User experience: the factors to improve the perception of value in software projects

Experiência do usuário: os fatores para melhorar a percepção de valor em projetos de software

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ABSTRACT
Although it is important to design software that can improve the perception of value from the user experience, this subject is dispersed in the literature. The aim of this study is to identify the relevant factors to be considered in software projects to improve the perception of value from the user experience. The method adopted was systematic literature review based on the Scopus and Web of Science databases, when 114 papers were selected for analysis. The results presented the factors: Usability, Design, Loyalty, Quality of experience, Interaction, Satisfaction classified as Psychological dimension, and Innovation and Productivity classified as Operational dimension, which were evaluated as relevant factors to be considered in software projects. The theoretical contribution is to gather these factors to improve the perception of value in software projects dispersed in the literature. The practical relevance is to help software developers design superior software that can improve the perceived value for users. The social contribution is to deliver value to software users by improving their experience.

Keywords: user experience, UX, perceived value, software projects, networks.

1 INTRODUCTION
User Experience (UX) represents user interactions throughout the lifecycle of related products and/or services (Alenljung et al., 2017; Zhao et al., 2023). UX concepts encompass user orientation as the focus of the development and life-cycle of products and services (Partala & Kujala, 2016). The strategy for developing UX-oriented products and
services aims at optimizing the value perceived by customers (Luther et al., 2020), but in software projects this subject is dispersed in the literature, needing to be gathered.

The value perceived by users is subjective and depends on the interaction between the user and the products/services, being influenced by the environment in which the user is (Isomursu et al., 2011). According to Nylén & Holmström (2015), products/services should be designed in such a way as to create positive emotional responses in users. Therefore, the interactions between users and the functionalities of a software, product, or service integrated in UX contemplate physical and psychological perceptions (Japutra et al., 2021).

When the term UX emerged, it was usually associated with software development and online tools, such as websites, portals, or mobile applications (Luther et al., 2020). Thus, UX enabled Apple to achieve a top market share and be at a new level in different segments (Nylén & Holmström, 2015). UX-oriented development can also reduce costs during projects, especially when only user-relevant functionality is considered (Al-Azzawi, 2014).

UX can be perceived differently, depending on the application or type of need of the users involved (Sánchez-Franco & Roldán, 2005), whether it is goal-oriented or recreational. The relationship between user satisfaction and system effectiveness was addressed in a few studies that considered that for software to be effective in current times, it is necessary that the UX exceeds the basic expectations of functionality (Gatian, 1994; Zarour, 2017a).

A growing number of academic publications on UX and its different approaches, dimensions and paradigms demonstrate the importance of user orientation in software and product development (Davidavičienė et al., 2021; Zarour, 2017a). The satisfaction of users is an essential factor for organizations that provide software or digital services (Khalil Zadeh et al., 2017; Mauro et al., 2023; Shen et al., 2022). Developing software whose UX is intuitive and user-friendly, in addition to considering psychological aspects of users, can increase the efficiency of organizational processes (Al-Azzawi, 2014; Zhao et al., 2023). The creation of value with customers can then lead to a competitive differentiator for companies involved in UX (Jantan et al., 2020), increasing the
satisfaction and loyalty of the costumers for the product or service (Hwang & Kim, 2017; Mauro et al., 2023).

Although relevant for software developers, the main factors to improve the perception of value are dispersed in the literature, which is a gap that this study intends to fill. To this end, the following research question is formulated:

RQ1: What are the main factors to be considered in software projects to improve the perception of value from the user experience?

Using systematic literature review, this study identified that: Usability, Design, Loyalty, Quality, Interaction, Satisfaction, Innovation and Productivity, appeared as relevant factors to be considered in software projects, to improve the perception of value from the UX.

This study is structured as follows: after this introduction, the definition and concepts about UX and perceived value are exposed. In the Methods section, the systematic literature review procedures are presented, followed by the presentation and analysis of the results. The discussion on the subject and conclusions are addressed, with the final considerations and suggestions for future researches.

