

Brief Communication

Between artificial intelligence and customer experience: a literature review on the intersection

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Abstract

This paper is a literature review of the intersection field between Artificial Intelligence (AI) and Customer Experience (CX). We analyzed and synthesized the most recent and prominent literature on the subject, providing an overview of the state of the art, through articles found in the Scopus database. Among the main findings, it is noteworthy that this intersection appears as an interdisciplinary topic of interest in the fields of Computer Science, Business and Management, and Engineering. Additionally, studies often examine conversational agents such as chatbots and voicebots, as well as machine learning prediction models and recommendation systems as a way to improve the Customer Experience. The most common sectors in the review are tourism, banking and e-commerce. Other segments and technologies appear less and may be underrepresented, thus a scope for future research agenda. Despite the existing literature, it is observed that there is still substantial space for expansion and exploration, especially considering the emergence of new generative Artificial Intelligence models.

Keywords Artificial intelligence · Customer experience · User experience · Literature review · Marketing strategies

1 Introduction

Customer Experience (CX) emerge as a promising element of analysis when it comes to technology-mediated consumption, especially in light of the development of digital products. It presents itself as a factor that can be crucial for organizations. Conversely, in the field of Artificial Intelligence (AI), there is a substantial number of studies exploring User Experience (UX), a term that may be more common but is inherently distinct than CX. However, the quantity of research on Customer Experience and Artificial Intelligence is notably less than the amount that addresses Artificial Intelligence and User Experience. Therefore, there is an opportunity to explore the subject through a review of recent literature.

In this sense, this article aims to explore the existing literature on the relationship between Artificial Intelligence (AI) and Customer Experience (CX), as well as identify emerging theoretical points of discussion, providing an overview of the current state of the intersection between these concepts. By focusing on understanding the intersection between AI and CX, this study emphasizes the field of Customer Experience, rather than User Experience, recognizing that it has been less explored in the literature.

Due to the specificity of the topic, we chose to use a broader search string to ensure a significant sample of research for analysis and, in a second step, refine the search based on specific inclusion and exclusion criteria, as highlighted in

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the following sections. This approach allowed us to delve into the specific aspects of the Customer Experience domain influenced by Artificial Intelligence technologies. A bibliometric analysis of the articles found was conducted, and, subsequently, an in-depth reading of the most cited articles between 2019 and 2023, i.e., in the last 5 years. This analysis provides insights into the advancements and research directions in the AI + CX domain, representing valuable findings.

In this regard, this article does not delve into the theoretical aspects of AI and/or CX only, but highlights the main fields of study on the intersection, with a focus on providing an overview of the most recent and relevant research on the subject.

2 Theory

The field of user experience (UX) gained significant recognition with the emergence of human–computer interaction, notably popularized by Donald Norman in the 1990s. It encompasses whether an individual has a positive or negative experience while interacting with digital products [17]. Over time, it has evolved into a fundamental concept for interface designers and digital product developers.

Hassenzahl and Tractinsky [11] emphasize that UX focuses on designing quality experiences in technology usage, surpassing mere instrumental use and usability concerns. Additionally, product creators sometimes fail to fully comprehend how UX decisions significantly impact customer acquisition [17]. The term “user” is commonly related to UX and UI domains, particularly when focusing on the specific stages of product usage, when there’s less emphasis on the marketing techniques that lead users to consume a particular product or service [31]. As a result, while UX often deals with interactions, consumer experience goes beyond mere usability functions. Therefore, they are not entirely separate; instead, User Experience is encompassed by Customer Experience [31].

As consumers increasingly seek experiences that cater to the specifics of their customers’ identities [23], the need for marketing professionals to consider people’s online experiences leading to purchasing behaviors also grows [18]. Bhattacharya and Sinha [5] underscores the increasing integration of AI-powered chatbots in the customer journey, highlighting a trend in the field of UX. Furthermore, studies by Joshi et al. [16] highlight that UX, within the broader scope of CX, establishes crucial metrics for marketing through the use of chatbots in consumer interaction.

