

Live support by chatbots with artificial intelligence: A future research agenda

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Abstract

This research uses a Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) protocol to investigate the utility of artificially intelligent (AI) conversational chatbots in service business settings. The findings shed light on key theoretical underpinnings focused on human-computer interactions and clarify the benefits and costs of using responsive chatbot technologies. This contribution implies that, for the time being, works are still in progress for interactive, anthropomorphic chatbots to mimic human customer services agents' verbal, vocal and visual cues, when they respond to online queries. In conclusion it puts forward plausible research avenues in this promising area of study.

Keywords:

Conversational agents; online customer services; customer experience; anthropomorphism; artificial intelligence.

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1. Introduction

Consumers and prospects who use the digital media to interact with service businesses are increasingly chatting with AI conversational systems, in lieu of human customer services agents. Very often, they are engaging with online dialogue systems that simulate human conversations in live chat interfaces through interactive websites and/or via social network services (SNSs), without even knowing (Camilleri and Kozak 2022; Chen et al, 2021; Lee and Lee 2020). Most customer service chatbots run through messaging apps like Facebook Messenger, WhatsApp or via short message services (SMSs) (Capriotti et al. 2021; Hajarian et al. 2021).

Automated conversational technologies are assisting consumers with product recommendations, helping them navigate through the service businesses' websites and/or to resolving their consumer issues and queries (Flavián and Casaló 2021). They offer personalized technical support as well as problem-solving advice like human agents of call centers (Belanche et al. 2020a; Luo et al. 2019). Chatbots are programmed to respond to online questions by recognizing texts including keywords and phrases relating to common customer roadblocks (Hoyer et al. 2020). Hence, they can interact with individuals to provide them with solutions according to the information they receive.

Many organizations are deploying chatbots to provide customer services and technical support to online users (Camilleri 2021; Schuetzler et al. 2020). They are reducing the volume of cases that are usually handled by customer service representatives, including those that involve simple or common questions, that can be dealt with by frequently answered questions (FAQ), or through quick responses (Ranoliya et al. 2017). As a result, the use of chatbots is reducing the organizations' reliance on human interactions in customer service settings. Thus, employees are in a better position to focus on more complex consumer concerns and could dedicate their energies to resolve complaints and time-consuming cases (Buhalis and Cheng 2020).

Generally, chatbots are utilized to gather information from customers, to improve their response times to resolve customer service issues, and/or to request routing, where necessary. While some chatbot applications are based on

sophisticated AI systems to process content, others work like autoresponder sequences (Przegalinska et al. 2019). In plain words, they may usually scan for specific keywords and common phrases from one or more databases in order to generate responses through a sequence of messages.

Previous literature reported that conversational chatbots can minimize the amount of labor that is required to produce specific results with or without supervision (Adam et al. 2021; Crollic et al. 2021). Some of them may schedule meetings with customers and could even perform follow-up functions. When chatbots cannot solve problems (as they do not always recognize keywords and phrases), their consumer cases are assigned to human agents (Belanche et al 2020b). Consumers do not have to rewrite or reiterate their queries, as service employees can follow up on the chatbots' previous threads. Interestingly, conversational chatbot systems may also be integrated with customer relationship management (CRM) programs in order to improve the consumers' online experiences. CRM and other automated systems may enable businesses to use consumer data including their purchase history, to enhance their customer-centric services (Camilleri 2020).

Recently, there is an increased interest among academia and practitioners on the customers' digital experiences with service businesses (Paschou et al. 2020). In the past few years, several researchers sought to explore the utilization of AI chatbots with natural language processing capabilities; as they emulate human conversations in online customer service settings (Luo et al. 2019; Przegalinska et al. 2019; Riikinen et al. 2018). Very often, previous studies relied on empirical research methodologies including quantitative approaches (Kasilingam 2020; Pillai and Sivathanu, 2020; Rese et al. 2020) and experiments (Adam et al. 2021; Iovine et al. 2020; Sheehan et al. 2020) to better understand the acceptance and use of these disruptive technologies. Many commentators discussed about their attributes and features, as interactive technologies are supporting businesses in their service delivery (Rutschi and Dibbern 2020; Pillai and Sivathanu 2020; Melián-González et al. 2021; Orden-Mejía and Huertas 2021; Schanke et al. 2021; Schuetzler et al. 2020).

For the time being, there are just a few theoretical papers and/or review articles that capture, scrutinize and interpret the findings from the extant literature on this promising field of study. The objectives of this review are threefold: (i) Firstly, it identifies relevant theoretical underpinnings that investigate human-computer interactions, (ii) secondly, it uses PRISMA's systematic review approach, to search, screen, extract and synthesize previous literature that is focused on the use of chatbots by service businesses.

Therefore, it appraises the contributing authors and exposes the most popular researched topics relating to the use of these responsive dialogue systems, and (iii) thirdly, it discusses about the pros and cons of using chatbots as conversational agents in customer service settings. It clarifies how, why, where and when they are used to improve interactions with customers and prospects. In conclusion, it puts forward key implications, recognizes its limitations and presents future research directions to academia.