2 THEORETICAL BACKGROUND

2.1 USER EXPERIENCE (UX)

The term UX was coined by Don Norman in 1993 while working at Apple as a User Experience Designer (Luther et al., 2020). The divergence between academic definitions for UX, such as usability, activity or emotional design, prevents a single definition for the term UX (Lallemand et al., 2015a). Planning UX involves delivering more than just functionality in products or services (Law et al., 2014). A common criterion of the term UX is the direct relationship between people and products/services while humanizing the perspective of interaction (Luther et al., 2020).

The International Organization for Standardization (ISO, 2010) defines UX as users’ personal perceptions and responses to the use of products/services. Although usability has earlier been defined in ISO as the extent to which a product can be used to achieve certain goals effectively, efficiently and satisfactorily under certain circumstances (Al-Tahat, 2020), Lallemand et al., (2015a) argue that usability is a
fundamental part of UX. Additionally, Mahut et al. (2018) present the interdependence of UX with other factors such as design and environment.

UX can evolve and be modified throughout the entire cycle of use and interaction by addressing design perceptions, functionalities, technologies and even specifications evaluated by users (Lallemand et al., 2015; Mishra, 2021). In other words, even if the product or service remains the same, UX can be updated by the emergence of new technologies or services offered by companies entering the market (Hassenzahl & Ullrich, 2007). In this sense, some authors have published papers on the definition and how to measure UX under different environments (Law et al., 2014; Luther et al., 2020; van Schaik & Ling, 2008).

The roots of UX are directly related to software and application development (Mahut et al., 2018; Santosa, 2016) and to factors related to user perception during interaction with software (Mahut et al., 2018). Because of interactions during the UX cycle, users go through emotional experiences such as satisfaction, motivation, expectations and mood, among others (Luther et al., 2020; Mahut et al., 2018; Mauro et al., 2023; Zhao et al., 2023).

2.2 PERCEIVED VALUES

Human-computer interaction (HCI) has been the subject of standards since the 1950s (Luther et al., 2020). Value-related concepts are subjects of interest in psychology, marketing, and in HCI research (Ervasti, 2012). Users' experience about the usefulness, practicality or relevance of the software is often associated with perceived value (Isomursu et al., 2011), however, the definition of perceived value is approached from different points of view and has been related to UX in specific projects (Ervasti, 2012; Jeong et al., 2017).

Meeting user needs during UX is defended as one of the pillars for perceived value (Keinonen, 2010), whereas the perceived value during UX by users directly depends on their social or psychological values and the context of use and interaction performed (Isomursu et al., 2011). The value perceived by users can be utilized to predict or explain the acceptance of a given product or service (Partala & Saari, 2015), nevertheless, the
perception of value during UX must be assessed individually and can contemplate multiple dimensions (Ervasti, 2012)

The value perceived by users in the digital age undergoes rapid transformations and must be measured by the target audience so that the objectives are achieved (Nylén & Holmström, 2015). Several authors propose ways to measure UX and perceived values separately (Mahut et al., 2018; Watjatrakul, 2018; Zhao & Dholakia, 2009). For Nylén & Holmström (2015), one of the ways to measure UX is through user engagement.

The importance of measuring perceived values in UX was highlighted by Shin (2015) who found a significant relationship between UX quality and consumer loyalty. For this study, we consider that the acceptance of a software project and, consequently, the identification of the perceived values by the users may depend on the confirmation of their expectations (Oliver, 1977). It is recognized that the perceived values in software projects span multiple dimensions and are linked to personal, social and goal-oriented values (utilitarian values), therefore, perceived value can then be associated with personal, social and contextual values (Partala & Kujala, 2016).

Luther et al. (2020) analyzed the recurrence of studies on the psychological aspects of UX and perceived values, corroborating with Partala & Saari (2015) on its relevance. Perceived value can be further reduced or distorted when impacted by poor impressions or negative UX (Cham & Costa, 2017).

