data by utilizing it to go beyond traditional artefact evaluation methods, which assess artefacts by considering how usable and interface-friendly they are. Self-concept is related to what the user expects to get during the use of the artefact compared with what the artefact delivers. The more the artefact meets the IDEAL user expectations, the more likely it will achieve market success.

When it comes to artefact evaluation, more research is still needed to show the use of the self-concept. However, there is already evidence of the use of this method in Design, for example. In Neves' (2017), it is used to evaluate mobile games compared to other methods such as GameFlow. In Mendes (2020), the Self-concept is used to evaluate the experience of watching a short film with VR (Virtual Reality) glasses. Neves (2017) focuses on the method's potential to characterize the user. Mendes (2020) relates it to user experience concepts and focuses on the method's potential to evaluate artefacts.

So, as a research question, how can Self-concept help the generation of insights and results that go beyond the technical qualities of the artefact?

3 METHOD

Digital wallet applications, such as Google Pay, Apple Pay, and Samsung Pay, promise to "replace" the user's wallet. In other words, the user can register all cards (credit, debit, and food) and make payments at physical establishments with the smartphone, at card machines that allow payment by contactless (payment by proximity).

The self-concept method can encapsulate the whole user experience, therefore encompassing several aspects that are dealt with separately in other methods, such as the SUS.

The evaluation was done by prototyping the current versions available for use and comparing them to an updated version not available for use yet. Due to confidentiality reasons, the application name will not be revealed. The research was initiated by the need to evaluate versions of the same application.

3.1 Objectives

· Adapt the Self-Concept to be added to extend digital artefacts usability methodology.
· Evaluate the results obtained, checking if there was any benefit from using the Self-Concept.

3.2 Motivation

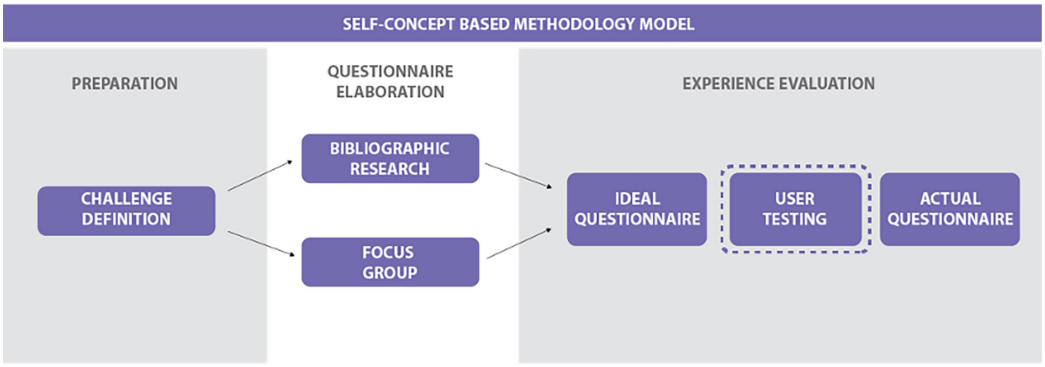
This research was provoked by the problem that users were giving up when using digital payment applications, mainly while creating a digital account in a Financial Institution (FI) or Digital Bank (ref.) in a habitual financial app. Considering that, we performed usability testing on the application with voluntary participants. The testing objective was to compare the effectiveness of two versions of the current application with a new low-fidelity version developed to solve some known problems when using the digital payment application flow and interface. For that, three prototypes were made using Adobe XD and used in the users' test. We finished the test by applying for a SUS Questionnaire. However, the users' drop-out might not be directly linked to usability and interface issues. So, we adopted the Self-concept method to encapsulate the user experience and go beyond the usability testing results.

3.3 Self-Concept evaluation method

We chose to extend the usability testing of digital wallet application prototypes. As stated earlier, the Self-concept aims to capture the user's IDEAL expectation of using the artefact and compare it with the ACTUAL experience they have had. This comparison is made through two equal questionnaires, but utilized in different moments. The IDEAL expectation is collected BEFORE the interaction with the artefact, and the ACTUAL experience is collected AFTER the interaction. This way, it is possible to characterize users, compare artefacts, and generate a score.

The steps in implementing the method can be divided into three stages: Preparation, Preparation of the Questionnaires, and Evaluation of the Experience. The illustration below (Figure 1) provides an overview of the assignment of the Self-concept evaluation approach in general.

Figure 3- Self-concept Methodology



Source: Adapted from Neves, Campos and Franklin, 2019.