2. Literature review

Chatbots are usually considered as automated conversational systems that are capable of mimicking humanlike conversations. Previous research suggested that, at times, human beings are treating computers as social beings (Nass and Moon 2000; Nass et al. 1994; Rha and Lee 2022) although they are well aware that dialogue programs do not possess emotions, feelings and identities. Individuals may still perceive that service chatbots have some sort of social presence when they interact with them (Leung and Wen 2020; McLean et al. 2020; Pantano & Scarpi, 2022; Schuetzler et al. 2020), even though these technologies are capable of responding to thousands of potential users at once (Caldarini et al. 2022).

Currently, few academic contributions are using theoretical bases like the social presence theory (Grimes et al. 2020; Schuetzler et al. 2020) and/or the social response theory (Adam et al. 2021; Huang and Lin 2011), to explore human-computer interactions, and/or the utility of dialogue systems like chatbots, albeit a few exceptions. A few commentators made specific reference to related theories to describe the characteristics of chatbots or of conversational

agents, that are primarily used for consumer engagement purposes (Cheng and Jiang 2020; Kull et al. 2021; Mostafa and Kasamani 2021; Nuruzzaman and Hussain 2020).

The human machine communication theory was formulated in response to the growing number of technologies like AI and robotics, that are designed to function as message sources, rather than as message channels (Flavián et al. 2021). Lewis et al. (2019) contended that social bots, and even a few chatbots have pushed into the realm of what was thought to be a purely human role. Wilkinson et al.'s (2021) study shed light on the human beings' perceptions about conversational recommender systems. In this case, the authors went on to suggest that experienced users trusted their disruptive technologies and had higher expectations from them.

Other researchers examined the online users' trust toward chatbots in various settings (Balakrishnan and Dwivedi 2021; Borau et al. 2021; Cheng and Jiang 2020; De Cicco et al. 2020; Hildebrand and Bergner 2021; Kushwaha et al. 2021; Mozafari et al. 2021; Nuruzzaman and Hussain 2020; Pillai and Sivathanu 2020). Eren (2021) confirmed that the users' performance perceptions regarding the use of chatbots positively affected their customer satisfaction levels in the banking sector. This finding is in line with the expectancy violation theory, as individuals form expectations following their interactions with information systems (Chopra 2019; Neuburger et al. 2018).

The individuals' social expectations from conversational technologies are especially pronounced when they incorporate cues of humanness (Adam et al. 2021; Pfeuffer et al. 2019), that are not present in traditional systems like websites, mobile applications, and databases (Belanche et al. 2021). The anthropomorphic features of AI dialogue systems make it easier for humans to connect with them (Adam et al. 2021; Becker et al. 2022; Forgas-Coll et al. 2022; Van Pinxteren et al. 2020).

In many cases, a number of quantitative researchers have investigated online users' perceptions and attitudes toward these interactive technologies. Very often, they relied on valid measures that were tried and tested in academia. Some utilized the theory of reasoned action (Huang and Kao, 2021), the theory of planned behavior (Brachten et al. 2021; Ciechanowski et al. 2019), the behavioral reasoning theory (Lalicic and Weismayer 2021), the technology acceptance model (Kasilingam 2020) or the unified theory of acceptance and use of technology (Mostafa and Kasamani

2021), as they sought to investigate the individuals' utilitarian motivations to use chatbot technologies to resolve their consumer issues.

Others examined the users' gratifications (Cheng and Jiang 2020; Rese et al. 2020), perceived enjoyment (De Cicco et al. 2020; Kushwaha et al. 2021; Rese et al. 2020), emotional factors (Crollic et al. 2021; Lou et al. 2021; Schepers et al. 2022; Wei et al. 2021), and/or intrinsic motivations (Jiménez-Barreto et al. 2021), to determine whether they were (or were not) affecting their intentions to use them.

Table 1 presents a list of the most popular theoretical frameworks that were used to explore the use of chatbots in different contexts.

Table 1. A non-exhaustive list of theories relating to human-computer interactions

Theory	Definition
Anthropomorphism theory (Adam et al. 2021; Van Pinxteren et al. 2020)	The anthropomorphism theory describes the tendency to imbue real or imagined behavior of nonhuman agents with humanlike characteristics, motivations, intentions or emotions.
Affordance theory (or theory of affordance) (Rutschi and Dibbern 2020; Stoeckli et al. 2020)	The affordance theory suggests that the perception of the environment can lead to specific courses of action. Affordances or clues in the environment indicate possibilities for action, that would not require sensory processing.
Assemblage theory (Jiménez-Barreto et al. 2021)	The assemblage theory asserts that, within a body, the relationships of component parts are not stable and fixed; rather, they can be displaced and replaced within and among other bodies, thus approaching systems through relations of exteriority.
Behavioral reasoning theory (Lalicic and Weismayer 2021)	The behavioral reasoning theory suggests that reasons serve as important linkages between the individuals' beliefs, global motives (e.g., attitudes, subjective norms, and perceived control), intentions, and behaviors.
Cognitive fit theory (Chen et al. 2021)	The cognitive fit theory proposes that the connection between the task and the information presentation format can have an effect on the individual users' task performance.
Commitment-consistency theory (Adam et al. 2021)	The commitment-consistency theory suggests that individuals strive to be consistent in their words and actions.
Communication accommodation theory (Zhang et al. 2021)	The communication accommodation theory seeks to explain and predict why, when, and how people adjust communicative behavior during social interactions. This theory seeks to clarify which consequences may result from those adjustments.