Customer Experience, at its core, involves the analysis of customer journeys, encompassing all elements of a company’s offering in which each department strives to provide a positive experience—ranging from customer service and advertising to packaging, product reliability, and more [20]. Moreover, it is the response that customers have to any interaction with a company during the process of purchase, usage, and service [20]. Therefore, personalization becomes a crucial factor in the discussion of AI and CX. Technologies like augmented reality or virtual reality have gained traction in user experiments [25], while the implementation of chatbots, for example, enables process automation and quick responses, service adoption or product recommendations [18].

It is noteworthy that Artificial Intelligence (AI) represents a broad term encompassing a variety of techniques and methodologies, with some terminological issues, where other terms are frequently used as the same, such as machine learning, algorithms, deep learning, robots, and so on Dwivedi et al. [8]. Due to this diversity, efforts were made to identify the specific techniques, methodologies, or “Artificial Intelligences” that the most prominent research addresses in this literature review. Therefore, it is of great significance that this literature review also points to the type of AI being analyzed by the scientific community. Thus, we highlight the most common AI technologies that emerge from the literature on AI + CX, using thematic analysis.

3 Methods

The metadata collection for bibliometric analysis was conducted using the search string (“Artificial Intelligence” AND “Customer Experience”) within the Scopus database. Although the string is quite broad, it was deliberately maintained in this manner, with subsequent filtering to refine the results, considering that “Customer Experience” is already a specific term. The initial search yielded 468 articles, on which analysis was performed using Bibliometrix package for R on the resulting dataset. The analysis provided an overview of the subject that is discussed in the results section. Subsequently, the following selection criteria were applied to ensure relevance and quality of the papers for further literature review:

1. Open access and peer-reviewed: conference papers, book chapters, and similar works were excluded, limiting the research to open-access articles in the English language.
2. Recency: artificial intelligence has undergone significant transformations in recent years, especially considering the post-pandemic scenario and, more importantly, the emergence of large language models (LLMs) or generative AI. Prioritizing studies from the last five years (2019–2023) allows for coverage of the impacts of these new technological advancements.
3. Relevance to the topic: from reading the abstracts, articles that only briefly mention Artificial Intelligence or use the term as a keyword but do not delve into the subject in their study were excluded.

After this selection, of the initial 63, a secondary process was performed. The final sample selection for this study comprises two subsets: First, papers with a citation count exceeding 10.0 per year, considered the most prominent, a total of 9 papers. Secondly, 15 papers from the current year were included, recognizing that their recent publication might result in lower citation count. The final sample is 24 papers. Figure 1 illustrates the detailed process, including the applied string, filters, and exclusion criteria.

4 Analysis and discussion of results

4.1 Bibliometric analysis

This discussion begins with a comparative analysis of the quantity of publications on the topics of AI + CX and AI + UX. From Fig. 2, it is evident that the intersection between Artificial Intelligence and Customer Experience is still substantially less researched than the intersection between Artificial Intelligence and User Experience. Both topics show growing interest; however, AI + CX exhibits modest growth in publications compared to AI + UX since 2003.

Looking at the timeline presented in Fig. 1 for the last five years, there is an increase in publications on the topic from 2019 to 2021, followed by a slight decrease in 2022. However, up to the current period, the second semester of 2023, the number of publications has already exceeded that of the previous year, reaching the same level as in 2021. The bibliometric analysis shows that the annual growth rate for the initial sample (468 papers) on AI + CX is 3.36% since 2003, and publications on the subject has been increasing for the last five years (See Fig. 2b).