3 METHODS

The use of systematic literature review (SLR) is recommended whenever the goal is to gather evidence on a pre-defined research question, using clear methods to identify and relate works linked to the topic of study (Pollock & Berge, 2018). An SLR should also provide a comprehensive overview of the research findings from rigorously established criteria to provide the best understanding of the delimited subject (Zarour, 2017b). The content analysis of the research corpus in an SLR is performed from critical and thoughtful reading of the papers (Penha et al., 2020).

As a research protocol and according to the recommendations of the study by Pollock & Berge (2018), an SLR should contain six main stages: (3.a) Objectives and goals; (3.b) Survey of relevant research; (3.c) Obtaining data; (3.d) Qualification of
studies; (3.e) Synthesis of evidence; and (3.f) Interpretation of results. This protocol provides essential standardization and rigor for SLR-type studies (Pollock & Berge, 2018).

3.1 OBJECTIVES AND GOALS

The purpose of this study is to systematically explore the current published studies to answer RQ1: What are the main factors to be considered in software projects to improve the perception of value from the user experience? This study was motivated by the large number of academic publications on UX and on perceived value in different approaches, being relevant to synthesize these studies (Zarour, 2017a), for a better general understanding (Stage 3.a)

3.2 SURVEY OF RELEVANT RESEARCH

According to Pollock & Berge (2018), four steps are necessary to select the research corpus (Stage 3.b). They are: identification - a step in which the research string is defined; screening - a step in which the results are delimited according to the research objectives; eligibility - a step for applying inclusion and exclusion criteria; constitution of the corpus - the final step contemplating only the resulting papers as a sample base.

The search was performed during the first semester of 2023 and the search string used to obtain papers in the Scopus and Web of Science (WOS) databases was initially: ("user experience" OR "UX") AND ("value perception"), but this generated few papers, so it was expanded to ("user experience" OR "UX") AND "valu*", resulting in 3,370 papers in Scopus and 1,856 papers in Web of Science, filtering only papers, in a total of 5,226, presented in Table 1.

<table>
<thead>
<tr>
<th>Search string</th>
<th>Scopus</th>
<th>Web of Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&quot;user experience&quot; OR &quot;UX&quot;) AND (&quot;value perception&quot;)</td>
<td>11 documents (5 papers)</td>
<td>4 documents (3 papers)</td>
</tr>
<tr>
<td>(&quot;user experience&quot; OR &quot;UX&quot;) AND &quot;valu*&quot;</td>
<td>6405 documents (3370 papers)</td>
<td>3387 documents (1856 papers)</td>
</tr>
</tbody>
</table>

Created by authors.
To reduce this number of papers, filters were applied as presented in Table 2, and the identification of studies via databases was guided by PRISMA 2020 flow diagram for new systematic reviews (Page, McKenzie, Bossuyt, Boutron, Hoffmann, Mulrow, et al., 2021), summarized in Figure 1.

Table 2. Literature review protocol

<table>
<thead>
<tr>
<th>Keywords</th>
<th>user experience, value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boolean operators</td>
<td>OR to provide alternatives; AND to join keywords</td>
</tr>
<tr>
<td>Expansion operator</td>
<td>Asterisk (*) to expand the keyword; quotes (“”) to search the whole set of words</td>
</tr>
<tr>
<td>Search string</td>
<td>(&quot;user experience&quot; OR &quot;UX&quot;) AND &quot;valu*&quot;</td>
</tr>
<tr>
<td>Databases</td>
<td>Scopus and Web of Science</td>
</tr>
<tr>
<td>Language</td>
<td>English</td>
</tr>
<tr>
<td>Publication type</td>
<td>Paper</td>
</tr>
<tr>
<td>Time window</td>
<td>1990-2023</td>
</tr>
<tr>
<td>Inclusion criteria</td>
<td>a) Subject area: Business, Management and Accounting; Engineering</td>
</tr>
<tr>
<td></td>
<td>b) Keywords: Technology, software, “user experience”; “perceived value”</td>
</tr>
<tr>
<td>Exclusion criteria</td>
<td>a) Papers that do not focus on the human interactions with computers,</td>
</tr>
<tr>
<td></td>
<td>b) Papers that focus exclusively on computers / programming</td>
</tr>
</tbody>
</table>

Adapted from Leite (2012)

3.3 OBTAINING DATA

The initial identification (Stage 3.c) contemplated the restriction to papers only in their final version. For a paper to be published in journals, peer validation is normally performed using the double-blind review method (Volpato, 2010). Peer validation seeks to filter and delimit relevant publications in terms of originality, quality, rigor and relevance to the research theme (Pilatti et al., 2010). The filter for papers was applied, as well as the language restricted to English, and subject area limited to Business, Management and Accounting, and Engineering, thus the total results of the databases became 756 in the WOS database and 1666 in the Scopus database, composing a total of 2422 papers.

