

MEASURING CUSTOMER EXPERIENCE IN MOBILE APPS: A SYSTEMATIC LITERATURE REVIEW

MJERENJE KORISNIČKOG ISKUSTVA MOBILNIH APLIKACIJA: SUSTAVNI PREGLED LITERATURE



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Review

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Abstract

Purpose – This research study is aimed at investigating the role and impact of mobile applications in an omnichannel shopping context, with a particular focus on customer experience. The objective of this research is to identify and analyze the specific aspects of customer experience that are enhanced using mobile devices.

Design/Methodology/Approach – Our systematic literature review utilized the Scopus and Web of Science databases. The search process followed the PRISMA protocol, using the keyword ‘customer experience’ and criteria related to ‘mobile applications.’ Descriptive and text-network analyzes were used to formulate the results.

Findings and implications – The study found customer experience articles published in mobile environment since 2013 to be focused on three main areas: technology, consumer, and brand. Mobile apps can be relevant at almost every stage of the customer experience process. Although hedonistic factors are appearing increasingly in the literature, the majority of research employs quantitative tools with variables derived from technology acceptance models. Thus, new research gaps can be identified.

Sažetak

Svrha – Istraživanje nastoji istražiti ulogu i utjecaj mobilnih aplikacija u kontekstu višekanalne kupovine, s posebnim naglaskom na korisničko iskustvo. Cilj je istraživanja identificirati i analizirati specifične aspekte korisničkog iskustva koji se poboljšavaju korištenjem mobilnih uređaja.

Metodološki pristup – Istraživanje se temelji na sustavnom pregledu literature korištenjem baze podataka Scopus i Web of Science. Proces pretraživanja odvijao se prema protokolu PRISMA koristeći ključnu riječ „customer experience“ (korisničko iskustvo) i kriterij vezan uz „mobile apps“ (mobilne aplikacije). Za formuliranje rezultata korištene su deskriptivna statistika i analiza tekstualne mreže.

Rezultati i implikacije – Istraživanjem je otkriveno kako su članci o korisničkom iskustvu u mobilnim aplikacijama objavljeni od 2013. usredotočeni na tri glavna područja, tj. tehnologiju, korisnika i marku. Mobilne aplikacije mogu biti relevantne u gotovo svakoj fazi procesa korisničkog iskustva. U literaturi se sve više pojavljuju hedonistički čimbenici. Većina istraživanja koristi kvantitativne metode te varijable izvedene iz modela prihvatanja tehnologije. Stoga se može identificirati novi istraživački jaz.

Limitation – This research study analyzes publications published over a decade, between 2013 and 2023. Disaggregating the research along the purchase decision-making process, i.e., examining pre-purchase, purchase, and post-purchase consumer behavior, could be an interesting line of research.

Originality – The research focuses on the significance of mobile applications in customer experience, which is a current and specific area of interest. In order to map the role of mobile apps, a systematic literature review was conducted, which proved to be a useful tool in exploring the theory of customer experience in a mobile environment.

Keywords: customer experience, mobile apps, systematic literature review

Ograničenja – Istraživanje analizira publikacije objavljene od 2013. do 2023. godine. Razdvajanje istraživanja kroz faze procesa odlučivanja o kupovini, tj. ispitivanje ponašanja potrošača prije, za vrijeme i nakon kupovine, moglo bi biti zanimljiv smjer istraživanja.

Doprinos – Istraživanje je usredotočeno na značaj mobilnih aplikacija u korisničkom iskustvu, što je aktualno i specifično područje interesa. Proveden je sustavni pregled literature u cilju mapiranja uloge mobilnih aplikacija, a koji se pokazao korisnim alatom za mjerenje korisničkog iskustva u mobilnim aplikacijama.

Ključne riječi: korisničko iskustvo, mobilne aplikacije, sustavni pregled literature

1. INTRODUCTION

In an omnichannel shopping environment (Lazaris, Vrechopoulos, Fraidaki & Doukidis, 2014), mobile applications or apps play a crucial role at touchpoints (De Keyser, Verleye, Lemon, Keiningham & Klaus, 2020; Homburg, Jozić & Kuehnl, 2017; Lemon & Verhoef, 2016) where consumers interact with a brand or retail entity. Applications can offer a convenient and efficient alternative to traditional interactions (Molinillo, Ekinci & Japutra, 2019) throughout the purchase decision process (Kotler & Keller, 2006). According to Liu, Lobschat, Verhoef & Zhao, (2019), there may be a variation in the frequency and intensity of purchases based on the interaction with a retail entity through a mobile interface. Related research (Alnawas & Aburub, 2016; Bellman, Potter, Treleaven-Hassard, Robinson & Varan, 2011) has shown that commercial apps can stimulate and even increase sales by improving customer engagement through flexible, convenient, and interactive connectivity (Molinillo et al., 2019; Kumar, Rajan, Gupta & Dalla Pozza, 2019). Despite the fact that the topic has been significantly researched, several directions offering scope for further investigation can be outlined.

The following section of the paper presents the theoretical background with a detailed examination of the customer experience phenomenon, emphasizing the significance of mobile devices in the omnichannel shopping journey and a comprehensive analysis of the existing literature on measuring mobile customer experience. Based on the theoretical background, the methodological section elucidates the background of the research by addressing the research questions. This is followed by a summary of the results in accordance with the formulated research questions. Finally, the conclusion section discusses the potential implications of the results, the limitations of the research, and future research directions.