Fig. 1 Selection of works for the literature review step by step. These studies are synthesized in the results section

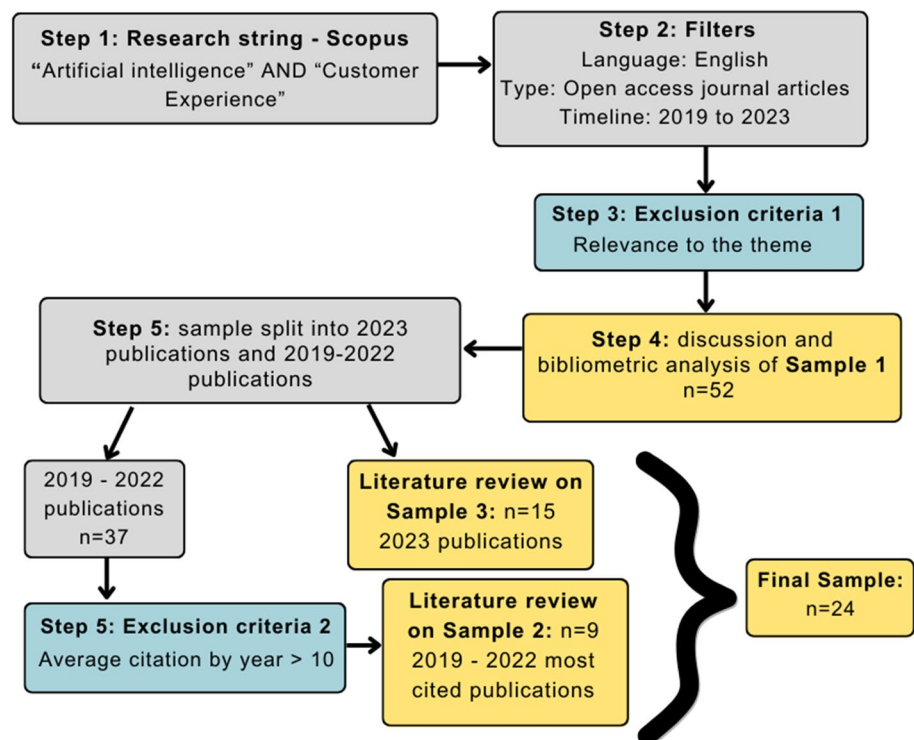
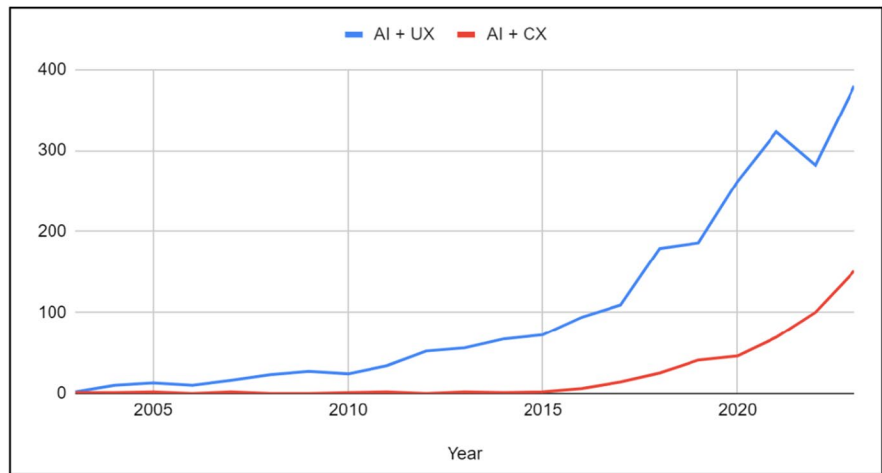
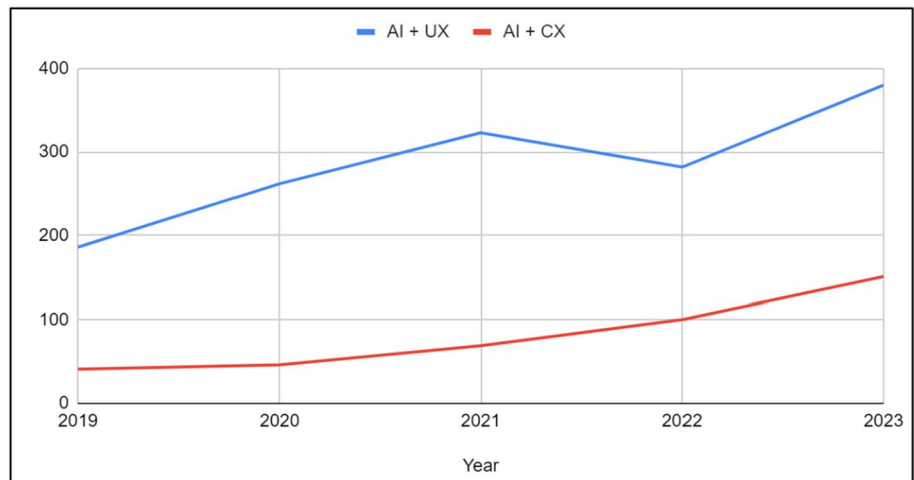


