

AI Chatbots sociotechnical research: An overview and Future Directions

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Abstract

AI chatbots present a specific class of AI systems. They are conversational, personalized and exhibit social presence to users. Their adoption and use in the workplace is increasing. This study provides a systematic literature review of the state of art publications on the collaboration of AI chatbots in the workplace and paves the way for potential new areas of research in the IS field. The review includes not only journals but also conference proceedings. There are three themes that emerged from our literature review namely value co-creation, ethics and user experience. Finally, the study provides recommendations for further research in the increasingly important subject of AI chatbots.

Keywords

AI chatbots, Conversational AI, Human-AI Collaboration, Socio-technical system, Systematic Literature Review, Future Research

1. Introduction

The adoption of AI chatbots, has accelerated during Covid-19 and continues to grow. The global chatbot market size is expected to reach USD 3.99 billion by 2030 [1]. AI Chatbots allow users to interact with computer systems using natural language via text or voice [2, 3]. Indeed, AI chatbots are conversational agents, a class of dialog systems, that imitate human oral and/or written interactions to support users navigate through different sources of information to find answers to their requests [4] [5].

The characteristics of AI chatbots distinguish them from other software that organisations adopt [6] [7]. *First*, the underlying Machine learning technology allows AI Chatbots to continuously evolve and learn through the data generated from their use [7]. *Second*, AI Chatbots provide an intuitive conversational interface using natural language. *Third*, it holds anthropomorphic features that could trigger feeling of closeness and connectedness [7]. *Fourth*, their use could trigger a range of emotions beyond what users experience with traditional enterprise systems [7] [8]. *Fifth*, their initial adoption and implementation is lighter and less complicated than traditional enterprise systems such as ERP for example [9, 10]. Due to such novel characteristics, the collaboration between humans and AI chatbots present a distinctive phenomenon that enmeshes the social and the technical aspects [11]. From this perspective, humans have an active role to play in the continuous improvement of the AI Chatbot while their design could trigger further attachment and human-like closeness [12]. To understand the role of humans in the adoption and use of AI Chatbot, it is important to zoom in to a particular context [13]. Hence, this article focuses on the adoption, implementation and use of AI Chatbot in organisations. This focus excludes the personal use of conversational AI Chatbot such as Apple's Siri and Amazon's Alexa.

Against this background, the aim of this paper is to examine the current research on AI chatbots and the potential research agenda. It answers the questions of: How AI chatbots have been studied? And what are the areas that are ripe for future research?

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To do so, we systematically analyse existing literature on AI chatbots in the period of January 2016-May 2022. The findings show the lack of research on the internal use of AI Chatbot in the workplace, the lack of qualitative case studies research and that users' actual experiences of AI Chatbots is under studied. We hence develop a future research agenda that is committed to the use of the AI chatbot in its organisational setting.

2. Methodology

The goal of this systematic literature review is to pave the way for future research regarding AI chatbots in the workplace. We addressed our research question by conducting a systematic literature review (SLR) according to [14] [15] that follows basic principles during the search process.

We started the search process by defining the search scope to guarantee a structured and organized search. We followed the process according to [15], which contained four steps. In the first step the process was determined. The following literature review was organized iteratively with an intertwined proceeding of reading, interpreting, and analyzing the identified literature [15]. Secondly, publications were specified as the source. In the third step, we applied inclusion and exclusion criteria.

Next, we defined our search technique, which was a keyword search combined with backward search according to [15]. The literature search was completed in May 2022 in Scopus and the Web of Science platform, which have been considered as the world's most trusted publisher-independent global citation database [16]. In order to identify the literature, we used the following keywords as search strings:

(('chatbot*' OR 'AI chatbot*' OR 'AI enabled chatbot*' OR 'Conversational agent*' OR 'conversational AI') AND ('workplace' OR 'organisation*' OR 'organisation*' OR 'enterprise*'))

We included articles published only in English in journals and conferences with publication dates from 2016 until now. We chose to select only this time frame to identify the research gap based on the latest research and the fact that the publications before this year were scarce. Research on AI chatbots gained momentum after 2016, which was the tipping point for chatbots and conversational interfaces, when major companies started to invest in such technologies [3]. Key inclusion criteria are for papers to: 1) have a sociotechnical perspective; 2) focus on management and use. Hence, articles that are purely technical, mainly in the computer science field, that deal with code development and technical aspects of implementation and algorithms were excluded from the analysis.