2. THEORETICAL BACKGROUND

The importance of customer experience arises from the fact that consumers can interact with companies through multiple channels, leading to a multifaceted customer journey (Lemon & Verhoef, 2016). According to Holbrook and Hirschman's (1982) definition, experiential marketing highlights the significance of consumer experience in shaping their product or service preferences. A consumer's interaction with the consumption environment plays a crucial role in influencing their preference, as it can either support or inhibit the achievement of their consumption goals. Carbone and Haeckel (1994) have defined the consumer experience as the aggregate and cumulative consumer perceptions that arise during the process of learning about, acquiring, exercising, retaining, and sometimes discontinuing a product or service. It is important to note that the experience should be distinguished from the object of purchase. Pine and Gilmore (2013) have argued that a purchase is an experience, regardless of the product or service being acquired.

Subsequent research studies saw a discernible increase in the utilization of holistic and multidimensional approaches to customer experience (Schmitt, Brakus & Zarantonello, 2015; De Keyser et al., 2020; Verhoef, Kannan & Inmar, 2015; Brakus, Schmitt & Zarantonello, 2009). These approaches suggest that all service exchanges result in some form of customer experience, regardless of its nature and form. In general, multidimensional approaches focus on five important components of the customer experience: sensory, affective, cognitive, behavioral, and social aspects (Lemon & Verhoef, 2016; Verhoef et al., 2015; Palmer, 2010; Gentile, Spiller & Noci, 2007).

The significance of touchpoints in clarifying the customer experience cannot be overstated. Touchpoints encompass both verbal and non-verbal interactions (Duncan & Moriarty, 2006), as well as personal or non-personal interactions (Manser Payne, Peltier & Barger, 2017),

where the customer engages with the company, brand, category, product, or environment during a dynamic decision-making process (Lemon & Verhoef, 2016). It is crucial to thoroughly investigate the influence of mobile apps on the customer experience as touchpoints that can be manifested in various forms, including physical environments, online platforms, and face-to-face interactions (Voorhees et al., 2017).

The number of mobile users is expected to continue to grow in the coming years (Statista 2024). Therefore, mobile apps have become a strategic point for retailers, with a significant impact on customer experience and competitiveness (van Heerde, Dinner & Neslin, 2019). Therefore, retailers are investing heavily in mobile apps to increase consumer engagement and showcase their competence and expertise in this area (Gill, Sridhar & Grewal, 2017).

The impact of retail mobile apps on the customer experience has been studied extensively, indicating that it affects emotional, sensory, cognitive, and social aspects (Japutra, Molinillo, Fitri Utami & Adi Ekaputra, 2022; Molinillo, Navarro-García, Anaya-Sánchez & Japutra, 2020). As a result, customer engagement and loyalty to a particular retail chain can also be influenced. Moreover, analysis by Molinillo and colleagues (2020) demonstrates that the influence of mobile apps on emotions is more substantial than typically recognized in the literature.

User behavior during the customer experience, as thus the user experience, is influenced by both hedonic and utilitarian motives (Babin, Darden & Griffen, 1994). The utilitarian motives are based on Davis's (1986) technology acceptance model (TAM), which explains (1) why users accept or reject certain information systems and (2) how user acceptance changes due to the design of different system elements. It is important to acknowledge the impact of both types of motives on the user experience in order to design effective information systems. The model described includes the system's functions, perceived usefulness, perceived ease of use, user attitudes, and user behavior. It is also worth noting that the

original technology acceptance model (Davis, 1986) already includes the affective or emotional response to technology usability, which determines both the intention to use and the actual use of the technology in the improved version (Davis, Bagozzi & Warshaw, 1989).

It is important to consider that customer experience is also influenced by both utilitarian and hedonic aspects. Stein and Ramaseshan (2020) found that technology and purchase atmosphere have a significantly greater impact on hedonistic-oriented decision situations than on utilitarian orientations. Kujala, Roto, Väänänen-Vainio-Mattila, Karapanos, and Sinnelä (2011) asserted the significance of long-term user experience and the hedonistic aspects of customer experience, such as the pleasure of use or aesthetics, in shaping users' experiences. Similarly, research by Van Schaik and Ling (2008) highlighted the importance of the aesthetic quality and beauty of digital stimuli (e.g., websites) as factors that strongly influence customer experience.

It is evident that the use of mobile devices in the omnichannel customer experience is a topic of increasing research interest (Lazaris, Vrechopoulos, Doukidis & Fraidaki, 2015). In summary, main directions of the literature on the customer experience approach (e.g., technology adoption, hedonic and utilitarian motivations) have been identified. Consequently, it is important to examine this issue from the perspective of omnichannel customer behavior, focusing on a shopping situation in which users use smartphones. This is the research gap we aim to explore in our research.

In addition, it is also necessary to consider how these theories are approached by different research methods. The second and third research questions of this paper are concerned with the relationship between new types of theoretical approaches and methods.

3. METHODOLOGY

A systematic literature review provides an opportunity to supplement a larger primary data

collection (Wee & Banister, 2016). This is achieved by taking a step back from the research focus (Robinson & Lowe, 2015) and synthesizing the information in a well-structured manner (Khan, Kunz, Kleijnen & Antes 2003). The aim is to provide a broader picture of the current state of a research topic in scientific research (Paul & Menzies, 2023).