Contingency theory (Leung and Wen 2020)	The contingency theory suggests that performance is a consequence of the fit between several factors including the structure, people, technology, strategy, and culture. This theory claims that there is no best way to do things. The optimal course of action is contingent (dependent) upon internal and external situations.
Diffusion of innovations theory (Kushwaha et al. 2021; Mostafa and Kasamani 2021)	The diffusion of innovations theory seeks to explain how, why, and at what rate new ideas and technology spread. The diffusion occurs when users communicate about innovations with other individuals.
Expectancy theory (or Expectancy theory of motivation) (Chopra 2019)	The expectancy theory (or expectancy theory of motivation) proposes that an individual will behave or act in a certain way because they are motivated to opt for specific behaviors (over others) as they can predict the result of their chosen behavior.
Expectation violation theory (Crolic et al. 2021)	The expectancy violations theory (EVT) is a theory of communication that analyzes how individuals respond to unanticipated violations of social norms and expectations.
Flow model for the computer-mediated environment (Kushwaha et al. 2021)	The flow model for the computer-mediated environment suggests that the fitness of task (i.e., the difference between challenges and skills), perceived control, and cognitive spontaneity (“playfulness”) are the antecedents of flow. Flow itself is measured through the constructs of enjoyment and concentration. The consequences of the flow model focus on the process, increased learning, and increased creativity.
Functionalist theory (of emotion) (Crolic et al. 2021)	The functionalist theory suggests that emotional experiences and expressions are influenced by personal characteristics (including biological factors, learning history), the emotion-eliciting event, and social contexts.
Human computer interaction theory / Human machine communication theory (Lewis et al. 2019; Wilkinson et al. 2021)	The human–computer interaction theory focuses on the interfaces between individuals (users) and computers.
Information systems success model (Kushwaha et al. 2021)	The information systems success model seeks to identify, describe, and explain the relationships among six of the most critical dimensions of success along which information systems are commonly evaluated, including information quality, system quality, service quality, usage intentions, user satisfaction and net system benefits.
Politeness theory (Dippold et al. 2020)	The politeness theory is a theory that appeared within the framework relating to the pragmatic approach in linguistics. According to this theory, interlocutors would create the right environment, and adopt appropriate strategies that facilitate effective communications.
Self-determination theory (Jiménez-Barreto et al. 2021)	The self-determination theory suggests that people are motivated to grow and change by three innate and universal psychological needs. This theory posits that individuals are able to become self-determined when their needs for competence, connection, and autonomy are fulfilled.
Situational theory of problem solving (Cheng and Jiang 2020)	The situational theory of problem-solving attempts to explain why and how individuals communicate during problematic situations.

Situational theory of publics (Cheng and Jiang 2020)	The situational theory of the publics is used to clarify why and to what extent individuals engage (in an active manner) or stay passive during information acquisition-related behaviors.
Social cognitive theory (Chong et al. 2021)	The social cognitive theory suggests that the individual's knowledge can be enhanced by observing others within the context of social interactions, experiences, and from outside media influences.
Social presence theory (Grimes et al. 2020; Leung and Wen 2020; McLean et al. 2020)	The social presence theory suggests that the "sense of being with one another" is influenced by digital interfaces in human-computer interactions.
Social response theory (Adam et al. 2021)	The social response theory clarifies that social cues may arouse the users' responses to information technology. It suggests that individuals are inclined to treat computers as social actors (rather than as media), even though they are well aware that they do not possess feelings, identities, or human motivations.
Structural role theory (Seering et al. 2018)	The structural role theory suggests that subjects (like bots) behave in specified, structured ways to achieve certain goals within a space.
Technology acceptance model (Kasilingam 2020; Mostafa and Kasamani 2021)	The technology acceptance model posits that the individuals' perceptions about the ease of use as well as their perceptions about the usefulness of technologies would determine their acceptance or rejection.
Theory of conversation (Moriuchi et al. 2021)	The conversation theory is a cybernetic and dialectic framework that describes the motivation that drives humans to both maintain their current resources and to search for new resources.
Theory of planned behavior (Brachten et al. 2021; Ciechanowski et al. 2019)	The theory of planned behavior is a psychological theory that links beliefs to behavior. This theory maintains that three core components, namely, attitude, subjective norms, and perceived behavioral control, will predict the individuals' behavioral intentions.
Theory of reasoned action (Huang and Kao 2021)	The theory of reasoned action suggests that the individuals' intention to perform certain behaviors is a function of their attitudes toward the behavior and of their subjective norms (this theory anticipated the theory of planned behavior).
Trust commitment theory (Kushwaha et al. 2021)	The trust-commitment theory suggests that trust and commitment, are important factors for a successful relationship.
Unified theory of acceptance and use of technology (Mostafa and Kasamani 2021)	The unified theory of acceptance and use of technology is an extension of the technology acceptance model. It suggests that the individuals' performance expectancy (i.e. synonymous with perceived usefulness), effort expectancy (i.e. similar to perceived ease of use), social influences (i.e. related to subjective norms) and facilitating conditions would have a significant effect on their intentions to use technology.
Uses and gratifications theory (Cheng and Jiang 2020; Rese 2020).	The uses and gratifications theory is utilized to explore why and how people use specific media to satisfy their needs for entertainment.