The search in both databases resulted in 43 articles without duplicates. we further examined the articles by reading their abstract and methodology. This resulted in excluding 15 articles that had a pure technical perspective in the development and evaluation of chatbots and articles that considered AI and Machine learning in general, without a particular focus on Conversational AI. The remaining 28 articles were deemed relevant and hence were subjected to further analysis. We further performed a backward search and included additional articles, which resulted into a total of 35 articles included.

3. Findings

3.1. Research methods

In terms of the methods used to study AI Chatbot, our literature review reveals that, conceptual research accounts for the majority of the articles while empirical research is still nascent. Conceptual studies examine topics such as ethical challenges [17] [18] [19], benefits of chatbot usage [20] [21], features and design of chatbots [22] [23].

The few empirical studies adopt either mixed methods or quantitative approaches, as shown in Figure 2. The review finds that qualitative research and mixed methods are the least adopted

approaches. However, qualitative research is particularly useful for exploratory and in-depth understanding of processes and social action [24] and technology in use. Qualitative research could also reveal the sociotechnical arrangements that would enhance AI chatbot use and realise its organisational benefits.

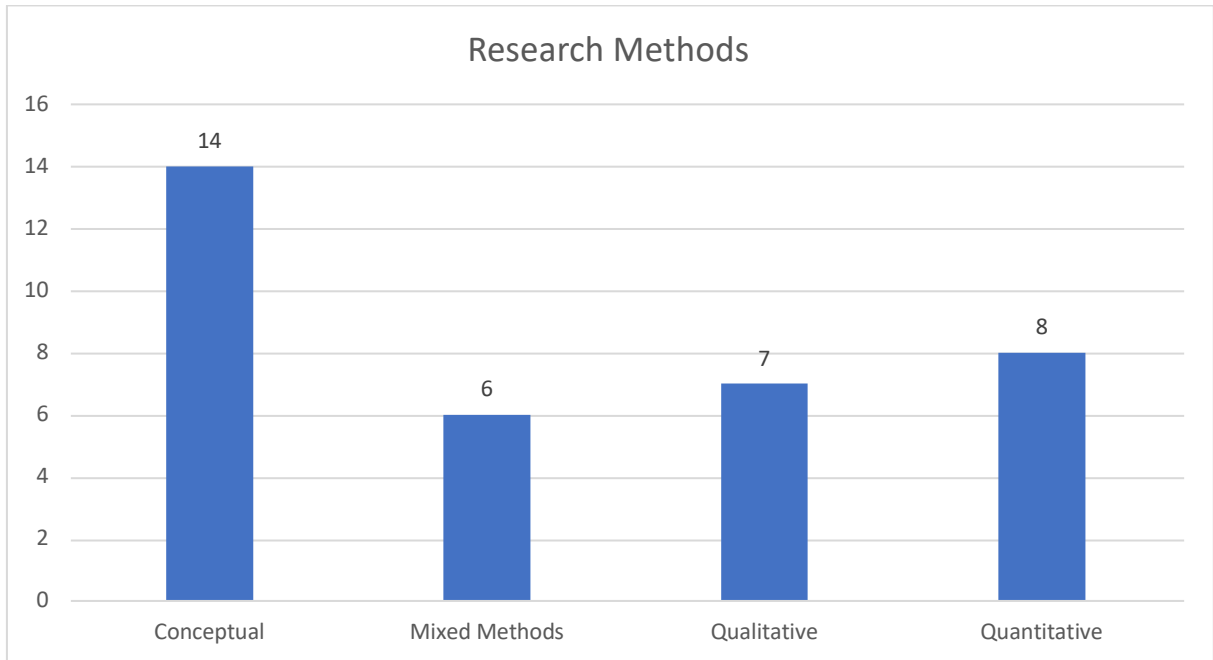


Figure 1. Research Method

3.2. Type of use

The use of AI chatbot in organisations could be divided into internal or external use. The internal organisational use of AI Chatbot provides employees with access to corporate information held in different systems and hence could reduce information overload. The external organisational use of AI chatbots provides customers with a way to find information and communicate with the organization. [20]. AI chatbots for internal use are task-oriented and provide in-organisation services to employees to find information, conduct tasks and navigate in-organisation systems and documents. They are commonly referred to as virtual enterprise assistants [7]. Externally facing chatbots interact with consumers and are used in marketing, advertising, customer service, e-commerce, healthcare, education to provide a wide range of services to consumers from finding information, initiating transactions, giving advice or guiding learning. Externally-facing chatbots are often referred to as virtual customer assistants [7]. ‘Social chatbots’ belong to the externally-facing and are primarily built for conversation and entertainment purposes [25].