In the analysis, a search strategy adhering to the PRISMA protocol (Moher, Liberati, Tetzlaff, Altman & PRISMA Group, 2009) was developed. The protocol precisely defines exclusion criteria and selects articles based on title and abstract.

Suitability of the included items is then decided based on the full text. Finally, articles that meet the eligibility criteria were analyzed in detail. One of the main advantages of this methodology is its well-structured and detailed approach. In scientific publications, there are several guiding threads that follow the systematic literature steps to support researchers (White & Schmidt, 2005; Pati & Lorusso, 2018; Lame, 2019; Livschitz & Dream, 2023).

The table below illustrates the structure of the systematic literature review presented in this paper.

TABLE 1: Research plan

Research Phase	Steps	Description
<i>Research objectives</i>	Research problem	How to measure customer experience in mobile applications.
	Research questions	1. How to approach the concept of customer experience in case of mobile apps? 2. What methodologies can be employed to investigate the utilization of mobile tools in the context of customer experience? 3. What variables are used to measure the utilization of mobile usage in the context of customer experience?
<i>Research Procedure</i>	Selection of databases	Scopus, Web of Science
	Keywords	'Customer Experience'
	Disciplinary filters	zero level: academic research studies in Business Economics, Social Sciences, Communication, Telecommunication, and Decision Sciences
	Document type	Article, Review Article, Book, Book chapter, Dissertation or Thesis, Conference paper
	Language	English
	Timeframe	zero level: 2004-2023 first level: 2013-2023
<i>Screening protocol</i>	Criteria	title, abstract, keywords
	Keywords	mobile application user experience
<i>Evaluation criteria</i>	Variables considered	year of publication journal number of citations authors keywords subject areas defined by title, abstract and author keywords
	Analytical tools	descriptive statistical analyzes automated content analysis text-network analysis

Source: Edited by the authors.

3.1. Research objectives and questions

The objective of this systematic literature review is to provide an overview of the potential aspects and methods for measuring customer experience in a context where the customer is utilizing a mobile application in retail environment. The starting point for the research design consists of well-formulated research questions, which will also help to maintain focus during data processing and analysis. The systematic literature review provides basic descriptive support for our study by addressing the following questions:

RQ1: How to approach the concept of customer experience in a mobile environment?

RQ2: What methodologies can be employed to investigate the utilization of mobile apps in the context of customer experience?

RQ3: What variables are used to measure the utilization of mobile apps in customer experience?

3.2. Research design

The data was collected from Scopus and Web of Science databases. The corresponding publication database was developed at several levels, starting with the keyword 'customer experience'. The keyword was primarily examined from 2004 onwards without any disciplinary

filter, i.e., not restricted to a specific research area. Our intention was to investigate the customer experience in which the consumer uses mobile applications.

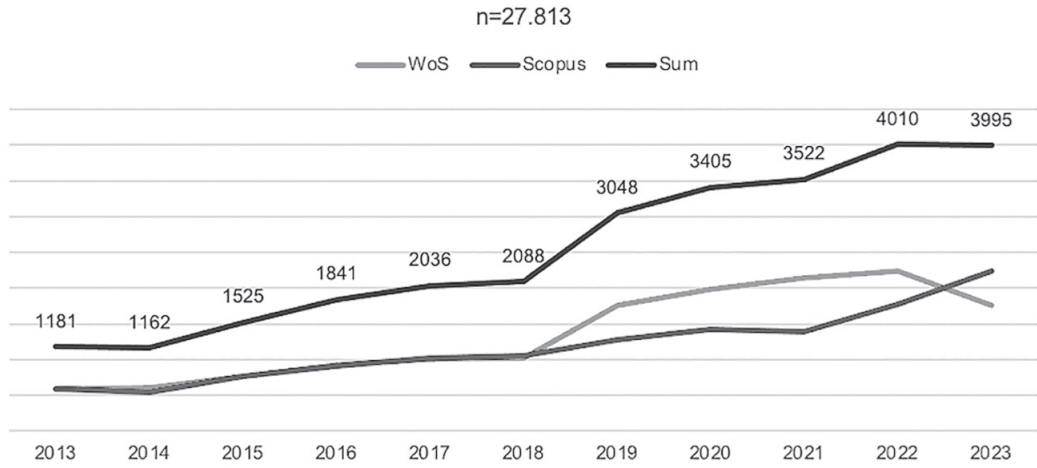
According to the analysis of Google Trends, there has been a noticeable increase in the number of searches for the keyword 'customer experience' since 2012. The data also shows a significant interest in the online and digital aspects of customer experience (Google Trends, 2024).

However, it can also be observed that from an academic perspective, the number of related publications has risen significantly since 2013. Therefore, to ensure a comprehensive review, studies published between 2013 and 2023 were included in the analysis.

The publications in the database were carefully selected based on other specific criteria, in addition to narrowing the time frame:

1. this study focuses on keyword 'customer experience'; and
2. its relation to the fields of 'Business Economics', 'Social Sciences', 'Communication, Telecommunication and Decision Sciences';
3. the document type selected were Article, Review Article, Book, Book chapter, Dissertation or Thesis, and Conference paper;
4. furthermore, to enable more complex analyzes, only publications in English were selected.

