Factors Influencing Users' Adoption and Use of Conversational Agents:

A Systematic Review

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Abstract

As artificially intelligent conversational agents (ICAs) become a popular customer service solution for businesses, understanding the drivers of user acceptance of ICAs is critical to ensure its successful implementation. To provide a comprehensive review of factors affecting consumers' adoption and use of ICAs, this study performs a systematic literature review of extant empirical research on this topic. Based on a literature search performed in July 2019 followed by a snowballing approach, 18 relevant articles were analyzed. Factors found to influence human-machine cognitive engagement were categorized into usage-related, agent-related, user-related, attitude and evaluation, and other factors. This study proposed a collective model of users' acceptance and use of ICAs, whereby user acceptance is driven mainly by usage benefits, which are influenced by agent and user characteristics. The study emphasizes the proposed model's context-dependency, as relevant factors depend on usage settings, and provides several strategic business implications, including service design, personalization, and customer relationship management.

Keywords: intelligent conversational agent; chatbot; cognitive engagement; adoption; customer service; systematic review

1. Introduction

Advancements in artificial intelligence (AI), natural language processing (NLP), and voice recognition have led to increasing availability and use of conversational agents – systems or interfaces designed to simulate cognitive engagement with real humans in the form of conversations through text, voice, or both (Rubin, Chen, & Thorimbert, 2010). Conversational agents are representative intelligent agents with the ability to respond to users' requests in an intelligent way, learn users' preferences and behavior, and engage with users in conversations. Further, fast development in speech-related technologies has stimulated interest in voice-based conversational agents (typically presented in the form of voice assistants or intelligent personal assistants) that are able to automate and ease many of the users' daily tasks (Myers et al., 2007; Moriuchi, 2019), such as playing music, checking weather information, and controlling home ambiences. For the purposes of this study, three realms of cognitive engagement within the context of intelligent conversational agents (ICAs) were defined: (a) text-based chatbots (also known as chatterbots or bots), which sustain interaction purely through text-based inputs and outputs, and are mostly integrated into messaging apps or websites (e.g., WhatsApp, Facebook Messenger, WeChat); (b) voice-based chatbots or personal assistants (e.g., Apple's Siri, Amazon's Alexa, Google's Google Assistant); and (c) embodied conversational agents (e.g., robots), where the computer interface "is represented as a human body, and that uses its face and body in a human-like way in conversation with the user" (Foster, 2007, p. 306).

Powered by natural language processing (NLP) and machine learning (ML) tools, artificially intelligent conversational agents are gradually becoming a popular solution for many businesses to provide customer service. According to a Forbes Insight survey of 700 C-suite executives, 86 percent of companies that adopt AI to improve customer experience use chatbots

for customer service (Alger, 2018). Chatbots allow businesses to reduce traditional customer service costs by speeding up response times, answering up to 80 percent of routine questions to free up (human) agents from repetitive work to focus on and handle more complex client inquiries such as complaints (Reddy, 2017). From the customers' perspective, without the need to download an app, a chatbot enables 24/7 fast and convenient customer support, personalized cognitive engagement, and no waiting time (Akhtar, Neidhardt, & Werthner, 2019). As a result, it has been predicted that enterprises will create more chatbots than traditional mobile apps in the future (Brandtzaeg & Følstad, 2018). Furthermore, Gartner (2020) predicted that by 2022, 70 percent of customer interactions would involve emerging technologies such as machine learning applications, chatbots and mobile messaging, up from 15% in 2018.