3. Methodology

The researchers critically review the relevant literature that is related to the use of chatbots in service business. They rely on PRISMA's robust protocol to capture and analyze articles (Moher et al. 2015). This methodology provides an evidence-based checklist that is linked to a four-phase flow diagram, to ensure that the systematic review is rigorous and trustworthy. Arguably, PRISMA increases the legitimacy of this bibliographic research, reduces bias as well as chance effects (Paschou et al. 2020). Hence, it enables future researchers to replicate this review in other areas of study, in different contexts. In sum, it provides a clear account of the procedures that were used to search, screen, extract and synthesize the findings from previous literature.

3.1 Searching through academic databases

The search query was carried out through Scopus and Web of Science. These repositories feature a list of academic documents' titles, contributing authors, year of publication and the sources (that accepted the content for publication). This information can be sorted from highest to lowest number of citations (or by date, relevance, first author A-Z, first author Z-A, source title A-Z or source title Z-A).

The review considered academic contributions associated with service businesses that were published in English, from January 2017 up to December 2021. Both Scopus and Web of Science distinguished between different document types and subject areas/research areas. They clearly indicated the authors' affiliations, countries and funding agencies/funding sponsors, among other useful data.

This systematic review considered publications that comprised the words "chatbot(s)" or "chatterbot(s)" in their title, abstract and keywords. Empirical and theoretical/conceptual articles that were published in high-impact, peer-reviewed journals were considered as eligible publications for the purposes of this research. The chosen list included only contributions that were indexed in both Scopus and Web of Science's core collections in Science Expanded (SCI-EXPANDED) and in its Social Sciences Citations Index (SSCI). The systematic review avoided the duplication of results from Scopus, SCI-EXPANDED and SSCI. The search query excluded publications that were featured in Web

of Science’s Emerging Sources Citations Index (ESCI) as well as books, book series, conference proceedings and trade publications, from this review exercise. Table 2 summarizes the search criteria:

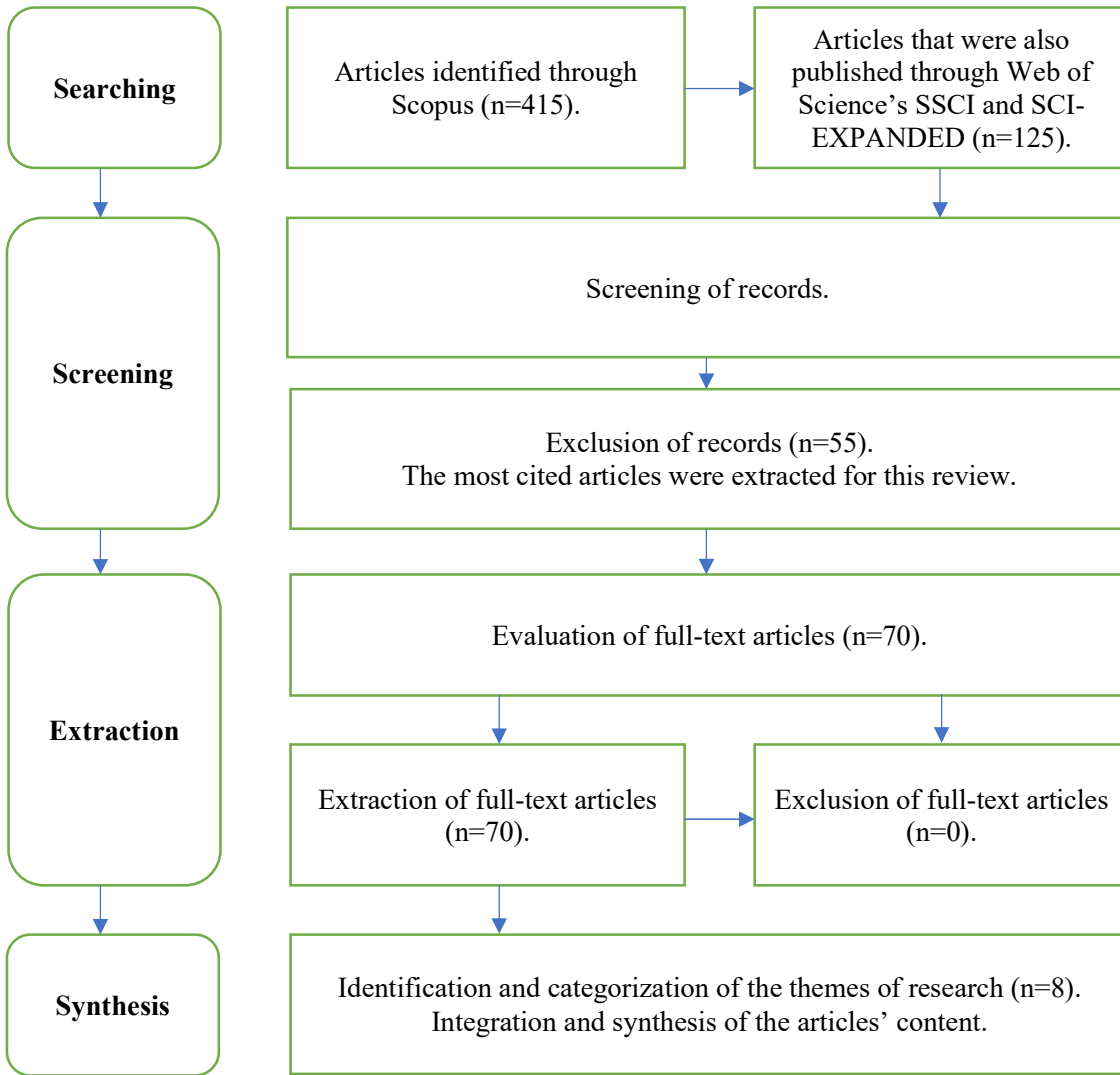
Table 2. Inclusion and exclusion criteria for the systematic review

Search Criterion	Inclusion	Exclusion
Repository	SCOPUS and Web of Science’s SSCI and SCI-EXPANDED	Other sources
Publication type	Articles, including experimental, quantitative (survey), qualitative (interviews), reviews (conceptual, content analyses, discursive, meta-analyses)	Books, Book series, Chapters, Conference proceedings, Trade publications
Date	January 2017- December 2021	
Language	English	Other languages
Field of research	“Business, management and accounting” in Scopus’ subject areas. “Business” and “Management” in Web of Science’s categories.	

3.2 Screening and extraction of the relevant documents

The findings revealed that there were four hundred twenty-one (421) documents that were indexed in Scopus, as from the year 2000. Four hundred fifteen (415) of these articles were published from January 2017 to December 2021. There were one hundred thirty-seven (137) documents what were published in Web of Science’s SCI-EXPANDED and SSCI (excluding ESCI). One hundred twenty-five (125) of these publications were published in the last five years, as reported in Figure 1.

Figure 1. The PRISMA protocol that was used for this systematic review



Seventy (70) of the most-cited articles that were indexed in Scopus as well as in Web of Science’s SSCI and SCI expanded repositories, were examined, in their entirety, to ensure the accountability, integrity, and transparency of the results.

3.3 A synthesis on the benefits and costs of conversational chatbots

An inductive approach was used to integrate the findings from as many sources as possible, to clarify the pros and cons of using conversational chatbots in service environments. The researchers organized the content from the

extracted articles, scrutinized it, and identified the main themes. The predominant areas of studies relating to the provision of automated customer services through conversational chatbot technologies, are illustrated in Table 3.

Table 3. A list of the most popular researched topics relating to the use of artificially intelligent chatbot technologies

Research area	Definition
Anthropomorphic chatbot (Adam et al., 2021; Sheehan et al., 2020)	An anthropomorphic chatbot uses humanlike features including conversational tones, names, avatars, et cetera, to respond to online customers' queries.
Artificial intelligence chatbot (or AI chatbot) (Chen et al., 2021; Luo et al., 2019)	An AI chatbot is a natural language processing program (i.e. a website or app) that simulates human conversations. This automated technology is equipped with sophisticated speech recognition and is used to respond to customers' queries.
Conversational chatbot agents (conversational entities, conversational interfaces, conversational recommender systems or dialogue systems) (Grimes et al., 2021; Schuetzler et al., 2020)	Conversational chatbot solutions are AI-powered virtual agents that respond to online queries. They are designed to communicate like human customer services agents. These interactive technologies are capable of understanding the meanings of words and of engaging in natural conversations.
Customer experience with chatbots (Hoyer et al., 2020; Jiménez-Barreto et al., 2021)	This notion refers to the online users' personal experiences with conversational chatbot technologies. The online customers' experiences with chatbots can be improved if they perceive them as convenient in terms of their efficiency, functionality and responsiveness during their service delivery.
Chatbot customer service (Ngai et al., 2021; Schanke et al., 2021)	This notion refers to the provision of online customer services that are delivered through pragmatic, semantic and syntactic conversational capabilities of chatbot technologies.
Customer satisfaction with chatbots (Eren, 2021; Orden-Mejía and Huertas, 2021).	This notion refers to the customers' satisfaction levels with the chatbots' responsive communications, in terms of their accuracy, reliability, adequacy, sufficiency and timeliness of quality information (chatbots are expected to deliver service quality to their consumers).
Customer value (or the customers' perceived value) of chatbots (Lalicic and Weismayer, 2021; Riikinen et al., 2018).	This notion refers to the customers' overall assessment about the utility of conversational chatbots. The consumers' perceptions can be based on how interactive technologies respond to their queries. The consumers' perceived value of chatbots may be considered as an antecedent of their satisfaction with them.
Service robots (robot advisors)	This notion refers to the service equipment or software that can perform useful tasks (including responding to online queries) for humans. They may