FIGURE 1: Number of publications on 'Customer experience' in the economic and related fields between 2013 and 2023



Source: Edited by the authors.

Thus, the final database includes a total of 27,813 studies.

3.3. Search process and criteria

The search and filtering of results for data processing was conducted in multiple steps.

During the analysis process, the dataset underwent five rigorous steps of filtering and analysis, as illustrated in Figure 2. The first step involved primary filtering of the entire database, which initially contained 27,813 publications. This step resulted in a reduced dataset of 678 publications that specifically addressed mobile app issues and contained the terms 'mobile app' or 'mobile application' in their title, abstract, or author keywords. Duplicates and studies not matching the keyword were excluded from the database during this step. This approach ensured that the final dataset was highly relevant and reliable.

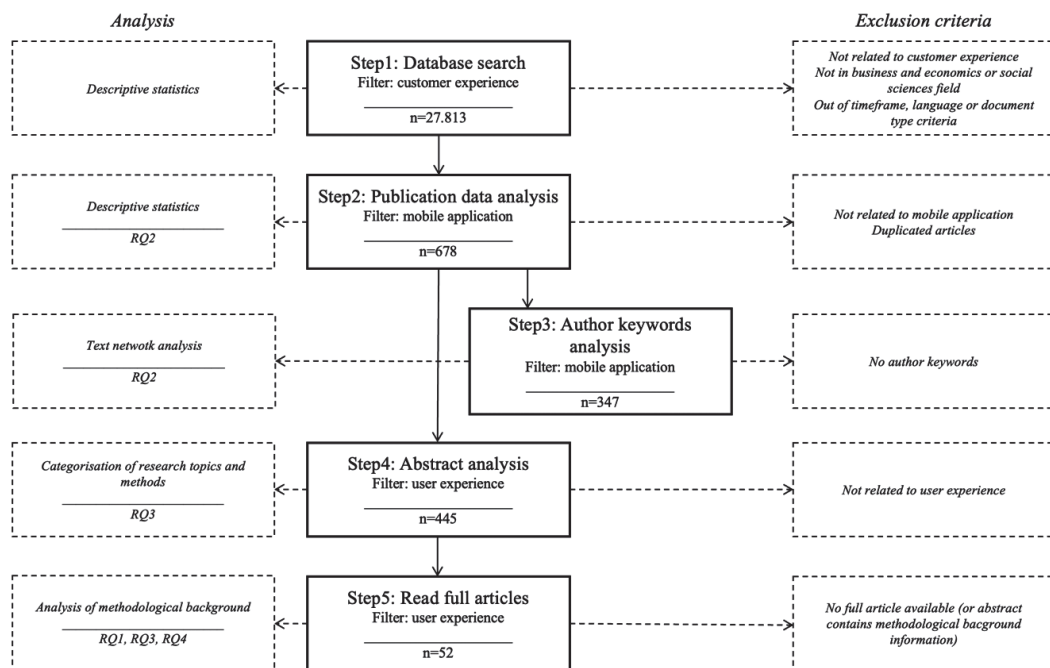
In the next step, 347 publications related to mobile apps were filtered by keywords. The resulting keyword set underwent automated text-network analysis to confidently identify relevant research areas related to the second

research question. The InfraNodus application utilizes cutting-edge artificial intelligence technology, advanced text mining, network analysis, and state-of-the-art data visualization methodologies to analyze uploaded text, with a specific focus on keywords.

The subsequent filtering process was based on the initial filtering, as the presence of keywords was not a mandatory requirement. In this instance, a thorough analysis was conducted on the titles and abstracts of studies in order to confidently address the aspect of customer experience literature in a mobile environment and to assertively approach the third research question. The objective was to concentrate on the functions and elements of mobile app usage in a shopping journey.

To comprehensively address the research questions, a thorough analysis of 52 publications that included abstracts and/or full texts was conducted. This involved an in-depth examination of the aims, theoretical background, and data collection and analysis methodology of the publications.

FIGURE 2: Article search, selection, and evaluation strategy



Source: Edited by the authors.

4. RESULTS

4.1. RQ1: How to approach the concept of customer experience in a mobile environment?

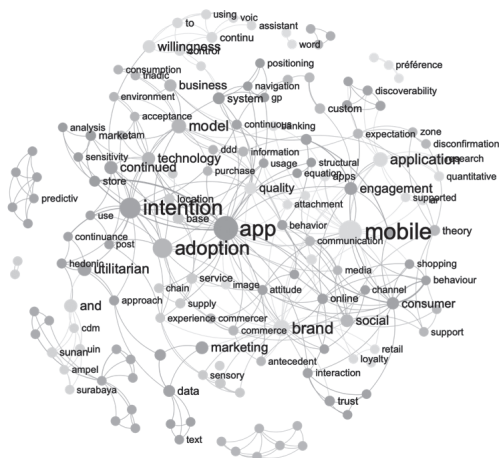
The literature on customer experience in a mobile environment has seen a significant increase in academic research (as evidenced by the 678 publications on the subject) in the last few years. It is worth noting that the year 2021 saw the highest growth rate compared of all previous and subsequent years.

The analysis was conducted by examining keywords in the database. Items with available data were extracted, resulting in the analysis of 347

articles (out of 678 articles). The dataset ultimately comprised 1,943 keywords ($n=347$), which formed the basis of the network of connections.