As ICAs increasingly become a key player in marketing and customer relationship management, understanding the factors that influence customer adoption of ICAs and the willingness to use them is imperative for several reasons. Firstly, from the theoretical perspective, a better understanding of consumer attitude towards and adoption of novel technology, especially where technology agency plays a key role in the user experience (i.e., chatbots acting as customer service representatives), will be useful to evaluate the application of current frameworks and models of technology adoption and/or to identify the need to adjust or refine current models or to conceptualize a new one. From the practical viewpoint, identifying the factors that influence consumers to adopt and use ICAs will benefit both developers (i.e., design implications) and businesses looking to adopt these agents (i.e., strategic implications) in ensuring that the developed/implemented conversational agents will meet user requirements. However, there has been little research to date to systematically review what contributes to the adoption and use of ICAs from a user's perspective. Existing studies have primarily focused on

the acceptance and usage of ICAs in specific contexts, such as healthcare, education, and military (Vaidyam et al., 2019; Abdullah, Gaehde, & Bickmore, 2018; Laranjo et al., 2018; Tegos et al., 2016), or amongst specific populations, such as children, patients, and the elderly (Ring et al., 2015; Macedonia et al., 2014). Due to the often disciplinary-spanning and thus somewhat disjointed nature of extant research on this topic, there is a need to provide a more synthesized view of factors affecting consumers' adoption and use of ICAs in order to achieve the aforementioned theoretical and practical contributions. To that end, and in response to the aims of this Special Issue, this study performs a systematic review of extant empirical research on consumers' acceptance and willingness to use ICAs to systematically explore factors influencing cognitive engagement between humans and machines. In particular, this study employs the systematic review approach for several reasons: (1) it allows the performance of identifying specific articles and synthesizing collected evidence that fits the pre-specified inclusion criteria to answer a particular research question from many empirical studies and can provide evidence of effect to inform practice; (2) compared to conventional narrative reviews, it is the most accurate approach and offers more rigor in the research process, and (3) by using explicit, structured, clear and replicable reviewing procedures, it can provide reliable findings from which conclusions can be drawn and decisions made (Snyder, 2019).

This systematic review synthesizes extant studies quantitative, qualitative, and mixed methods studies that attempt to answer the following research question: What are the factors influencing consumers' intention to use ICAs? This study aims to provide an overview of factors that can facilitate or limit the implementation of ICAs in e-business settings and provide directions for further research within this particular area. Thus, using a systematic review can determine which antecedents promote acceptance and usage intention, and whether their effect

on acceptance and usage intention is consistent across the identified sources, and discover areas for future research to demonstrate the effect, with a power that no single study has. This systematic review was conducted following the guidelines of Higgins and Green (2011) and Kitchenham et al. (2009). First, we summarized the characteristics of the studies, including the type of ICAs examined, their users, interaction modes, contexts, and research methods. Then we analyzed the theoretical foundations of the selected studies and categorized the examined factors into five subcategories. Based on the theoretical frameworks used in the studies and the identified factors, we put forward a collective model capturing factors influencing users' adoption and use of ICAs. Drawing on our model, we provide strategic implications for businesses and marketing professionals to adopt and implement this technology.

2. Methodology

To offer a rigorous and up-to-date understanding of the factors that affect consumers' willingness to adopt conversational agents, this study followed a systematic literature review methodology grounded on previous studies (Higgins & Green, 2011; Kitchenham et al., 2009) following the guidelines provided by the seminal work of Kitchenham et al. (2007). The first step of the review was the development of the research protocol, which followed the Cochrane Collaboration approach (Higgins & Green, 2011). The protocol was created to guide the review and as a tool to avoid any potential biases from the researchers. This study was conducted by all co-authors whose research areas are on applications and implications of artificial intelligence in the service context.

2.1 Search Strategy

This systematic literature review addresses the following research question: "What are the factors influencing users' adoption of ICAs?" The main aim of the review was to identify a comprehensive list of factors influencing consumer adoption of ICAs. The literature search was conducted in July 2019 using all fields in the following three databases: Scopus, Web of Science, and Science Direct, following a predetermined search strategy and the search terms listed in Table 1. According to Martin-Martin (2018), although Google Scholar can find the majority of citations found by Web of Science (95%) and Scopus (92%) and has a large number of unique citations, about half of Google Scholar's unique citations are not from academic journals and a significant minority (19-38%) of them are not in English. In addition, it was also argued that there is no reliable and scalable method to extract data from Google Scholar, and the metadata offered is still limited, which reduces the practical suitability of this source for large-scale citation analyses (Martin-Martin, 2018). Furthermore, Gusenbauer and Haddaway (2020) demonstrated that Google Scholar is not appropriate as a principal search system. Therefore, Google Scholar was not selected as a search database in this study. Additionally, the researchers selected keywords based on the goal of this research and followed the requirement (e.g., word limits) in each database. More importantly, the search terms were chosen to narrow down the search outcome to relevant studies examining adoption and usage intention of ICAs as their outcome variable(s), instead of papers on general usage of ICAs or satisfaction with ICAs or other types of outcome variable/measure. Since different digital databases use search engines with different requirements, a preliminary search was conducted in each database to ensure the appropriateness and relevance of the adopted keywords. Due to the recent emergence and