Fig. 2 Publications on AI + CX in the last years



a) Last 10 years



b) Last 5 years

The motor themes on the AI + CX literature can be categorized into two main clusters. The first cluster encompasses finance, decision making and efficiency, while the second one focuses on learning systems, commerce and machine learning. Additionally, service quality, intelligent robots and process automation are also present, albeit not as prominently, as shown in Figure 3.

The timeline represented on Fig. 4 shows the trend topics on the AI + CX intersection, illustrating an evolutionary path of technologies analyzed. Initially, these were identified as decision support systems, progressing through learning algorithms towards encompassing themes such as process automation, data analytics and machine learning. Through the literature review discussed in the "Literature review" section, it becomes evident that recent research has extensively analyzed machine learning as a primary AI technology in the Customer Experience domain. Surprisingly, chatbots, although emerge significantly in the review, are not directly highlighted in the bibliometric analysis Fig. 5.

There appears to be a balance in publications across three areas that encompass the majority of studies on Artificial Intelligence and Customer Experience: Computer Science, Business and Management, and Engineering. For comparison, a search that replaces "Customer Experience" with "User Experience" shows a considerable difference between these areas, with a predominance of Computer Science in the AI + UX intersection, as can be observed in Fig. 5. The field of Business and Management is more prevalent in research on Artificial Intelligence than in AI + UX, despite its dominance in studies that specifically focus on consumer experience, which is expected. In any case, the