The questionnaire is customized according to the artefact, so there is no ready-made questionnaire. However, it is possible to state that the Challenge Definition and Questionnaire Elaboration are essential steps for the method. The Challenge (Preparation Stage) is not limited to the artefact but also the activity and the user experience. For this research, the artefact evaluated was a digital wallet application, not the entire application, as the focus was on creating a digital account in a Financial Institution (FI) through the application. The Questionnaire Elaboration stage occurs by collecting qualifiers representing the user's feelings during the artefact test experiment. For that step, Bibliographical Research about the artefact and the Focus Group will be used. In addition, the Experience Evaluation stage is the execution of the method with volunteer participants and data collecting.

For the Questionnaire development, the Focus Group technique and Unstructured Interviews were assigned to gather the necessary qualifiers. Remember that the qualifiers do not need to be just one word (adjectives); the important thing is that they represent feelings and that they complete the phrases "I would like to feel" (First Questionnaire) and "I felt" (Second Questionnaire). As a result, eight qualifiers with their respective antonyms were selected for the questionnaire elaboration (Table 1).

Table 1- Focus Group qualifiers

	1	2	3	4	5	6	7	
Independent	+++	++	+	0	+	++	+++	Dependent
Confused	+++	++	+	0	+	++	+++	Tranquil
Well-informed	+++	++	+	0	+	++	+++	Old-fashioned
Confident	+++	++	+	0	+	++	+++	Suspicious
Anxious	+++	++	+	0	+	++	+++	Relieved
Satisfied	+++	++	+	0	+	++	+++	Disappointed
Agile	+++	++	+	0	+	++	+++	Slow
Safe	+++	++	+	0	+	++	+++	Vulnerable

Source: The Authors (2023)

This type of arrangement where qualifiers and their respective antonyms are placed - separated by a 7-point Likert Scale - is called a Semantic Differential Scale. To make it more intuitive for the user to respond and understand the intensity of each feeling on the scale, the numbers (1 - 7) were replaced by the sum symbol (+), and the neutral point was represented by the number zero (0).

3.4 Materials

The artefact selected for this research was a digital wallet application. However, as already mentioned, it focuses on creating a digital account in an FI (Financial Institution) or Digital Bank through the application. As there was no possibility of using the application itself, prototypes in Adobe XD were generated instead.

During a previous usability assessment, where heuristics were applied, some problems in both apps (App Mini and Full - versions of the app to facilitate reader understanding) were identified, and a new version with such adjustments was proposed. So, the usability test provided here includes the creation of four prototypes, two from App Mini and two from App Full. Both versions of each app will be compared in the test, the current version of each app (in Prototype) and the new versions designed by the team (in Prototype). For secrecy reasons, some brands had to be suppressed to keep the parties involved (companies and manufacturers) safe.

The usability evaluation method was selected, and it was applied through questionnaires, interviews, and prototypes of the functionality evaluated (App for Pay with Digital Account). The prototypes were developed by the research team, and two of the prototypes represent how the apps (Mini and Full) look today, and the third Prototype represents a proposed new version. Significantly, this New version (Prototype 3) was developed by the team through a heuristic analysis of the current versions of the apps to solve usability and activity flow problems, but details about the heuristic analysis and usability problems identified are not included in this document.

3.5 Participants

The participants were a group of 12 end-users with mixed gender, technology knowledge, and age. Focusing on 30 to 45 years old age group, with the following configuration (each with three users):

- Group 1 (New + Mini)
- Group 2 (Mini + New)
- Group 3 (New + Full)
- Group 4 (Full + New)

Participants were selected following criteria defined and based on previous research data related to the evaluated application. In addition, two selection criteria were defined, namely: the age group, which should consider users between 30 and 45 years old; the degree of specialization and proximity to information technologies, which should consider users with some experience in this regard.

A short questionnaire was used to recruit participants to collaborate with the experiment, which made it possible to observe some characteristics of the users' profiles concerning the application. These data are listed in Table 2 below.

Table 2- User's profile data

Average age	37,9 years old
System OS.	86,7% Android users
Digital Payment adoption	60% adoption
Application adoption	6,7% adoption
Digital Payment mentioned	PIX, PicPay, and AME
Banks mentioned	Nubank, Itaú, Caixa and Banco do Brasil

Source: The Authors (2023)

3.6 Procedures

The test experiment was limited to the use of mobile payment in the onboarding process and the creation of a digital bank account, establishing, as an end, the onboarding on the account summary screen. No specific interaction was requested, informing participants, but only that they should simulate the use of the application in the process of opening a bank or Fintech digital account. The test included fundamental interactions using an application, such as tapping the screen, dragging, and filling in fields. As it is a low-fidelity prototype, the data entry fields were designed to be filled in automatically.