A second filter, consisted of selecting only papers that had at least one of the following keywords: technology or software, and the necessary keywords: “user experience” or “perceived value”, reduced this amount to 1626 papers in both databases.

To continue the identification process, it was then necessary to export the databases. The exportation was done in Refman format (RIS) in Scopus and in text format (TXT) in WOS. The export process met the precepts necessary for using the online tool.
for data analysis in SLR in the Rayyan software (Ouzzani et al., 2016). Rayyan main feature is the interface to perform SLR dynamically, enabling the unification of databases in a practical way (Ouzzani et al., 2016).

Among the 1626 papers imported into Rayyan, 1318 duplicate papers were identified when the duplicity analysis tool was applied, reducing to 308 papers in total. Among the resulting papers, 13 papers were not publicly available for download in the respective journals or online search engines, such as Google Scholar or Microsoft Academic, reducing to 295 papers assessed for eligibility.

After reading the title and abstract of these papers, as recommended by Pollock & Berge (2018), 139 papers were excluded, leaving 156 papers selected for full reading. After that, 28 papers were excluded for not focusing on the human interactions with computers, and 14 that focused exclusively on computers / programming, remaining a total of 114 papers, as presented in Figure 1.

Figure 1. PRISMA 2020 flow diagram for new systematic reviews

Adapted from Pollock & Berge (2018)
3.4 QUALIFICATION OF STUDIES

To minimize bias in this exploratory study, no software was used to track previously selected words, trying to overcome what Zupic and Čater (2015) called “the noise effect on the data”, motivated by the difficulty that the algorithms have in weighing the importance of words/factors/variables for this study.

To qualify the studies (Stage 3.d) and find the main factors to be considered in software projects, to improve the perception of value from the UX, each author of this study read at least seven different papers in one week, when through a meeting platform, each one presented the main factors identified in the papers, and the group discussed the findings, sometimes gathering the findings under one same factor, sometimes identifying a new one. This method was used until the 114 papers were read and discussed by the group.

After that, the Bibliometrix software was used to support the process of identifying, among the 114 papers, the most relevant journals in this area, and AtlasTi was used to group the analysis notes, comments, coding, and citations. According to Walter & Bach (2015), AtlasTi provides all the necessary tools to facilitate the process of qualitative interpretation in research. It is important to emphasize that the software does not have tools to automate qualitative interpretation, leaving it up to the researcher to assess and interpret the research.

4 RESULTS AND DISCUSSION

The synthesis of evidence of the results (Stage 3.e) as well as the presentation of the papers included in the research corpus are part of this section. Subsequently, the categories related to UX and value, identified during the analysis of the papers, are presented. The research corpus consists of 114 English language papers published between 1994 and 2023.

4.1 RELEVANT JOURNALS

The publications on UX are from the software or HCI area. However, journals from other areas such as psychology, engineering, marketing, administration and even project management, presented publications on UX and Value. It can then be considered
that the theme of this SLR goes beyond the boundaries of software development and can be considered interdisciplinary.

The journals with the highest volume of publications on UX and value were highlighted: Interactions (n=5), International Journal of Human Computer Studies (n=5), Computers in Human Behavior (n=4) and Interacting with Computers (n=4).

4.2 THE DIMENSIONS AND THEIR FACTORS

It was possible to identify two main dimensions where the main factors to be considered in software projects in order to improve the perception of the UX value can be classified: Psychological and Operational (Stage 3.f). The list of factors and authors can be found in Table 3.