InfraNodus algorithmically grouped the uploaded keywords into four major themes (clusters) based on their appearance in the publications (Figure 3). Upon examining the network map, the literature frequently addresses inquiries regarding user attitudes and various stages of the customer experience, including engagement, usage, purchase, and evaluation of communication. The most researched applications are related to online shopping, retail chains, and the banking sector. It is worth noting that the authors of the research studies also employ keywords related to virtual reality technologies.

FIGURE 3: Visualization of text-network analysis of keywords focused on customer experience in mobile environment on infranodus.com



Source: Edited by the authors.

As well as identifying topics, our analysis also enables highlighting specific areas (clusters) of the network of connections, allowing for a more detailed analysis of the topics through data visualization.

An analysis of the issues related to applications reveals three major areas, as shown in the figure:

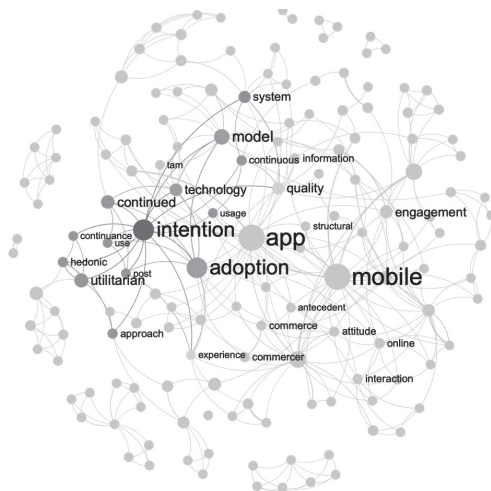
1. several studies approach the topic from a *technological perspective*, focusing on development, user experience, usage, and application functionalities;
2. a significant proportion of the studies are related to the *consumer or user*, with a focus on their attitudes, behavior, and satisfaction;
3. additionally, there is another group of studies related to *marketing*, including brand, advertising, and sales.

Articles also discuss two other areas: technical functions of the application, such as GPS, position tracking, and assistance services, and the quality-of-service issues, which may be related to the application's performance.

Furthermore, the network diagram highlights the theory of technology adoption (TAM), which is a common topic among researchers studying mobile applications.

It is essential to consider the effect of mobile application operation on users' future intentions and reactions, such as continued usage, interaction, or transactions (Figure 4). Acknowledging the existence of a plurality of perspectives and demonstrating a high degree of expertise is an important step in ensuring a well-rounded and impartial approach to this subject. Publications in this area address both the hedonic and utilitarian aspects of user intentions in relation to achieving continued user presence. When focusing on the user, important topics such as experience, attitude, and engagement are discussed, as they are also frequently examined.

FIGURE 4: Visualization of text-network analysis of keywords focused on consumer adoption on infranodus.com



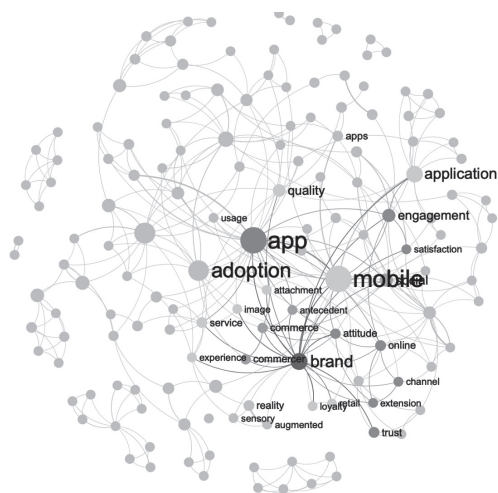
Source: Edited by the authors.

Based on our further analysis, three other research directions regarding the brand are outlined (Figure 5):

- first, the issue of user attitudes and trust, commitment and satisfaction they generate;

- then the experience and loyalty generated by activities (purchases) on mobile devices and their quality; and finally,
- a small part of the analysis also covers specific areas such as the use of virtual and augmented reality techniques, which is a specific area of brand experience.

FIGURE 5: Visualization of text-network analysis of keywords focused on brand experience on infranodus.com



Source: Edited by the authors.

Overall, the keyword network analysis has outlined well the topics that the literature addresses in the context of customer experience in mobile environment. Therefore, further analysis of technological, user, and brand aspects of the topic is worthwhile.

The essence of omnichannel is that consumers can connect to a service in various ways, such as in-person, online, or on mobile devices, or a combination of these (Lazaris & Vrechopoulos, 2014). However, it is important to note that the way consumers choose to connect will have a significant impact on their customer experience, trust, satisfaction, and intention to use (Bitkina, Park & Kim, 2022). To gain a comprehensive understanding of the customer experience in a

mobile environment, it is highly recommended to review the publications included in this research. It is important to focus on the research problem and questions by examining the studies that met all the screening criteria and had a full text available for processing (n=52).

Retail mobile apps play an important role in various stages of the purchase process given that they are reliable and effective tools for facilitating these stages. They include information gathering (Baraković & Skorin-Kapov, 2015), evaluation (Penco, Serravalle, Profumo & Viassone, 2021; Moon, Han, Chun & Hong, 2016), decision making (Luxford & Dickinson, 2015), purchase (Qin, Peak & Prybutok, 2021; Prashar, Gupta, Parsad & Vijay, 2019), transaction (Goyal & Kar, 2019; Brakewood, Ziedan, Hendricks, Barbeau & Joslin, 2020), and post-purchase behavior (Ma, Chong & Song, 2022; Mishra, Shukla, Rana & Dwivedi, 2021).