In general, the steps of experimentation were: recruitment, scheduling, sending instructions to participants, and interaction (data collection).

The test activities were conducted according to the following script:

· Volunteers Recruitment;
· Scheduling;
· Sending instructions and Free and Informed Consent form;
· Conducting the testing.

A preparation step is vital for every user interaction and testing activity. It includes creating questionnaires, consent forms, and even a pre-test to see if the flow is correct.

Preparation for tests

To be able to attract volunteers to carry out tests with the prototypes:

· A registration form was created for volunteers who are non-experts in technology and aged 35–45 years;
· Sending email thanking the proposal and scheduling the tests;
· Sending instructions by email, tutorial one to be used to register the cell phone screen and sending the Free and Informed Consent form;
· Sending a link to a meeting (Microsoft Teams ® or Google Meet ®), as scheduled and chosen by the volunteer.

As already mentioned, the test was individual and monitored by two researchers, a moderator and an observer. The test execution script is described below, and each participant tested two prototypes, one of them being one of the current versions and the new version. It is essential to say that the first questionnaire to be assigned was the Self-

-concept (IDEAL) before the interaction with any of the prototypes. After each Prototype was tested, the second Self-concept (ACTUAL) questionnaire was assigned, followed by the SUS questionnaire.

Tests execution

At first, it was thought that the same volunteer would test the current and the new version of the same app in the experiment. However, due to the complexity of developing four prototypes, each volunteer will test only one of the prototypes created. What is best to avoid prejudice and give more time to those responsible for developing the prototypes?

The test was carried out following a sequenced protocol of steps. First, we had the reception of the volunteer participant and then the presentation of the team members who were taking the test. A request was made to record the meeting, and thus, we recorded the volunteer's consent. It was warned that the participant would test two of the prototypes, and it would take about 30 minutes in all. Participants were informed that some data during account creation would be a simulation for security reasons and that, if they felt comfortable, they could speak aloud during the test. Furthermore, there was no right or wrong, and he was free to interact with the app as he chose.

After that, the volunteer was asked to imagine a scenario: "Imagine that you want to open a digital account at a bank to start receiving payments and making non-cash transactions. After all, we are in a pandemic, and many people no longer use cash or prefer information from other payments. You heard about this app. You have downloaded and installed it on your phone. Now, you are about to enter the application for the first time".

Therefore, the user was asked to respond to a self-concept questionnaire about how he would like to feel in his IDEAL experience with the application. According to the subdivided groups, the participants received the prototype link during the interaction to take the test on their cell phones, and the screen was recorded during the test with the AZ Recorder ®. After these steps, participants answered a self-concept questionnaire marking how the participant felt in their REAL experience. Also, the user was asked to answer the SUS questionnaire about the interface, and he was asked what he thought of the Prototype and the interface. In an empathetic way, we guided the participants to feel comfortable to talk and to express their experiences.

Next, another version of the prototypes was sent through a link. Once again, the participant answered a self-concept questionnaire, telling how she/he felt about his/her actual experience. After that, the participant was asked to answer the SUS questionnaire about the interface of the other Prototype.

Moreover, at the end of the interactions, guiding questions were set to structure an informal conversation with the participant to capture more insights.

1. What is your impression of this interface (Global Dashboard)? What do you think he can do?
2. Do you already have a digital account at any FI or digital bank?
3. How did you describe your experience in the process of creating a digital account?
4. Is it a feature you would use (create a digital account)? Why?

Data Collection (Evaluation Experience)

Notably, the experiment was composed of semi-structured interviews accompanied by two researchers, one moderator, and one observer. The moderator had a guide script to conduct the interaction, but he/she had the autonomy to ask additional questions to collect the participants' perceptions and assign three questionnaires to participants, one SUS (System Usability Scale) and two Self-Concept ones.

The qualitative data obtained during the semi-structured interviews were later transcribed and analyzed thematically. During the sections, visuals are generated from the screen capture and the image capture of the users. All meetings were recorded, and so were the participants' smartphone screens while using the prototypes. The video conferencing platforms used were Microsoft Teams and Google Meets. Additionally, the smartphone screen recording application used was AZ Recorder. Later, such recordings were used for data analysis.

3.7 Data Analysis

The application of the self-concept generates a score for the artefact, which represents the Euclidean distance between the first and second questionnaires. As stated earlier, this method evaluates an artefact by comparing the user's expectation (ideal experience) and ACTUAL experience in relation to the artefact. And the shorter the distance, the better the artefact is evaluated. Such a distance is generated by Euclid's Formula (Figures 2 and 3).