availability of ICAs for general consumers, the search process focused on articles published after 2009 (the past ten years) to ensure the studies represent state-of-the-art research on this topic.

Table 1. Search Terms

Concepts	Keywords
#1 Intelligent agents	chatbot OR "voice assistant" OR "conversational agent"
#2 Adoption	adopt* OR accept* OR use
#3 User	user OR consumer OR customer
Search Strategy:	#1 AND #2 AND #3

2.2 Study Selection

Five co-authors together performed searches in the three digital libraries: Scopus, Web of Science, and Science Direct. These databases were selected as they cover a broad range of publications in many different areas and disciplines (Tsafnat et al., 2014; Wohlin, 2014). They are considered suitable as a principal search system in systematic review studies (Gusenbauer & Haddaway, 2020). According to Kitchenham et al. (2007), complementary searches are essential to conduct a full systematic literature review. The large variety of search databases have different interfaces and search algorithms, which allow for different string search terms. This often causes the search in databases very challenging and often result in missing out important literature (Wohlin, 2014). Additional search can be done through searching in reference lists and going backwards by following citations, thus performing a snowballing approach (Webster and Watson, 2002; Wohlin, 2014). Therefore, this review identified additional studies through snowballing by scanning reference lists and citations of articles identified from the databases.

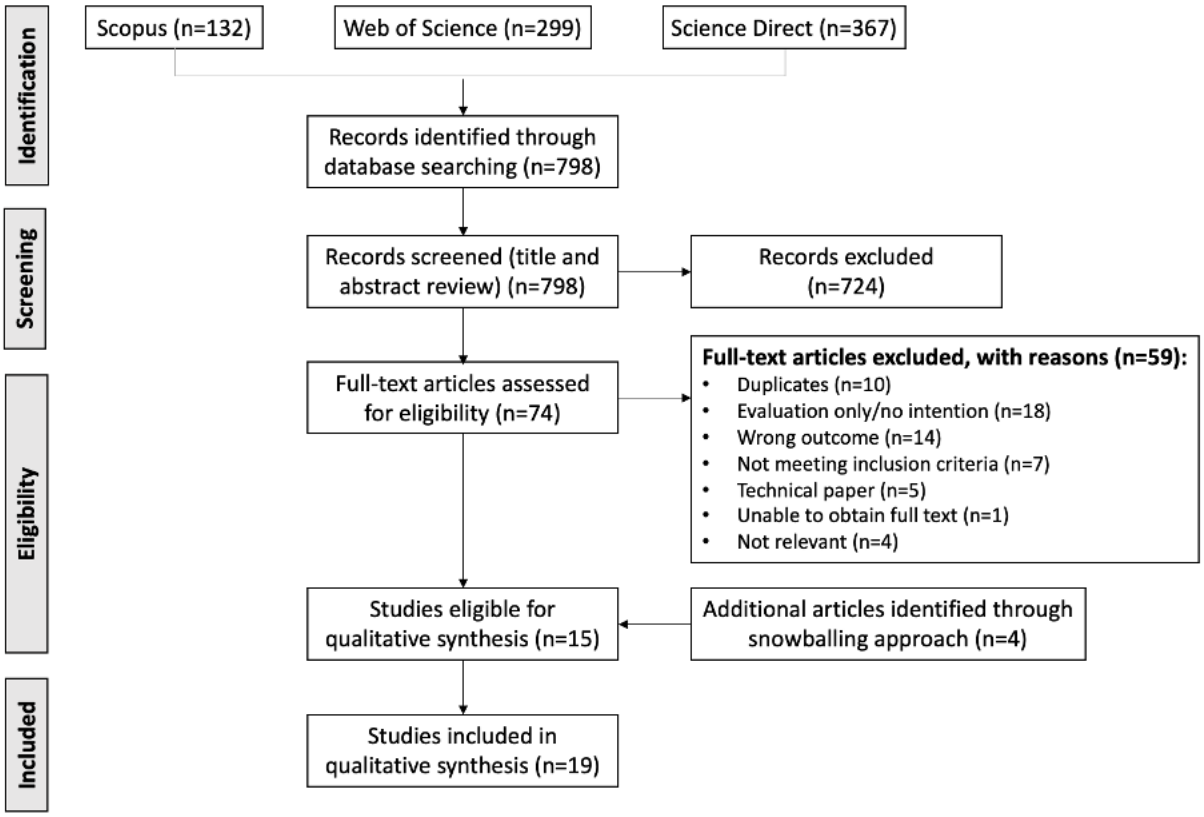
The database search resulted in 798 articles. These included 132 articles from Scopus, 299 articles from Web of Science, and 367 articles from Science Direct. Five co-authors conducted an initial screening of the articles' titles and abstracts. Each article was reviewed by