Studies that examined the internal use considered mainly its value co-create. They find that for AI chatbots to generate business value in its internal use, they need to be used by the employees and further improve [7, 26]. However, employees’ experience of using AI Chatbot has received little attention [27]. Studies that examined external customers mainly considered users’ experience as summarised in Table 1. It is observed that ethics has received less attention in both types of use.

Table 1
Summary of SLR

Application Area	Publications	Concept				
		Ethical considerations	Value co-creation	User experience	Other	
Employees (internal use)	Okuda and Shoda [22]			X	Enterprise chatbots, business applications	
	Lee and Shin [19]	X				
	Johannsen, Schaller [20]		X			
	Patel, Chiu [28]		X			
	von Wolff, Hobert [29]		X			
	Stoeckli, Dremel [30]		X			
	Brachten, Kissmer [31]			X	Employees' acceptance	
	Gkinko and Elbanna [7]			X	Emotions, employees; perspective	
	Flanagan and Walker [32]			X		
	Brachten, Bruncker [33]		X			
	Terblanche [23]			X	Design	
	Nguyen, Sidorova [34]		X		Business processes, sociotechnical	
	Asatiani, Malo [35]		X		sociotechnical	
	Customers (external use)	Bibault, Chaix [36]		X		Evaluation of chatbots in health care
		Parviainen and Rantala [18]	X			COVID-19 pandemic
Williams, Hopkins [37]				X	Design	
Barna, Melnyk [38]				X	tourism	
Cai, Li [39]				X	Intention to use	
Jones and Jones [40]			X		Reconfiguration of work practices	
Ford and Hutchinson [41]				X		
Majumder and Mondal [21]			X		HR	
Canhoto and Clear [42]		X		Value destruction		

Kushwaha, Kumar [43]		X	
Khoa [44]		X	Customer experience
Selamat and Windasari [45]		X	Design
Krchova and Hoesova [46]		X	Covid-19
Murtarelli, Gregory [17]	X		
Diederich, Brendel [47]		X	Design
Baird and Maruping [48]	X		delegation mechanisms, collaboration
Seeger, Pfeiffer [49]		X	Design, Anthropomorphism
Rai, Constantinides [50]	X		collaboration
Lacity, Scheepers [51]		X	

3.3. Challenges of adoption and use of AI chatbots in organisations

Few studies examined the challenges of adopting and using AI chatbot in organisations. Patel et al. [28] provide an overview of strategic applications of AI chatbots that expand from serving the fundamental need of business operations, to include information processing and business process management. They emphasise on the value co-creation through enhanced collaborative efforts as well as ensuring rich customer experience. They argue that the value generated was inherently tied to the type of routine capability they enabled and the contexts in which the AI chatbot was used. Furthermore, they suggest that organisations need to consider four types of implementation challenges: technology-related challenges, user-related challenges, technology-related enablers, and project management enablers.