Table 3. Factors to be considered in software projects to improve the perception of value from the user experience

<table>
<thead>
<tr>
<th>Factors</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological Dimension</td>
<td></td>
</tr>
<tr>
<td>Usability</td>
<td>Al-Tahat (2020); Blandford et al. (2008); Dunkle, (2015); Lindgaard (2014); Majrashi et al. (2020); Moridíis et al. (2018); Nikou &amp; Economides (2019); Park, Han, Kim, Cho, et al. (2013); Ramakrishnan &amp; Kaur (2020); Revenás et al. (2020); Sánchez-Franco &amp; Roldán (2005); Santosa, (2016); Sauer (2018); van Schaik &amp; Ling (2008); van Wyk &amp; van Ryneveld (2017); M. Yu et al. (2020)</td>
</tr>
<tr>
<td>Design</td>
<td>Alonso-García et al. (2020); Berry et al. (2004); Bollini (2017); Budd &amp; Wang (2017); Buono et al. (2020); Cham &amp; Costa (2017); Dourish (2019); Keinonen (2010); S. Kim (2019); Krueger et al. (2020); Matsuura et al. (2020); Paz (2019); Peter (2009); Poteet (2010); Prati et al. (2021); Qin &amp; Ng (2020); Sørum et al. (2012); Torres et al. (2008); van Schaik &amp; Ling (2008); Yasu et al. (2014)</td>
</tr>
<tr>
<td>Loyalty</td>
<td>Japutra et al. (2021); Torres et al. (2007); Watjatrakul (2018); Yu &amp; Sangiorgi (2018)</td>
</tr>
<tr>
<td>Quality of experience</td>
<td>Balakrishnan &amp; Sangaiah (2017); Knight (2011); Magoutas et al. (2010); Olsina et al. (2012); Shin (2015); Vasconcelos et al. (2020); Wong et al. (2021); Yin et al. (2020)</td>
</tr>
<tr>
<td>Interaction</td>
<td>Alenjung et al. (2017); Caldwell &amp; Wang (2009); Davidavíené et al. (2021); Jantan et al. (2020); Mahut et al. (2018); Park, Han, Kim, Oh, et al. (2013); Schon et al. (2020); Zhao &amp; Dholakia (2009)</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>Badran &amp; Al-Haddad (2018); Ghatian, 1994; Lin &amp; Cheng (2017); Pavelin et al. (2012); Zhao &amp; Dholakia (2009)</td>
</tr>
<tr>
<td>Operational Dimension</td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>Daim et al. (2014); Meinel et al. (2020); Nylén &amp; Holmström (2015)</td>
</tr>
<tr>
<td>Productivity</td>
<td>Cheah et al. (2020); Chouki et al. (2020); Couto et al. (2020); Dessureault (2019); Dewit et al. (2021); Doherty &amp; Doherty (2019); East et al. (2008); Eid &amp; Abbas (2017); Hussein, Hussain, Mkpojiogu, Lim, et al. (2019a); Isäbirye et al. (2015); Luther et al. (2020); Simeone et al. (2021)</td>
</tr>
</tbody>
</table>

Next, the dimensions and their factors are explored.
4.2.1 Psychological dimension

Psychological dimension plays a crucial role in modifying UX and increasing user satisfaction, loyalty and perception of value in software projects (Hussein, Mkpojiogu, et al., 2019; Jha & Shah, 2021; Lee & Park, 2018, 2019). The field of UX is relatively new and one of the ongoing challenges it faces is defining the overall scope of UX and effectively measuring the experiential qualities of user interactions (Law et al., 2014). Designing to motivate customers is crucial to enhancing UX (Partala & Kujala, 2016; Wilson & Angela Sasse, 2004; Yoon et al., 2020). Motivation plays a significant role in driving user engagement, increasing customer satisfaction and, ultimately, boosting business success (Fukuda, 2016).

User satisfaction in UX is a term that evokes psychological, contextual and social issues (Isomursu et al., 2011; Jha & Shah, 2021; Lee & Park, 2018, 2019). Assessing satisfaction is even more complex when the perception of value or satisfaction itself depends on the evaluation of users, who often distort or fail to correctly assess their own perceptions (Lee & Park, 2018; Hassenzahl & Ullrich, 2007; Park & Han, 2013, 2018).