When examining customer experience, it is important to focus on the factors related to mobile apps, such as engagement (Alalwan et al., 2020; Oppegaard & Rabby, 2016), satisfaction (Gessa, Jiménez & Sancha, 2020; Fernandes & Barfknecht, 2020), and consumer intention (Wei & Li, 2021; Pappas, Mikalef, Giannakos & Kourouthanassis, 2019; Komulainen & Saraniemi, 2019; Huang, Chang, Yu & Chen, 2019; Kummer, Ryschka & Bich, 2018; Kujala, Mugge & Miron-Shatz, 2017).

The analysis was aimed at identifying the aspects of customer experience that have been studied in relation to mobile app usage. The findings suggest that the use of mobile apps can have a significant impact on the entire purchase process and any touchpoint, contributing to higher engagement, greater satisfaction with the product or service, and even increased intention to reuse or recommend. Findings indicate that the hedonic aspects are as important as the utilitarian elements when considering the customer experience, even in a mobile environment. Consequently, it is evident that factors such as enjoyment and aesthetics should be included in the research.

The research also reveals the multifaceted nature of the customer experience concept, with diverse interpretations emerging. However, it is crucial to recognize the distinct stages of the purchasing process, even when categorized into three stages.

In conclusion, the role of mobile applications in the customer experience is important not only for the experience; rather, impact on the purchase process can be interpreted along several dimensions. Among these, this paper highlights the purchase stages and the hedonic-utilitarian aspects.

RQ2: What methodologies can be employed to investigate the utilization of mobile apps in the context of customer experience?

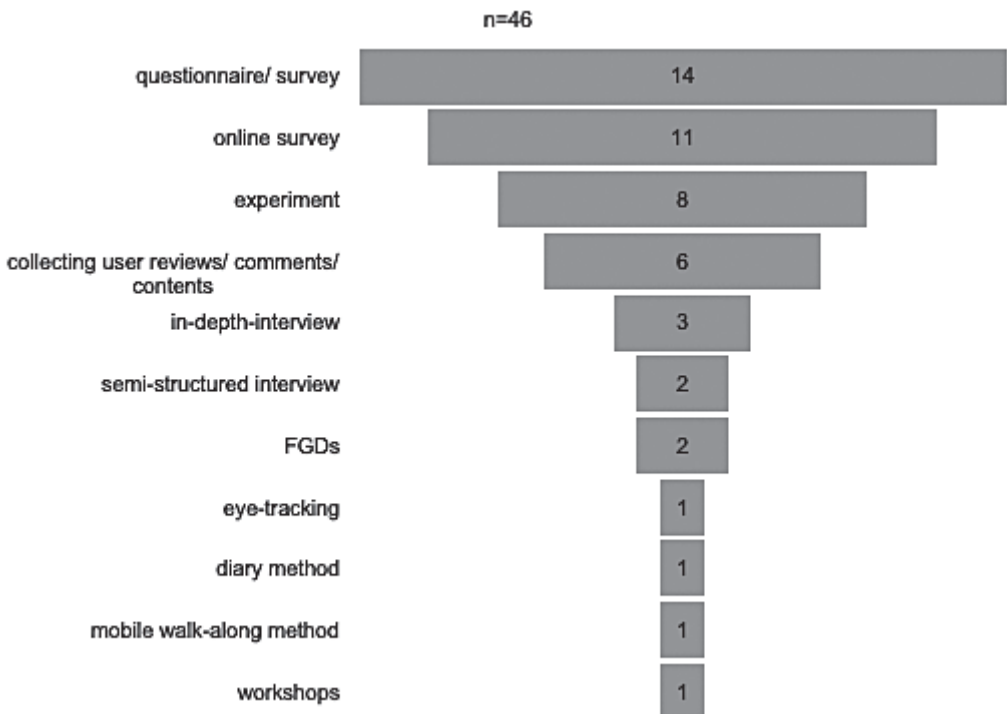
Regarding the methods employed in the collection of data, a total of 46 (out of 52 full text)

articles employing empirical methodologies were identified. There appears to be a clear preference for the studies using various questionnaire surveys and experimental methods, as these provide results with a thorough analysis based on advanced statistical methods. Other methods tend to complement these (Figure 6).

Another popular method that is used frequently is secondary data collection based on various online user content, often using data mining techniques to collect user content, comments, and customer reviews.

Among the qualitative approaches, traditional in-depth interviews and focus group discussions were the most common. Further analysis revealed clear trends and innovative methods, such as eye tracking, diary, and workshop methodology.