Lee and Shin [19] take a different approach and highlight four technical and managerial challenges including the ethical challenge, the shortage of machine-learning engineers, the data-quality challenge in terms of potential biases in the training data, and the cost-benefit challenge [19]. Another study focused on the internal business practice of innovation management by identifying value propositions of AI chatbots with the human-in-the-loop to support this process, including the support of employees during training, increase employee motivation and the high accuracy of results [20].

The use of AI chatbots to manage online interactions with consumers poses additional ethical challenges linked to the use of AI applications and opens up new ethical avenues for investigation. Another study discussed conceptually the ethical implications related to chatbots within the marketplace with regards to the progressive automation of online conversational processes and their integration. Combined with predictive analytics, AI chatbots have the capacity to generate significant information asymmetry, a feature that frequently characterises human - machine interactions and is based on the information disparities characterising those who join online interactions and that could have potential damaging consequences.

Some other ethical challenges include anthropomorphising AI chatbots and managing online security. As mediation mechanisms to the ethical challenges, they propose solving information asymmetry to mediate the risk of the asymmetrical distribution of informative power, increase users' credibility and reducing users' perception of risks and enhance their privacy as mediation mechanisms

accordingly. They also argue that attention should move from a focus on enhancing performance to embrace considerations that concern chatbot governance [17]. In addition, wrong AI chatbot design might not meet users' expectations and might be discontinued due to their design flaws [47]. While, Nguyen et al., [34] argue for a shift from the technical side to a socio-technical continuum to focus on the integration of AI with people and processes and their role in organisations and business processes. In particular, Asatiani et al., [35] introduced the concept of sociotechnical envelopment to encapsulate the interaction of social and technical factors that lead to a successful AI organisational envelopment.

3.4. Enablers of AI chatbots use in Organisations

In the context of digital workplaces, von Wolff et al. [29] identified three usage scenarios or functions of a chatbot: information gathering, process execution, and information provision. However, they argue that chatbots are mostly utilized for information provision along with the execution of corresponding processes. They investigated the implications of an AI chatbot in the workplace and summarise those into the reduction of time efforts, employee's workload, and costs. AI chatbots have been also proposed as a way to reduce and augment the cognitive load of the employees and can increase their performance [33]. Another study compared chatbots with traditional enterprise systems in terms of their action possibilities (i.e., affordances) and argued that chatbots augment social information systems of organisations with affordances of traditional enterprise systems. Hence, chatbots can be seen as valuable to cross the chasm between traditional enterprise systems and social information systems [30]. Accordingly, AI chatbots should be treated as lifelong learners and subject matter experts continually engaged in managing the information [51].

Therefore, AI chatbots hold great potential for enterprises as they can increase productivity and are cost-efficient by automating processes. Another study [48] focused on the interactions between humans and AI and the delegation mechanisms to autonomous agents in a variety of ways such as reflexive, supervisory, anticipatory and prescriptive agents, as an effort of human and AI collaboration, creating hybrid human AI assemblages [50].

While these studies focus on the value creation and the opportunities that chatbots provide in enterprises, [31] focused on the acceptance and adoption of chatbots by its employees. They name such chatbots Enterprise Bots and highlight that employees need to be convinced of the usefulness of a tool themselves in order to incorporate them in their working practices. They show that intrinsic motivation of the employees has a strong positive influence on the intention to use Enterprise Bots whereas external influences showed smaller effects [31]. Gkinko and Elbanna [7] adopted a different perspective and studied employees' emotions from the chatbot's actual use in the workplace. They find that AI chatbot characteristics influence users' emotions in the workplace and trigger mixed emotions that differentiate the use of AI chatbot in the workplace from conventional enterprise systems. They show that the existence of multiple emotions can encourage continued use of an AI chatbot [7].