Fig. 3 Main themes on AI + CX research

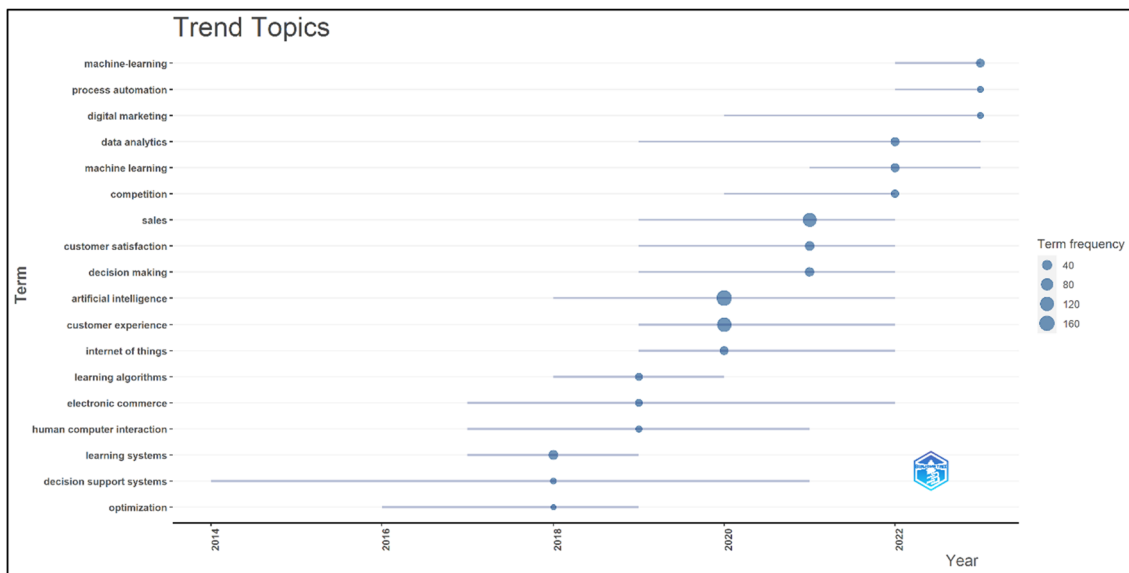
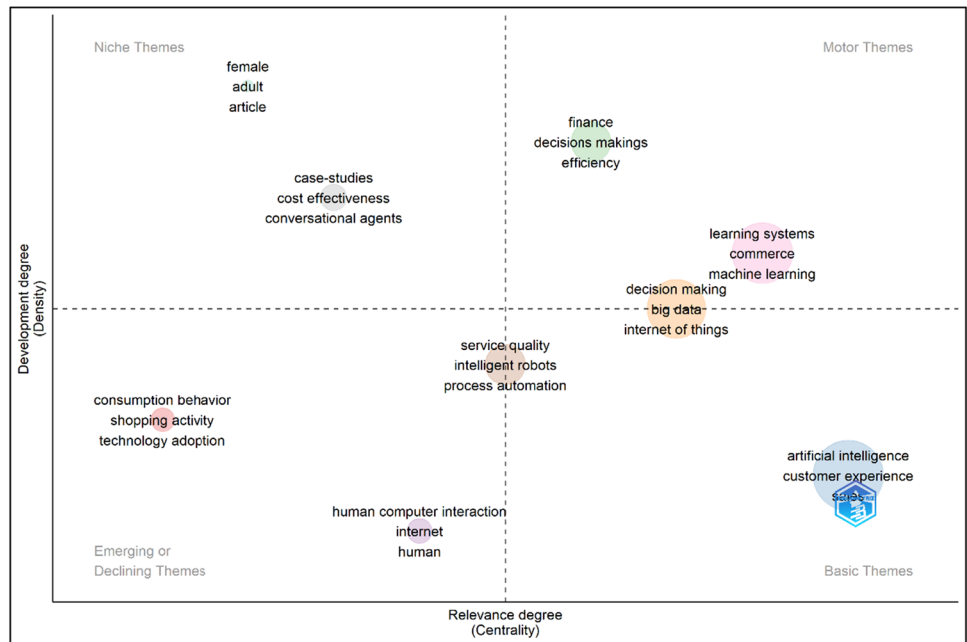


Fig. 4 Trend Topics on AI + CX research

AI + CX intersection seems to exhibit an interdisciplinary balance among these areas, whereas AI + UX seems to be a topic of interest in the Computer Science and Engineering areas.

4.2 Literature review

This review involves in-depth analysis and synthesis of the most relevant articles on the subject, along with the most recent. Therefore, we have selected the most cited articles between 2019 and 2023 for the integrative review. It is important to note that the analysis considered the average per year, rather than the total number of citations, as more recent articles tend to have fewer citations. The primary criterion comprises an average above 10.0 citations per year.

In Table 1, we summarize the types of Artificial Intelligence and/or technology analyzed in relation to both the most cited articles and the most recent ones published in 2023. The data interpretation methodology is based on thematic analysis, as delineated by Braun and Clarke [6]. The review highlighted two primary thematic categories concerning AI