(Blut et al., 2021; Belanche et al., 2021) be considered as adaptable technologies that could interact, communicate and deliver services to customers.

3.3.1 *The benefits*

Frequently, consumers are engaging with chatbot systems without even knowing, as machines (rather than human agents) are responding to online queries (Li et al. 2021; Pantano and Pizzi 2020; Seering et al. 2018; Stoeckli et al. 2020). Whilst 13% of online consumer queries require human intervention (as they may involve complex queries and complaints), more than 87 % of online consumer queries are handled by chatbots (Ngai et al., 2021).

Several studies reported that there are many advantages of using conversational chatbots for customer services (Grimes et al. 2021; Roy and Naidoo 2021; Wang and Yim 2019; Wilkinson et al. 2021). Their functional benefits include increased convenience to customers (Thomaz et al. 2020), enhanced operational efficiencies (Pantano and Pizzi, 2020), reduced labor costs (Belanche et al. 2020; Crollic et al. 2021), and time-saving opportunities (Adam et al. 2021).

Consumers are increasingly availing themselves of these interactive technologies to retrieve detailed information from their product recommendation systems and/or to request their assistance to help them resolve technical issues. Alternatively, they use them to scrutinize their personal data (Shum et al. 2018). Hence, in many cases, customers are willing to share their sensitive information in exchange for a better service (Thomaz et al. 2020).

The conversational agents that are less engaging than human agents can possibly elicit more disclosures from consumers (Grimes et al. 2021). They are in a position to process the consumers' personal data and to compare it with prior knowledge, without any human instruction (Ngai et al. 2021). Thus, conversational agents can learn in a proactive manner from new sources of information to enrich their database (Crollic et al. 2021; Grimes et al. 2021; Iovine et al. 2020).

Service chatbots can improve the handling of consumer queries whilst delivering engaging experiences (Chen et al. 2021; Hoyer et al. 2020; Jiménez-Barreto et al. 2021; Kushwaha et al. 2021; Przegalinska et al. 2019; Sidaoui et al. 2020). They are capable of interacting with online users in two-way communications (Huang and Rust 2017; Matiatou

2019; Roy and Naidoo, 2021). Their interactivity may result in significant effects on consumer trust (Borau et al. 2021; Mostafa and Kasamani 2021; Mozafari et al. 2021; Shiu-Wan et al. 2019; Wilkinson et al. 2021), satisfaction (Chen et al. 2021; Eren 2021; Orden-Mejía and Huertas 2021; Riikkinen et al. 2018), and repurchase intentions (Kasilingam 2020), as well as on positive word-of-mouth publicity (Adam et al. 2021; Mero 2018).

Many researchers reported that consumers are intrigued to communicate with anthropomorphized technologies as they invoke social responses and norms of reciprocity (Blut et al. 2021; Chong et al. 2021; Crollic et al. 2021; Flavian et al. 2021). Such conversational agents are programed with certain cues, features and attributes that are normally associated with humans (Melián-González et al. 2021; Moon and Nass 1996; Pillai and Sivathanu 2020; Schanke et al. 2021; Schuetzler et al. 2020).

The findings from this review clearly indicate that individuals feel comfortable using chatbots that simulate human interactions, particularly with those that have enhanced anthropomorphic designs (Selamat et al. 2021; Sheehan et al. 2020; Tsai et al. 2021). Many authors noted that the more chatbots respond to users in a natural, humanlike way, the easier it is for the business to convert visitors into customers, particularly if they improve their online experiences (Adam et al. 2021; Kushwaha et al. 2021; Przegalinska et al. 2019).

This research indicates that there is scope for businesses to use conversational technologies to personalize interactions with online users, to build better relationships with them, to enhance consumer satisfaction levels, to generate leads as well as sales conversions.