The factors associated with the Psychological dimension are: Usability, Design, Loyalty, Quality of Experience, Interaction and Satisfaction.

4.2.1.1 Usability

Usability refers to the ease with which users can interact with and navigate through the software. Intuitive and user-friendly interfaces enhance usability, reducing cognitive load and frustration. Usability is a core component of UX design, focusing on the efficiency and effectiveness of user interactions (van Schaik & Ling, 2008). Considering users' mental models and aligning the software functionality with their expectations helps create a positive experience. It is necessary to consider the connection between the experience related to the usability of the technology, the UX, and the experience with the Zarour (2017 a,b) product or service brand. However, usability can be perceived differently depending on the goals or needs of users (Sánchez-Franco &Roldán, 2005). Ease of use is also associated with factors such as perceived value, convenience, performance and functionality (Japutra et al., 2021).
Usability is one of the widely explored factors in relation to HCI and has also been applied to UX (Krueger et al., 2020; Partala & Kujala, 2016). Usability can influence user satisfaction or even the ways users evaluate UX (Gatian, 1994). Even though usability has applications and measurements different than UX (Cham & Costa, 2017), the papers in the research corpus highlight it as intrinsically linked to UX. Several authors research how to measure usability and, in some cases, even in parallel with the measurement of UX and perceived values (Lee & Park, 2018).

The connection between UX, usability and perceived value has also been addressed by Lin & Cheng (2015) who propose a strategic framework to provide user satisfaction. The set of user perceptions, whether they come from satisfaction, ease, usefulness or usability, results in the perceived value (Khoi, 2020). For Nurkka et al. (2009), usability is just one of the factors to consider when developing user satisfaction. User satisfaction is still one of the terms used to define usability in specific contexts (Olsina et al., 2012).

4.2.1.2 Design

The visual appeal and aesthetics of the software can significantly impact the user's emotional response and overall experience. It involves understanding the user’s goals, behaviors and requirements and incorporating them into every stage of the design process (Yasu et al., 2014). A well-designed interface with intuitive navigation, consistent branding and appealing visuals can evoke positive emotions, making the user more engaged and satisfied.

One of the UX techniques aimed at creating positive impressions or emotions in users is the User Centered Design (UCD) (Dewit et al., 2021). Berry et al. (2004) reinforce that UCD is an approach known for generating value during UX. This statement is corroborated by Hussein et al. (2019), who state that the proper application of UCD results in better products and services, thus increasing UX and perceived value by users; however, Dourish (2019) argues that user-driven design performance is something that needs to be structured to avoid so-called legitimacy traps.

For Ghajargar et al. (2017), UCD should prioritize empathy as a factor to understand the needs and expectations of the users. However, the UCD model which is
used by some organizations leads to the understanding that it was designed to bring return to the organization and not in the interest of the users (Keinonen, 2010). It is noted that there are fundamental differences between the target audience in relation to UCD and UX (Knight, 2011). UCD has its primary focus on workplace productivity, whereas UX would address personal needs more broadly and is evolving toward user-centric experience (Berry & Hungate, 2003).

Empathy with user needs and expectations should be emphasized throughout the process of developing UCD-based experiences (Ghajargar et al., 2017). According to Hussein et al. (2019), the integration between UX and UCD occurs when the project team is focused on the UCD approach, including top management support, UCD philosophies and adequate infrastructure support, although, Keinonen (2010) reinforces that it is necessary to perform a holistic identification of UX, thus avoiding the minimization of user needs.

4.2.1.3 Loyalty

Torres et al. (2007) state that creating a positive UX promotes loyalty. Satisfied users are more likely to become repeat customers and software advocates (Watjatrakul, 2018; Yu & Sangiorigi, 2018). Building trust, delivering consistent quality and actively seeking user feedback to continuously improve the product helps in establishing a loyal user base (Japutra et al., 2021). Fox (2017) states that loyalty in mobile software and apps can be achieved through ease of use. User loyalty is directly related to satisfaction and influences the positioning of brands and organizations, further influencing market share and return of capital to shareholders (Berry et al., 2004). Depending on user satisfaction during UX, the expected outcome is loyalty (Ponsignon et al., 2020).