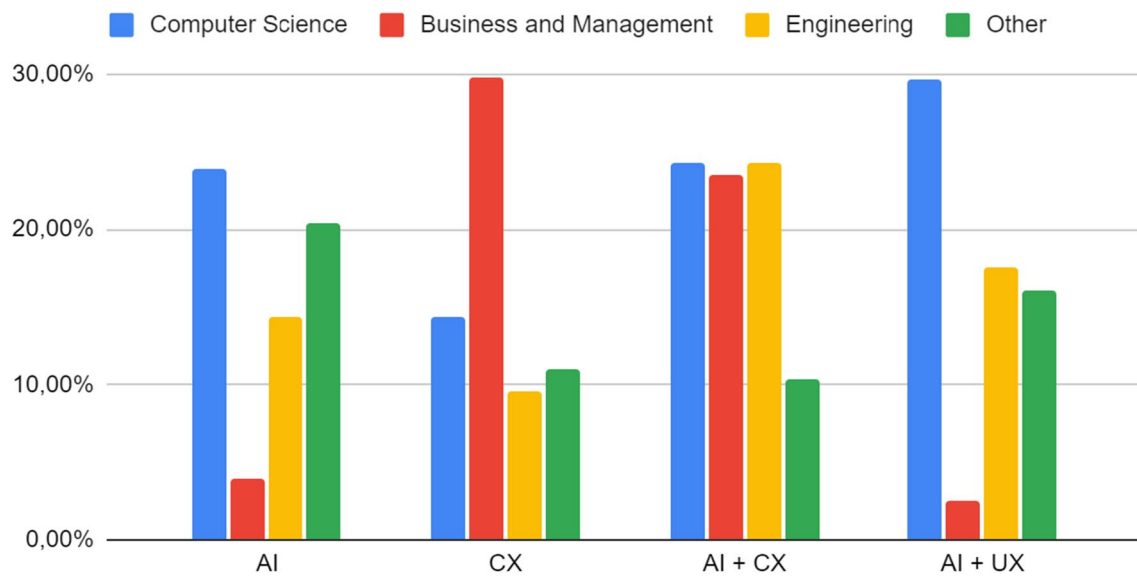


Fig. 5 Main areas on researches about AI, UX and CX

technologies. The first category encompasses diverse machine learning applications, including techniques like recommendation systems, segmentation, prediction models, and facial recognition. The second category focuses on conversational agents such as chatbots, voicebots, or voice assistants. Additionally, certain authors discuss various types of AI systems, while others do not specify particular techniques but rather delve into topics such as autonomous cars and other AI technologies, along with a combination of applications involving machine learning and conversation agents, hence they are listed on more than one line in Table 1.

Observing Table 1, it's evident that chatbots and voicebots represent the majority of AI technologies analyzed in recent research, especially between the top cited ones. Machine learning applications also appear significantly in 2023 publications. However, it is not possible to infer a growth in research on this topic, as sparsely cited articles from 2019 to 2022 were excluded from the sample analyzed in this study. Nevertheless, it can be stated that conversational agents and machine learning are the primary AI technologies researched in the intersection between AI and CX.

An observable trend within the existing literature pertains to a greater volume of papers examining the use of voicebots within corporate environments compared to those focused on their utilization in domestic settings. The motivation behind the use of "domestic" voicebots in online shopping is studied by McLean and Osei-Frimpong [19], discovering that consumers of Amazon voice assistant, Alexa, are driven by utilitarian, symbolic, and social benefits. Personalization is also crucial for voice assistant adoption according to Bawack, Wamba and Carillo [4]. In this context, domestic use of voice assistants is predominantly embraced for their practical utility but also by a certain degree of technological excitement. While the conversational agents trigger privacy concerns among domestic users [10, 19], these concerns do not prominently appear within the business and organizational uses examined in this literature review.

On corporate deployments, the focus is on streamline operations, reduce costs, and augment human labor. From an organizational viewpoint, this technology presents reduced expenses and enhanced customer support [2, 13]. According to Hoang et al. [13], virtual assistants can be integrated with VoIP technology to handle thousands of calls per day with optimal performance, creating a customer service that quickly reaches many users and helps companies reduce operator costs through automated calls [13]. For Abdo and Yusof [2], the conversational agents not only save cost and time for business organizations, but also, through the utilization of voice inputs and sentiment analysis, enhance the Customer Experience by providing efficiency and convenience.

The studies about chatbots highlight that they help maintain customer interest in using services [22], due to factors such as convenience, ubiquity, interactivity and technology readiness [15] along with ease of use, satisfaction, and trust [10]. Other aspects highlighted in the literature regarding the chatbot usage are accessibility and customization [12].