With the application of the self-concept, the function of creating a digital account was evaluated. It was possible to generate a comparison between prototypes concerning the evaluated function in the application in the usability test. For the other categories, we compared existing apps of each category, analyzing the emotions, feelings, and trust about payment methods, as well as the user experience.

Qualitative data was analyzed to identify users' precepts in the dialogues and in the way users communicate. We also observed non-verbal communication like gestures, hesitations, facial expressions, and other forms of communication with the body. We tried to understand the context of use beyond the context of interaction at the interface to include their understanding of how the device works (mental model) and the cultural and emotional aspects that make up their experience with the prototypes.

3.8 Results

This section presents the analysis of the data obtained in the tests with the users. According to data collected from the SUS (System Usability Scale) and Self-concept. As well as evaluation of the videos of the users' interactions with prototypes 1, 2 and 3. The team developed the Prototype interface and flowed with the Adobe XD to be used in the experiment.

As stated earlier, the Self-concept method was used to go beyond the usability scope and understand the user experience. Therefore, the two Self-concept questionnaires were assigned to the volunteer participants before and after the interaction with each Prototype - IDEAL Self Questionnaire and ACTUAL Self Questionnaire. Significantly, each participant interacted with two Prototypes.

Comparing Prototypes: One way to analyze the data collected by the Self-concept method is through the distance between the IDEAL Self and the ACTUAL Self (using the means of the Square Root of the Sum of the Squares Formula presented before). A sco-

re for each Prototype is generated, and it is possible to evaluate and compare different artefacts or even different versions of the same product. In this case, three versions of the same artefact were evaluated (Prototypes 1, 2, and 3). The table below shows the average Euclidean distance (square root of the sum of the squares formula) generated by evaluating the 12 participants for each Prototype. Prototypes 1 and 2 are two versions of the application available for download. Moreover, Prototype 3 refers to a new version of the application that aims to solve some activity flow and interface problems.

Table 3- Euclidean Distance (IDEAL x ACTUAL)

Prototype 1	4,17
Prototype 2	6,14
Prototype 3	2,35

Source: The Authors (2023)

Usually, the higher the score, the better the artefact evaluation. In Self-concept, on the other hand, the artefact with the highest score has the worst evaluation. The Self-concept approach implies that the closer the IDEAL expectation is to the ACTUAL experience, the greater the chance for user compliance. Therefore, as shown in Table 3, the Prototype closest to the IDEAL user expectations was the third. Furthermore, the experience with the Prototype 2 was the furthest away from the one considered IDEAL by the participants. Therefore, considering that 0 is a perfect score (where ideal expectations meet the ACTUAL interaction) and that the highest possible distance is 16.97 (when the ACTUAL Self is the opposite of the IDEAL Self). None of the Prototypes have had a bad evaluation on average.

Another way to analyze the self-concept data was through the evaluation of the participants. In Table 4, it is possible to see the individual score of every participant's response for each of the Prototypes evaluated (since all participants had to evaluate two Prototypes). Remember that the IDEAL Self Questionnaire is the same for both Prototypes because it captures the participants' IDEAL expectations or how they would like to feel, ideally, when using a Digital Account application.

Table 4- Score of the Prototypes per participant

Prototype 1		**Prototype 2**		**Prototype 3**	
P - 01	0	P - 02	6	P - 01	0
P - 03	3	P - 04	5,92	P - 02	0
P - 05	1	P - 07	3,32	P - 03	3
P - 06	9,49	P - 08	1	P - 04	0
P - 09	9,8	P - 10	10,58	P - 05	0
P - 12	1,73	P - 11	10,05	P - 06	4,8
				P - 07	2,45
				P - 08	0
				P - 09	1,41
				P - 10	7,81
				P - 11	8,72
				P - 12	0

Source: The Authors (2023)

IDEAL Experience of Participants: Contrary to Table 3, which presents the means and points out that none of the Prototypes has had a lousy evaluation when looking at the scores individually, some interactions were poorly evaluated. For example, considering the maximum score (16.97) an artefact could reach, it would be considered poorly evaluated if it had a score equal to or greater than half of the maximum distance possible (8.49). Thus, two of the participants did not have an experience close to what they considered ideal when using Prototype 1, another two when using Prototype 2, and only one when using Prototype 3.

On the other hand, six participants felt that the user experience of the new version of the application matches the experience they would consider ideal - this conclusion comes because of the 0 score evaluations. Thus, the Self-concept data points out that the Prototype 3 interface and flow changes improved the usability of the application and the user experience overall. By no means did all the participants rate Prototype 3 as being better than the others. However, it has yet to be possible to guarantee that these changes will result in better adhesion to the application and will reduce the drop-out and lack of engagement.