3.3.2 The costs

Despite the latest advances in the delivery of electronic services (Balakrishnan and Dwivedi, 2021; Ngai et al. 2021; Sands et al. 2021; Schanke et al. 2021), there are still individuals who hold negative perceptions and attitudes towards the use of interactive technologies (Lucia-Palacios, Bordonoba-Juste and Pérez-López 2021; Van Pinxteren et al. 2021).

Although AI technologies have been specifically created to foster co-creation between the service provider and the customer, Castillo et al. (2020) reported that there are a number of challenges (like authenticity issues, cognition challenges, affective issues, functionality issues and integration conflicts) that may result in a failed service interaction and in dissatisfied customers.

There are consumers, particularly the older ones, who do not feel comfortable interacting with artificially intelligent technologies like chatbots (Adam et al. 2021; Lucia-Palacios et al. 2021), or who may not want to comply with their requests, for different reasons. For example, they could be wary about cyber-security issues and/or may simply refuse to engage in conversations with a robot (Murtarelli et al. 2021; Pantano and Pizzi 2020).

A few commentators contended that consumers should be informed when they are interacting with a machine (Grimes et al. 2021). In many cases, they may not be aware that they are engaging with elaborate AI systems that use cues such as names, avatars, and typing indicators that are intended to mimic human traits (Adam et al. 2021). Many researchers pointed out that consumers may or may not want to be serviced by chatbots (Crollic et al. 2021; Ngai et al. 2021).

A few researchers argued that some chatbots are still not capable of communicative behaviors that are intended to enhance relational outcomes (Van Pinxteren et al. 2020). For the time being, there are chatbot technologies that are not programmed to answer to all of their customers' queries (if they do not recognize the keywords that are used by the customers), or may not be quick enough to deal with multiple questions at the same time.

Therefore, the quality of their conversations may be limited (Adamopoulou and Moussiades, 2020 Schuetzler et al. 2020; Sheehan et al. 2020; Wilkinson et al. 2021). Such automated technologies may not always be in a position to engage in non-linear conversations, especially when they have to go back and forth on a topic with online users (Thomaz et al. 2020; Van Pinxteren et al. 2020).

4. Theoretical and practical implications

This contribution confirms that recently there is a growing interest among academia as well as by practitioners on research that is focused on the use of chatbots that can improve the businesses' customer-centric services. It clarifies that various academic researchers have often relied on different theories including on the expectancy theory (Chopra, 2019), or on the expectancy violation theory (Crollic et al. 2021; Eren, 2021; Grimes et al. 2021), the human computer interaction theory/human machine communication theory (Lewis et al. 2019; Wilkinson et al. 2021), the social presence theory (De Cicco et al. 2020; Leung and Wen 2020; McLean et al. 2020; Schuetzler et al. 2020; Tsai et al. 2021), and/or on the social response theory (Adam et al. 2021; Huang and Lin 2011; Nass and Moon 2000; Nass et al. 1994), among others.

Currently, there are limited publications that integrated well-established conceptual bases (like those featured in Table 1), or that presented discursive contributions on this topic. Moreover, there are just a few review articles that capture, scrutinize and interpret the findings from previous theoretical underpinnings, about the use of responsive chatbots in service business settings.

This systematic review paper addresses this knowledge gap in the academic literature. It clearly differentiates itself from mainstream research as it scrutinizes and synthesizes the findings from recent, high impact articles on this topic. It clearly identifies the most popular articles from Scopus and Web of Science, and advances a definition about anthropomorphic chatbots, artificial intelligence chatbots (or AI chatbots), conversational chatbot agents (or conversational entities, conversational interfaces, conversational recommender systems or dialogue systems), customer experience with chatbots, chatbot customer service, customer satisfaction with chatbots, customer value (or the customers' perceived value) of chatbots, and on service robots (robot advisors). The researchers also discuss about the different attributes of conversational chatbots. They shed light on the benefits and costs of using interactive technologies to respond to online users' queries.

In sum, the findings from this research reveal that there is a business case for online service providers to utilize AI chatbots. These conversational technologies could offer technical support to consumers and prospects, on various

aspects, in real time, round the clock. Hence, service businesses could be in a position to reduce their labor costs as they would require fewer human agents to respond to their customers. Moreover, the use of interactive chatbot technologies could improve the efficiency and responsiveness of service delivery. Businesses could utilize AI dialogue systems to enhance their customer-centric services and to improve online experiences. These service technologies can reduce the workload of human agents. The latter ones can dedicate their energies to resolve serious matters, including the handling of complaints and time-consuming cases.

On the other hand, this paper also discusses potential pitfalls. Currently, there are consumers who for some reason or another, are not comfortable interacting with automated chatbots. They may be reluctant to engage with advanced anthropomorphic systems that use avatars, even though, at times, they can mimic human communications relatively well. Such individuals may still appreciate a human presence to resolve their service issues. They may perceive that interactive service technologies are emotionless and lack a sense of empathy.