The privacy concerns that are mentioned in voicebots papers are less prominent in the chatbots studies. However, discomfort and insecurity appear along with other negative aspects involving trust [15, 26], which may be somehow related to the privacy matters. For example, interactions between companies' employees and customers (human or machines) can have negative effects when one is unsure if the other is a machine or a human [26]. Moreover, the use

Table 1 Most recent and most cited research on AI + CX

Type of AI systems	Top cited references	Most recent references
Recommendation systems and other machine learning applications	Hamilton et al. [9]; Ameen et al. [3]; Samala et al. [27]	Silva et al. [30], Ho and Chow [12], Yaiprasert and Hidayanto [33]; Wulff and Finnestrand [32], Jadhav et al. [14], Ceccacci et al. [7]
Voicebots and chatbots	Hamilton et al. [9]; McLean and Osei-Frimpong [19], Bawack et al. [4], Puntoni et al. [24]; Samala et al. [27]; Robinson et al. [26]; Nguyen, Chiu and Le [22], Neuhofer, Magnus and Celuch [21]	Hoang et al. [13], Abdo and Yusof [2], Abdelkader [1], Sari and Adinda [28], Shin et al. [29], Ho and Chow [12], Jan et al. [15], Hasan et al. [10]
Other AI and technologies or AI systems in general	Samala et al. [27]; Neuhofer, Magnus and Celuch [21], Puntoni et al. [24]	None

of humor in chatbots has been noted to positively impact the customer experience, contrasting with the absence of similar effects when employed by human agents [29]. Recent literature has highlighted efforts to “humanize” the chatbots, sometimes portraying them as companions that helps in decision-making [9].

Abdelkader [1] identified that familiarity and comfort with technology play a significant role in moderating Customer Experience and overall satisfaction in digital marketing, identified in a study involving ChatGPT. Research concerning Large Language Models (LLMs) and their impact on Customer Experience is still preliminary and are expected to expand with the widespread adoption of these models. Nonetheless, it is evident that there are still much to be researched on the subject, considering the recent popularization of AI models.

It is noteworthy that data from interactions with chatbots emerges as a valuable resource for comprehending and meeting customer needs. Sari and Adinda [28] used this type of data to create personas and identify the most common reasons for interactions within the costumers. The authors observed that information seeking, transactions, security, entertainment, and addressing complaints are the most common.

Chatbots are often used to interact with customers as a means to enhance the experience, and this literature review illustrates that the academic community has dedicated efforts to comprehend user behavior concerning chatbot usage, particularly in understanding customer needs through interactions. This effort is possible because of the extensive text data that can be acquired from chatbot logs, among other contributing factors.

As observed in Table 1, machine learning applications like recommendation systems and prediction techniques also play a significant role in recent research on AI + CX intersection, which aligns with the findings of the bibliometric analysis.

Researches have been applying machine learning to create models for predicting efforts [14], to understand customer preferences and buying habits [33], and to provide recommendations, personalization and customization [12]. These techniques are supposed to enhance service quality [3, 27] and emerge as the most prevalent reasons within this review for the utilization of machine learning in enhancing Customer Experience.

The customer purchase history presents a very enlightening data source for training datasets in machine learning applications, providing insights for segmentation [33]. The segmentation of customers into smaller groups can improve the accuracy of marketing efforts, and machine learning is being used to better understand usage patterns, interactions and response to marketing stimuli. In this sense, Ho and Chow [12] examine the impact of recommendation systems on brand experience, brand preference, and repurchase intention, highlighting customization as a pivotal factor to be considered by marketing professionals. Additionally, this emphasis on customization aligns with the proposition presented by Silva et al. [30]. The authors also introduce a framework with new “technological dimensions”, such as connectedness and interactivity, to improve the Online Customer Experience, given the transformative impact of new technologies such as Artificial Intelligence, Augmented Reality and Virtual Reality on the e-commerce ecosystem.

It is noteworthy to highlight case studies that have been using machine learning for facial recognition and expression analysis as a strategy to predict consumer satisfaction. Ceccacci et al. [7], observed that data from emotion recognition systems and facial expression analysis can assist artistic directors in estimating audience satisfaction levels and predicting overall customer satisfaction. This approach represents a strategy that appears promising, shows potential as an avenue for predicting consumer satisfaction, although not prominently featured within the papers reviewed in this study.