According to Park et al. (2013), user satisfaction may depend on usability and influences perceived values and UX lifecycle. Shin (2015) identified that user perception and satisfaction have a significant relationship with loyalty.

4.2.1.4 Quality of Experience (QoE)

Quality of Experience (QoE) is a multidimensional concept that encompasses the user's subjective perception of various factors such as responsiveness, reliability,
efficiency and usability of the software (Balakrishnan & Sangaiah, 2017). Ensuring a smooth and flawless experience, minimizing latency and providing meaningful feedback can enhance QoE and user satisfaction. Therefore, businesses should prioritize customer satisfaction as a key driver for long-term success and customer retention (Shin, 2015).

The quality of the experience depends on multiple factors, such as understanding the users' profile, needs and effective design processes, among others (Alben, 1996). Developing memorable experiences creates emotional bonds that lead consumers to increase their loyalty to brands and products (Berry et al., 2004).

One of the suggested ways of strengthening user loyalty is precisely improve the quality of the UX, while Lallemand et al. (2015b) argue that discussing the quality of UX is the same as discussing UX, being unnecessary to use complex terms to define something even more complex like UX. The quality of experience perceived by users is individually modified by factors such as usage intention, autonomy and/or personal preferences (Vasconcelos et al., 2020). The relationship between software response time and UX quality was reinforced by Yu et al. (2020), whose study highlights that delays in responsiveness can negatively impact UX and cause user dissatisfaction.

4.2.1.5 Interaction

The observation of people interacting with technologies to evaluate the process of using tools to achieve goals has been the subject of studies since the 1980s (Parks, 2012). Evaluating the interaction between people and software can support the development of interfaces that allow improving the UX, and thus meeting the expectations of users. For Ellwein et al. (2020), the software development planning should consider presenting solutions to the user during the interaction process.

Interactions between people and computers or software can modify UX and, consequently, have been the subject of several studies (Fox, 2017; Santosoa, 2016; M. Yu et al., 2020). Nowadays, the interaction between people and software is not limited to physical keyboards, we can count on interactive screens (touchscreens), voice commands, augmented reality, or even devices for virtual reality (Torvatn et al., 2019). However, the development of interactions between people and software has suffered distortions
regarding the creation of inadequate layouts, psychological lures or inducers of purely commercial interactions (Dourish, 2019).

Natural interaction between people and software is one of the primary goals of the automation era (Triviño-López et al., 2020). Luther et al. (2020) state that usability in HCI typically does not consider the emotional or psychological perspectives evaluated in UX. The lack of consensus between usability and UX was reinforced by Lallemand et al. (2015 a,b), who define UX as a dynamic and subjective concept.

When it comes to the interaction between people and software, the interaction process may require complex steps or tasks, impacting the expected results during UX and, consequently, failing to achieve the expected value (Teittinen et al., 2013). The interaction between technologies and people, when properly planned, creates engagement and values that can be perceived by users (Isomursu et al., 2011).

4.2.1.6 Satisfaction

User satisfaction is closely linked to UX. When software meets or exceeds user expectations, it leads to higher satisfaction levels (Gatian, 1994; Lin & Cheng, 2017). This can be achieved through personalized experiences, tailored recommendations and the ability to customize settings to suit individual preferences. Statistical analyzes revealed that the influence of UX on customer satisfaction in software varied based on age and work experience (Badran & Al-Haddad, 2018), but there were no significant statistical changes in the relationship between software UX and customer satisfaction based on education level (Pavelin et al., 2012; Zhao & Dholakia, 2009).

4.2.2 Operational dimension

The operational dimension is related to how to maximize resources to reach its full potential and become one of the best in the market, which is linked to business strategy (Kozludzhova, 2019; Kettunen et al., 2021).