Figure 6: Distribution of data collection methods employed in the surveyed publications



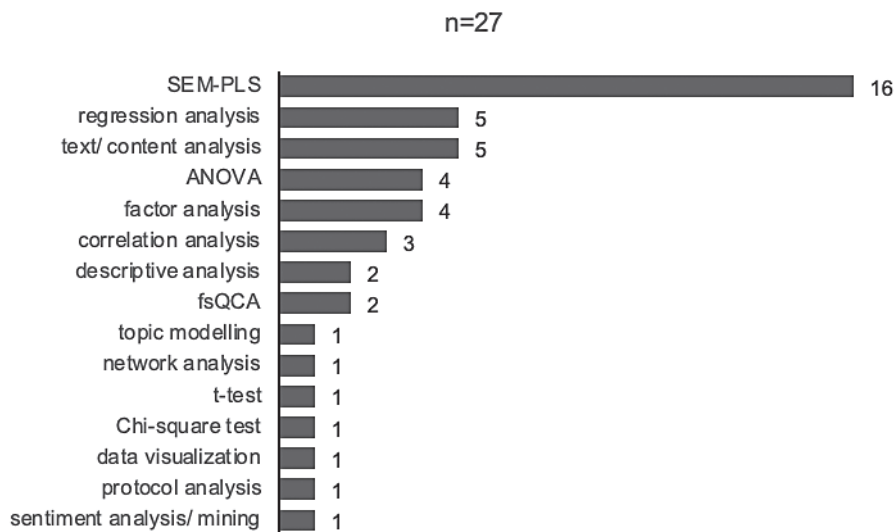
Source: Edited by the authors.

It is evident that quantitative methods are pertinent to this field. However, the significance of hedonic aspects, as discussed in the preceding section, necessitates the utilization of qualitative and neuromarketing tools (Bettiga, Bianchi, Lamberti, Noci, 2020).

In addition, this systematic literature review encompassed a review of the analytical meth-

odology employed in research utilizing quantitative methods. The majority of analyses used various forms of structural equation modelling, and the intensity of use of this methodology in academic research is evident in our review. However, regression, analysis of variance, and factor analysis also proved to be commonly used (Figure 7).

FIGURE 7: The publications analyzed categorized based on the methodology employed



Source: Edited by the authors.

4.2. RQ3: What variables are used to measure the utilization of mobile apps in customer experience?

As several studies have shown (Akdım, Casaló & Flavián, 2022; Mishra et al., 2021; Qin, et al., 2021), it is essential to differentiate between utilitarian factors, such as perceived usefulness and perceived ease of use, and hedonistic factors, such as perceived enjoyment, that impact customer experience with mobile apps.

The studies examined the approach to customer experience from very different angles. Some studies focus on the mobile app itself and its usage and intention to use, while others focus on

the impact on purchase intention or consumer behavior, or the overall customer experience.

As shown in Table 2, many studies try to capture different aspects of user intentions, with others focusing on the impact of apps on purchase intentions. It is worth noting that in both cases utilitarian variables (e.g., perceived usefulness, perceived ease of use, usability, perceived performance, control, etc.) are prominent, but hedonic motives are also encountered frequently (e.g., enjoyment, hedonic gratification, entertainment, aesthetics, etc.). In addition, research studies often touch on such factors as user and consumer expectations, feelings of security, and satisfaction.

TABLE 2: Summary of the variables covered by research on mobile applications in the area of customer experience

Topic	Authors	Used Variables
Intention to Use Applications	Bitkina et al. 2022	Perceived Security Perceived Convenience Perceived Trust Intention to Use
	Akdim et al. 2022	Perceived Usefulness Perceived Ease of Use Enjoyment Satisfaction Continuance Intention to Use
	Qin et al. 2021	Attitude Ease of Use Hedonic Gratification Informativeness Interactivity Utilitarian Gratification Virtuality Intention to Use
	Koghut & Al-Tabbaa, 2021	System Quality Information Quality Service Quality Frequency of Use Intention to Discontinue
	Wut, Ng, Leung & Lee, 2021	Cognitive Need Affective Need Social Need Gamification Mobile App Characteristics Mobile App Design Performance Expectancy Effort Expectancy Social Influence Facilitating Conditions Behavioral Intention
	Alsswey, Al-Samarraie, El-Qirem, Alzahrani & Alfarraj, 2020	Images Colors Language Layout User Intention to Adopt the App
	Huang et al., 2019	Perceived Usefulness Perceived Ease of Use Education Entertainment Escapist Esthetics Behavioral Intention (to Use)
	Kummer et al., 2018	Extroversion Conditional Value Perceived Privacy Risk Disclosure Value Disclosure Intention

Topic	Authors	Used Variables
Intention to Use Applications	Kujala et al., 2017	Expectations about Usability Useability Confirmation Usability Expectation Expectation about Enjoyment Enjoyment Confirmation Enjoyment Expectations Behavioral Intentions
Purchase Intention or Behavior	Choi, Wen, Chen & Yang, 2021	Expectations Perceived Performance Perceived Usefulness Confirmation Satisfaction Repurchase
	Wang, Wang, Wang & Zhao, 2021	Interface Visual Complexity Mobile Search Mobile Payment Security Precautions Visual Search Efficiency User Experience Implementation Intention of Online Shopping
	Fernandes & Barfknecht, 2020	Informative Content Perceived Ease of Use Trust Entertainment Digital Satisfaction Repurchase Intention
	Prashar et al. 2019	Effort Expectancy Apps Atmosphere User Experience User Satisfaction Price Discount Impulse Buying Intention
Usage and Satisfaction	Mahfouz, Joonas & Opara, 2020	Control Attention Focus Cognitive Enjoyment
	Tupikovskaja-Omovie & Tyler, 2022	User Journey
	Brakewood et al., 2020	Choosing a Mode Selecting Payment Method Boarding the Bus Satisfaction
Usage and Satisfaction	Yu, Zhou, Cai, Tan & Wang, 2020	Pre-Performance Expectations Service Process Tolerance Acceptance Satisfaction

Source: Edited by the authors.