In a broader sense, some researchers do not necessarily focus on one AI system to conduct the study, but rather try to provide useful insights to managers and marketing professionals to understand the big picture in organizational AI efforts. Puntoni et al. [24] presents a framework that conceptualizes AI as an ecosystem with four capabilities: data capture, classification, delegation, and social. From the study proposed by Puntoni et al. [24], it is possible to infer that investments made by organizations in AI do not inherently enhance the consumer experience, indicating that improving CX requires more than just the acquisition of new technologies.

Neuhofer, Magnus and Celuch [21] employ scenario techniques to simulate future situations, envisioning Artificial Intelligence agents surpassing existing technological capabilities to become an autonomous agent in co-creating experiences [21]. This aligns with the efforts of other studies that explore the “human-like” characteristics of AI systems [9, 29], albeit still poses as a promising avenue for deeper exploration in future research.

Among the papers reviewed, only one explores the concept of Explainable AI (XAI) and its impact on Customer Experience. Wulff and Finnestrand [32] provides a theoretical contribution to the field of AI and Organizational Design by emphasizing the importance of reducing the necessity for explainable AI. This presents a contrasting perspective to the substantial efforts directed towards enhancing AI explainability. Furthermore, the scarcity of literature on the intersection of Customer Experience and explainable AI highlights potential gaps that warrant further exploration in future research.

5 Final considerations

The literature review of the analyzed research in this study provides insights into how science and academic research have been addressing the subject in recent years, with a notable emphasis on chatbots (often referred to as conversational agents) and machine learning, which encompasses various functions, including personalization, facial recognition, clustering, and more. The banking sector, as mentioned, is significantly represented in research on chatbots and Customer Experience, along with the tourism sector. E-commerce in the footwear industry and beauty brands also appear, while other segments appear to be less representative in the AI + CX research. Various models and frameworks were proposed as outcomes of the analyzed studies, showing some diversity in the models and theories used to conceptualize the topic.

The launch of new generative Artificial Intelligence technologies and large language models, such as ChatGPT in November 2022, may have impacted research interest in this domain, but we can only speculate that, therefore, an aspect that can be explored in future studies. In this proposal, only one study was found that sought to relate Customer Experience to generative Artificial Intelligences, indicating a field that may be explored in the future. Since these generative AI are relatively recent, there is still a lot to be explored about how they relate to Customer Experience.

Lastly, it is important to note that the analysis of this study was limited to selected articles within the defined scope, using the search string "(Artificial Intelligence' AND 'Customer Experience')." Therefore, there may be highly relevant research, especially regarding User Experience, that was not included in our sample. Due to the ever-evolving nature of AI, ongoing research and updates are imperative, and can be conducted through different databases, periods of time, or other exclusion criteria.

This article aimed to conduct a literature review covering studies at the intersection of Artificial Intelligence (AI) and Customer Experience (CX). The reviewed studies encompass various AI applications, from chatbots and virtual assistants to personalized recommendations. Through this review, the goal was not only to highlight the most relevant works and provide an overview of the current landscape but also to identify recent interests in the field, given the rapid evolution of technological advancements in AI. The analysis and synthesis of these works shed light on the role of Artificial Intelligence in Customer Experience across various industries and its impacts on different areas of study. We expect that this review can outline a future research agenda to address emerging challenges, and serves as a resource for future researchers in identifying opportunities to advance knowledge and practice regarding the impacts of Artificial Intelligence on Customer Experience.

Author contributions MP and GMS conducted the data analysis and the review. JMT acted as a guiding professor in structuring the paper and designed the methodology figure. MP wrote the main manuscript text and prepared figures. JMT and GMS made contributions to the text. All authors reviewed the manuscript.

Data availability No datasets were generated or analyzed during the current study except for the papers in the references section. Figures 2 and 3 were elaborated by the authors using the result of the string in Scopus database.

Declarations

Competing interests The authors declare no competing interests.

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