The factors associated with the Operational dimension are: Innovation and Productivity.
4.2.2.1 Innovation

Innovation must improve previous experiences. The mere introduction of new elements or features doesn't guarantee a better UX (Ervasti, 2012). UX designers should ensure that innovations are grounded in user research and aligned with user expectations and preferences. They need to consider the context of use, user goals and pain points to ensure that the innovation actually enhances the overall experience rather than complicating it (Daim et al., 2014; Meinel et al., 2020; Nylén & Holmström, 2015).

Incorporating innovative features or functionality can enhance the user’s perception of value (Ervasti, 2012; Isomursu et al., 2011). Introducing new concepts, technologies or unique solutions that solve user pain points and address the user’s needs can make the software stand out from competitors and increase its perceived value (Daim et al., 2014; Meinel et al., 2020; Nylén & Holmström, 2015).

4.2.2.2 Productivity

Software that boosts user productivity and efficiency can significantly impact the perceived value (Cheah et al., 2020; Chouki et al., 2020; Couto et al., 2020). When software is designed with focus on intuitiveness, it means that the user interface and interactions are designed to be easily understandable and require minimal effort to navigate and use effectively (Dessureault, 2019; Dewit et al., 2021; Simeone et al., 2021). Additionally, when users can accomplish tasks more quickly and easily, it enhances their overall experience and makes the software more valuable to them (Hussein et al., 2019a; Luther et al., 2020). By removing barriers to productivity, UX design promotes user engagement, increasing the likelihood of repeated usage and better overall user experiences. Productivity-focused UX design reduces frustration and increases user satisfaction.

4.3 CONCEPTUAL MAP

UX in software projects depends on the value perceived by the user, which is based on the (1) Psychological dimension, affected by the factors: Usability, Design, Loyalty, Quality of Experience, Interaction, and Satisfaction; and (2) Operational dimension, influenced by the factors: Innovation and Productivity.
A conceptual map is presented in Figure 2.

Figure 2. Conceptual map of perception of value from user experience

To increase the perception of value of UX, software projects should focus on a holistic approach that integrates these factors. By understanding users' needs, preferences and psychological responses, designers and developers can create software that provides an engaging, intuitive, and satisfying experience, thereby maximizing user loyalty and perceived value. Continuous improvement through user feedback and staying ahead of industry trends can help ensure that the software remains innovative and productive for its users.

5 CONCLUSIONS

Although user experience (UX) has the focus on the user as its mission, it was noted that the perception of value for these same users is dispersed in the literature. This study sought to identify the main factors to be considered in software projects to increase the perception of value from UX. To achieve this, a systematic literature review was
utilized, based on UX and users' value perception, themes that are usually treated in a segregated way in the literature.

The scope of the entire UX life cycle encompasses the interactions of users, customers, or consumers with the software. The perception of value, as the main research topic, is little addressed in relation to UX and is out of the 114 selected papers, only one paper truly addressed this subject (Jantan et al., 2020).

UX itself, which has been the subject of study for more than three decades, remains challenging in practical terms (Luther et al., 2020; Wilson & Angela Sasse, 2004). It is noted, however, that the topic is relevant for academics and practitioners in seeking ways to improve the relationship between users and products or services.

The theoretical contribution of this study is to present the factors: Usability, Design, Loyalty, Quality of Experience, Interaction, Satisfaction, Innovation and Productivity, to be considered in software projects to improve the perception of value from UX, expanding the body of knowledge about software projects.

The practical relevance is to help software developers design superior software that can improve the perceived value of UX through the use of these identified factors in their software project.

The social contribution is to deliver value to software users by improving their experience, contributing for a better diffusion of the information / knowledge, in line with the Sustainable Development Goal # 10 of the United Nations (UN, 2014), cooperating to reduce inequalities.

Although Scopus and Web of Science are the largest and most respectful databases, other databases could present papers with other factors not identified here, a limitation of this study. For future studies, it is suggested to expand these databases, seeking to identify other relevant factors. Another suggestion is to analyze how each factor impacts the perception of value from the user’s experience in software projects.
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