Self-concept Considerations: In summary, through the answers to the IDEAL questionnaire, it was possible to analyze that the participants would like to feel independent, calm, attentive, confident, satisfied, agile, relieved, and safe using the application. Considering the ACTUAL experience, the participants felt entirely independent while using Prototype 3, except for one who evaluated being independent/dependent as "not important" and two who would like to feel dependent.

They also felt safe, apart from one who marked the safety feeling as "not important" after the test. However, it is worth mentioning that while all the participants marked Safe +++ as the ideal, only eight of them felt very safe during the interaction with the Prototype, and some felt less safe in intensity (++, +). This implies that there are still some improvements to be made concerning the feeling of trust.

Table 5- Users' Quotes

"I liked the interface right away."
"I did not feel any difficulties; it is simple, very practical."
"I thought it was cool that it is an application that comes on the device, right?"
"I was confused. I would need something more friendly and with further information."
"The interface is good, very user-friendly, clean; simple (...) I really liked it."
"I would use it depending on the fees involved."
"I did not feel any difficulties; it is simple, very practical."
"The interface is good, very user-friendly, clean; simple (...) I really liked it."
"I thought it was cool that it is an application that comes on the device, right?"
"Security is an essential requirement."
"A lot of white and blue... A little colour would draw more attention."
"I would use it depending on the fees involved."
"I prefer to use my bank account."
"I was confused. I would need something more friendly and with further information."
"I had difficulty, and I was suspicious; I would need more support."

Source: The Authors (2023)

Overall, participants felt tuned in, confident, satisfied, and agile. Nonetheless, two of them pointed out that they felt confused when using the application, and another participant felt anxious, feelings that he/she did not expect to have ideally. Prototype 3 got close to the ideal user experience, and further research is recommended.

In short, the participants of the testing experiment rated Prototype 3 (New) as being faster, more uncomplicated, more attractive, and self-explanatory. Moreover, users had less difficulty interacting with the third Prototype and took less time to complete the onboarding and create an Account.

When considering the results obtained, there is a convergence between the adopted methods. In other words, the results of the Self-concept evaluation in Prototype 3 are aligned with the excellent performance of SUS (System Usability Scale) and the quantitative indicator of time in this same Prototype (Table 6 and 7, respectively). An analysis and evaluation approach that considers the implementation of several methods can positively evaluate the user experience by aggregating data from different sources, which, when analyzed together, enable richer insights and validate hypotheses with greater assertiveness.

4 DISCUSSION

Self-concept is a method that makes it possible to measure the distance between the user's idealized experience and his/her ACTUAL experience with an artefact efficiently and clearly. The data obtained by this measurement may allow a more punctual and careful analysis of specific elements for the user experience interaction, assertively indicating aspects that must be considered in the improvement of the artefact design. It is essential to highlight that when assigned in parallel with other evaluation methods (e.g., SUS, direct observation, heuristic analysis), Self-concept generates a robust qualitative and quantitative data mass, enabling many analysis and interpretation approaches.

There was a clear evolution in the usability of the Prototype 1 and 2 versions to the New (3) version. However, it is not possible to state clearly that this is the problem for the low adoption of the product by users. The test results in the onboarding process indicate that the UI / UX improvements have triggered a positive result in usability, but researchers do not perceive that this factor alone will enhance mobile payment retention.

It is understood that the users' retention of an artefact is more due to the perceived value and inherent advantages than solely through usability. There is a continuous and evolutionary increase in the usability of the artefact. If the product does not present a clear value to the user from achievement and engagement, there will be no retention or loyalty.

5 CONCLUSIONS

In this paper, we aim to understand the contribution of self-concept as an evaluation technique in a design process. To accomplish that, we used both the System Usability Scale (SUS) to evaluate usability and the Self-concept-based methodology to encapsulate the user experience. As a result, it was possible to define feelings/perceptions that qualify the experience with digital wallets.

The data presented above showcase an evolution in usability between the 1 and 2 Prototypes for the New (3). However, it is essential to highlight that there is a need to

design the interface and the artefact's business model. That is, defining the aspects and characteristics that show the user the advantages of using mobile payment over competing applications, many of which have a vast installed base and are already loyal.

The evaluation of prototypes using the self-concept method indicates that the artefacts have evolved in usability, as suggested by the SUS result. In the experience, the artefact's quality and other aspects, such as the users' feelings and the context of use, are also considered. That said, it is understood that the Self-concept is a promising tool in encapsulating the complex concept of experience and even measuring the potential for adoption and success of various artefacts.

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