Presently, chatbots can only respond to questions, keywords and phrases that they were programmed to answer. Although they are useful in solving basic queries, their interactions with consumers are still limited. Their dialogue systems require periodic maintenance. Unlike human agents they cannot engage in in-depth conversations or deal with multiple queries, particularly if they are expected to go back and forth on a topic.

Most probably, these technical issues will be dealt with over time, as more advanced chatbots will be entering the market in the foreseeable future. It is likely that these AI technologies would possess improved capabilities and will be programmed with up-to-date information, to better serve future customers, to exceed their expectations.

5. Limitations and future research avenues

This research suggests that this area of study is gaining traction in academic circles, particularly in the last few years. In fact, it clarifies that there were four hundred twenty-one 421 publications on chatbots in business-related journals, up to December 2021. Four hundred fifteen (415) of them were published in the last 5 years.

The systematic analysis that was presented in this research was focused on “chatbot(s)” or “chatterbot(s)”. Other academics may refer to them by using different synonyms like “artificial conversational entity (entities)”, “bot(s)”, “conversational avatar(s)”, “conversational interface agent”, “interactive agent(s)”, “talkbot(s)”, “virtual agent(s)”, and/or “virtual assistant(s)”, among others. Therefore, future researchers may also consider using these keywords when they are other exploring the academic and nonacademic literature on conversational chatbots that are being used for customer-centric services.

Nevertheless, this bibliographic study has identified some of the most popular research areas relating to the use of responsive chatbots in online customer service settings. The findings confirmed that many authors are focusing on the chatbots’ anthropomorphic designs, AI capabilities and on their dialogue systems. This research suggests that there are still knowledge gaps in the academic literature. Table 4 clearly specifies that there are untapped opportunities for further empirical research in this promising field of study.

Table 4. A research agenda on artificially intelligent chatbot technologies for automated customer services

Research areas that require further investigation	Focused research question
Conversational (and verbal) capabilities of chatbots	How and to what extent could chatbots utilize speech recognition software to simulate human conversations?
	How and to what extent could chatbots be capable of understanding the meanings of words and of engaging in natural conversations with online customers?
	Are the chatbots reactive or proactive in their responses to online customers' queries? To what extent can they be reactive or proactive?
	Are the conversational chatbots capable of handling complex queries and complaints? To what extent can they handle queries or complaints?
Anthropomorphic (visual and vocal) features and characteristics of chatbots	How and to what extent could the chatbots' vocal and visual features imitate human and customer services agents' responses?
	How and to what extent could chatbots mimic human-like characteristics in their communications with customers?

Customer perceptions about the chatbots' anthropomorphic features and characteristics	<p>Are online customers' perceptions about chatbots influenced by their anthropomorphic features (e.g. by the avatar's gender, age, race, ethnicity, accent)? Why?/Why not?</p> <p>Are online customers' perceptions about chatbots influenced by their anthropomorphic characteristics (e.g. empathetic tone of voice, disposition to assist, et cetera)? Why?/Why not?</p>
Effects of socio-demographic factors on customer perceptions about chatbots	<p>Which online customers are likely (or less likely) to engage with a chatbot? Why?/Why not?</p> <p>Are online customers willing to share information with a chatbot? Why?/Why not?</p> <p>Should online customers be notified that they are communicating with a chatbot? Why?/Why not?</p>
Customer perceptions about the acceptance and usefulness of chatbots	<p>Do online customers prefer availing themselves from chatbots or from human customer service agents? Why do they prefer chatbots over human agents, or vice versa?</p> <p>Which utilitarian factors are affecting the online customers' acceptance and usage of chatbots? Are these factors affecting customers' perceptions on chatbots? Why?/Why not?</p> <p>Are online customers perceiving chatbots as efficient, functional and responsive? Why?/Why not?</p> <p>What are the online customers' insights about the accuracy, reliability, adequacy, sufficiency and timeliness of the responses they receive from chatbots?</p> <p>Are chatbots delivering an added value to customers? Why?/Why not?</p> <p>Which factors are affecting the customers' perceived value of chatbots?</p> <p>Are the online customers willing to continue using chatbots? Why?/Why not?</p> <p>Which factors are affecting the online customers' intentions to use chatbots?</p> <p>Do online customers prefer to be serviced by a chatbot or by human agent (if they had to choose)? Why? / Why not?</p>
Customer perceptions about the service quality of chatbots	<p>How would online customers describe their experiences with chatbots? Are they experiencing positive or negative emotions (e.g. anxiety)? Why/Why not?</p> <p>Were online customers satisfied or dissatisfied by the service that was delivered by chatbots? Why?/Why not?</p>

Which factors are affecting the online customers' satisfaction levels with chatbots? Are they affected by their intelligence (e.g. verbal, vocal and visual cues, et cetera) or by their emotional dispositions (e.g. assertiveness, empathetic tone of voice, sociability, et cetera) of chatbots?

Which factors are affecting online customers' loyalty to the interface (e.g. website or SNSs like Facebook Messenger or Whatsapp) that connects them with service businesses' chatbots?

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