Terblanche [23] focused on the chatbot design practices for organisational coaching to support strong coach-coachee relationships and note the significance of managing expectations of the AI's capabilities and limitations, as it could jeopardise the trust relationship. In addition, users should be made aware that as the AI chatbot evolves and learns from usage, it could change its behaviour and therefore their interactions with it [23]. Flanagan & Walker [32] study the distribution of power within workplaces. They argue that chatbots offer distinctive potential affordances to unions in enhancing their resources and capabilities as 'orchestrators' of worker power. AI chatbots could be viewed as an infrastructural resource that enable otherwise marginal workers to receive basic information that reinforces union narratives of power and worker solidarity [32].

3.5. Application Areas

Canhoto & Clear [42] studied AI chatbots in a customer service context and argue that the inability to identify and manage the risks can lead some managers to delay the adoption of AI chatbots and thus may hinder value creation or even result in value destruction. Therefore, managers need to quantify the

potential for value destruction associated with each of the components of the AI solution. For instance, chatbots might lead to value destruction if they provide limited responsiveness, as highlighted in the context of HR and lead to lengthy interactions, but specifically in customer service, by producing a response that is not aligned with the brand image of the company [42].

Additionally, brand trustworthiness, mitigates the uncertainty of customers' perception of using chatbots at service touchpoints. Customer experience by using chatbots is influenced by the overall system design, customers' ability to use technology, and customer trust towards brand and system [43]. Furthermore, using innovative communication marketing tools, such as chatbots had a significant impact on the companies' innovation, as well as in the communication with customers. Krchova & Hoesova [46] argue that modern online marketing tools is the way to attract new market possibilities and they attribute the change from traditional to modern online communication tools to the change in customer behavior caused by the pandemic [46].

While, Khoa [44] focus on consumers' purchase intentions and propose managerial implications for an online business to enhance the chatbot functions to consumer behaviours. They show that the perceived usefulness and ease of use of chatbots positively affect the attitude of online consumers to the integrated marketing communication (IMC) activities of businesses. Simultaneously, IMC leads to impulse buying as well as the repurchase intention behavior of customers. As a result, the use of chatbots as a communication tool enhances consumer shopping behavior, including impulse purchase behavior and repurchase behavior [44].

In healthcare, studies focus on the evaluation of the chatbots to assist patients and the ethical challenges posed by chatbots from the perspective of healthcare professional ethics. One of the first studies that assessed an artificial conversational agent used to inform patients with breast cancer and found that their therapy management are at least as satisfying as answers given by a multidisciplinary medical committee and may save patients with minor health concerns from a visit to the doctor. This could allow clinicians to spend more time to treat patients who need a consultation the most [36]. Chatbots are also used for psychological support that could lead to significant improvements in well-being and stress [37]. However, there are many ethical challenges that lie in this context. While there was a significant increase in the utilisation of health-oriented chatbots to answer questions, recommend care options, check symptoms and complete tasks such as booking appointments due to the COVID-19 pandemic [18] argue that in terms of trust, patients may increase distrust in healthcare consultation chatbots due to their perceived ability [18].

In journalism, chatbots are used to reconfigure working practices and infrastructure, posing new editorial and technical challenges, and redefining relationships with audiences [40]. Others are using news chatbots, that function as disseminators of news, to reach new audiences by experimenting with a more informal, intimate relationship with citizen users [41].

Furthermore, COVID-19 has significantly accelerated the technological process of digitalisation of marketing activity in the field of tourism. Due to the opportunities chatbots provide in the travel industry, including 24/7 quick answers to customers' queries regardless of staff availability, they maximize the needs of modern consumers of tourism services [38]. In addition, in terms of the design, anthropomorphizing chatbots can facilitate effective customer interaction. Cai et al. [39] suggest that social presence cues and emotional message cues are major anthropomorphic cues are essential in shaping customer's usage intentions, trustworthiness, intelligence, and enjoyment [39]. Furthermore, Seeger et al., [52] developed a theoretical framework for designing anthropomorphic CAs and revealed that not all combinations of anthropomorphic technology design cues increase perceived anthropomorphism and highlight that nonverbal cues increase the positive effects of anthropomorphism when complemented with verbal of human identity cues.