In terms of the theoretical background, the publications are very diverse, with the Technology Acceptance Model (TAM) being the most popular (n=7) for investigating mobile applications while the Unified Theory of Acceptance and Use of Technology (UTAUT) model is surprisingly used in only two cases. The analysis also examined the inclusion of variables related to user behavior and user experience in different models.

The most common variables used, which also include elements of the TAM model mentioned above, such as ease of use or perceived usefulness, are listed in the table below (Table 2). Other commonly measured variables include user satisfaction, enjoyment, and practical elements such as informativeness or responsiveness.

TABLE 3: Variables commonly used in related research

variables	f
ease of use	9
satisfaction	6
perceived usefulness	6
enjoyment	4
informativeness	3
responsiveness	3

Source: Edited by the authors.

5. CONCLUSIONS, FUTURE RESEARCH DIRECTIONS AND LIMITATIONS

This systematic literature review (SLR) confirmed that the topic of measuring customer experience in mobile environment is a valid and pertinent area of research, as evidenced by numerous related publications. The comprehensive analysis focuses on six dimensions (industry, features, CX dimensions, methods, analysis, variables), as well as those that have been researched significantly less frequently and thus show future potential (Table 4).

According to our results, the use of mobile apps is particularly strong in the retail sector, so it is not surprising that this is the area in which most of the research has been conducted. As the studies focused mainly on the pre-purchase stage, where communication activities are supported, the role of apps in this respect was also highlighted. Moreover, the analysis pointed to other areas of widespread or emerging mobile apps use, such as banking and finance, services, and tourism, that show potential for future research too.

TABLE 4: Research focus in the dimensions of SLR

		Mainstream focus	Research gaps
D1	SECTOR	e-commerce, m-commerce, communication	banking and finance, services, tourism/ culture
D2	FEATURES	AR/VR, social media, banking, shopping	healthcare, gaming, learning, booking, consumption
D3	CX DIMENSIONS	user experience, intention to use	shopping situations, decision making process
D4	METHON	quantitative methods (survey, experiment)	qualitative methods, observations
D5	ANALYSIS	SEM-PLS, regression, content analysis, correlation	network analysis, sentiment analysis, data visualization
D6	VARIABLES	ease of use, perceived usefulness, satisfaction	enjoyment, informativeness, responsiveness, aesthetics

Source: Edited by the authors.

In the second phase of the study, the objective was to determine the features that are the primary value and purpose of the applications. In this respect, augmented reality, social media integration, and payment and shopping convenience were the features that appeared most frequently as research questions. However, healthcare, gaming, learning, booking, and possibly functions related to and improving consumption habits, emerged as functions with future potential based on the publications included in the analysis.

The majority of the topics examined in the customer experience measurement were related to user experience and intention to use. Other topics with considerable potential for future development include the factors of different situational influences, as well as a more detailed analysis of the various steps involved in the decision-making process.

Surveys and experiments were the most frequently used data collection methods in measurement and analysis, with qualitative methods and observations accounting for a much smaller proportion. The latter, through the integration of transactional data, can certainly have a significant impact on future research.

In line with the data collection solutions, the analysis tools used are also homogeneous, with the now popular SEM modelling being the most common tool used to support data processing. However, regression models, content analysis, and classic correlation analysis were also found to be used in the studies. Although these are the dominant analytical tools in the literature, there is potential for the use of network analysis, sentiment analysis, and data visualization techniques that easily highlight correlations based on the SLR.

The classic measures of customer experience, including ease of use, perceived usefulness, and satisfaction, are the components that have most often been investigated by researchers. Emotional aspects, such as enjoyment, have been included in the analyses to a much lesser

extent even though their moderating effect can be significant. From the models that have been published to date, the inclusion of variables related to informativeness and responsiveness in measurement models may be important, as there is currently a potential research gap in these areas.

Overall, it can be concluded that, as the use of mobile applications has become more widespread over the last decade, there has been a parallel increase in demand from both practitioners and academia to investigate the components and measurement of customer experience.

This research examined the articles on customer experience, with particular attention paid to the role of mobile applications, published over a period of roughly 10 years. It would be beneficial to eliminate this limitation in order to gain a comprehensive understanding. Moreover, the analysis has demonstrated that the articles predominantly address a clearly delineated phase in the purchase decision-making process. That aspect could have been delved into more profoundly by disaggregating the research.

While the research is limited in various ways, the systematic literature analysis nevertheless identified several promising avenues for future investigation. It is always possible to expand the research question in order to gain new insights into the project. Accordingly, an analysis focusing specifically on mobile apps or retail mobile apps would shed light on the measurability of features that specifically support shopping. With this in mind, we believe it is worthwhile to continue the research in the future so that the role of apps in different stages of the purchase process can be further elaborated by examining pre-purchase, purchase, and post-purchase consumer behavior.

The clear objective of collecting variables and research methods is to create a research framework proposal that is suitable for capturing the mobile customer experience in different shopping situations.

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