Majumder & Mondal [21] argue for a focus on the limitations of implementing AI chatbots in the context of human resources in the recent years to increase the robustness and improve them. They highlight some of the limitations that the employees and applicants might get frustrated with the limited responsiveness from the chatbot in case it is not trained enough. They emphasize that HR chatbots require ongoing review, maintenance, and optimisation in terms of their knowledge base and the way they are supposed to communicate with your end user on a daily basis [21].

Terblanche [23] studied chatbots in the context of coaching. They propose design practices to support strong coach-coachee relationships. Their practices intertwine in managing users' expectations in terms of the chatbot's continuous evolvement, identity and the level of anthropomorphism in the

chatbot, that could lead to social presence. Moreover, during the chatbot's learning path from the usage, it might change its behaviour and as a result the interaction with humans [23].

4. Future Research Directions

Based on the literature review, three future research directions related to human-AI collaboration in the workplace are suggested as follows.

4.1. Qualitative Research

Our results indicate that there are limitations and biases in terms of the methodologies used. As shown, qualitative research is nascent. Qualitative research is particularly relevant for new phenomena such as AI chatbots to generate and theorise about knowledge and themes instead of testing and confirming, especially in the emerging era of AI chatbots. Furthermore, there is an imbalance between the conceptual and empirical research, where users' experience could provide valuable insights from their actual collaborative use of AI chatbots.

Research is dominated by views that AI chatbots can be transferred across contexts and their use does not have to be bound to a specific application [28]. Therefore, each of the identified application areas faces similar challenges in terms of value co-creation, ethical considerations and user experience. However, we argue that understanding the specificity of context could reveal in-depth details on human collaboration with AI chatbot and how a new human-AI Chatbot system could be optimised in practice.

4.2. Actual User Experience

While conceptual articles focus on the value creation and benefit realisation of AI chatbots, empirical studies investigating users' actual experience is limited. Understanding users' actual experience from AI chatbots not only can provide valuable insight for the IS literature but also inform the design aspects. Based on the SLR, we conclude that there is lack of research for internal use of AI chatbots. Only few studies focus on this aspect, while most of them review the implications in a customer service context and their purchase behaviour. Future research on chatbot user experience needs to evolve from the intended use of AI chatbots to their actual use and users' experiences [7]. Further empirical research could focus on the users' actual collaborative experience, that could be a valuable source for their continuous use, as well as the changing nature of their collaboration with the AI chatbot that sometimes replaces the notion of a colleague, where employees might find easier to ask the AI chatbot instead of their colleague sitting next to them.

4.3. Negative Consequences

AI chatbots are modifying how people create value through human-machine collaboration [53]. However, there is limited literature on the negative consequences of use, misuse or even non-use. In addition, ethical considerations are concentrated in the health care context and more sparsely in organisations for internal processes and decision making. It has been argued that transparency, which is at the core of ethical considerations, can act as a foundation of trust and help in understanding technology [54]. As a result, ethical and trust considerations could be further explored in different context, for example the employees. Another way of value co-creation is to avoid biases with regards to the AI chatbot scope and goals and enhance the fair and unbiased training of the data [55]. Future research could move away from the challenges and explore the negative consequences from the users' actual experience and propose mitigation strategies. Such studies could inform not only the design of

the chatbots but also potential measures that organisations need to take in order to increase transparency and eliminate risks from users' use, non-use and misuse, since AI chatbots constantly learn from their users' input.

5. Conclusion and Limitations

This paper contributes to the AI chatbot use in the workplace by conducting a systematic literature review. It identified the research gaps and methodological biases and highlighted the state-of-the-art research topics. We categorised the current research into three streams, namely value co-creation, ethical considerations and user experience. The proposed future research directions are intended as a response to the current lack of coherence in the emerging field of chatbot research.

However, this research has some limitations. The search was limited in English keywords in journal and conference articles from two major databases. Future research could perform such SLR in additional database sources. Because of the restriction of the analysis to journal and conference publications in the workplace context, a few publications containing interesting material were potentially excluded from this review.

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