two co-authors separately; the two reviewers then compared their screening results and discussed any discrepancies and/or differences. A total of 74 articles passed the initial screening process and were subjected to a more detailed assessment of the full text. All studies (*N*=74) were assessed against a set of predetermined inclusion and exclusion criteria (see Table 2). The inclusion and exclusion criteria were defined and guided by the research question and purpose of the study, that is to explore the factors that influence consumers' adoption of ICAs in existing empirical studies. Failure to meet any inclusion criteria resulted in the exclusion of the study. Following the same procedure, each full-text article was reviewed by two co-authors independently; the two reviewers then compared and discussed their assessment results. Any apparent discrepancies during the selection process were resolved through discussion among all co-authors. It is important to note that despite there have been many studies on the topic of ICAs in the past ten years, most of their outcomes are user satisfaction or evaluation of ICAs, which were not aligned with the objective of this study, which is to assess intention to adopt or use ICAs. The number of excluded studies, including reasons for exclusion, were recorded at each stage of screening. The duplication check was manually conducted in each phase. Following the suggestion from Wohlin (2014) regarding the snowballing approach, i.e., using the reference list of a paper or the citations to the paper to identify additional papers for a literature review, this study identified additional studies from a forward snowballing search approach conducted in October 2019. This was conducted by checking the citations to the included papers identified through the database search. These papers were assessed using the same inclusion and exclusion criteria to determine whether they are qualified to be included in this systematic review. The final list of studies included in this review was 18 articles, 12 from the database search and six from the snowballing approach (see Figure 1).

Table 2. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
• All empirical studies, including grey literature; empirical studies conducting experimental manipulations and quasi-experimental variations; studies conducted in the laboratory, field, and online. • All types of end users who can make an independent adoption decision. • Studies using adoption and/or intention to use intelligent conversational agents as outcome variables. • Studies in different disciplines, using intelligent conversational agents designed to interact with users in any settings. • Studies using embodied (e.g., robots) or disembodied (e.g., chatbots) conversational agents, if the main focus of the study is in a conversational context.	• Studies published in languages other than English. • Studies published before 2009; they are not likely to be relevant to the objectives of this review, which focuses on emerging technology. • Conceptual/theoretical studies (i.e., without empirical evidence) related to the adoption and use of conversational agents. • Studies assessing outcome variables other than adoption, intention to adopt, and/or use (e.g. outcomes such as engagement, motivation, attitude, and satisfaction). • Studies using physical robots (machines) that do not have a conversational context (e.g. robot surgeon, robotic vacuum cleaner).

Figure 1. Systematic Review Process



2.3 Data Extraction, Analysis, and Synthesis

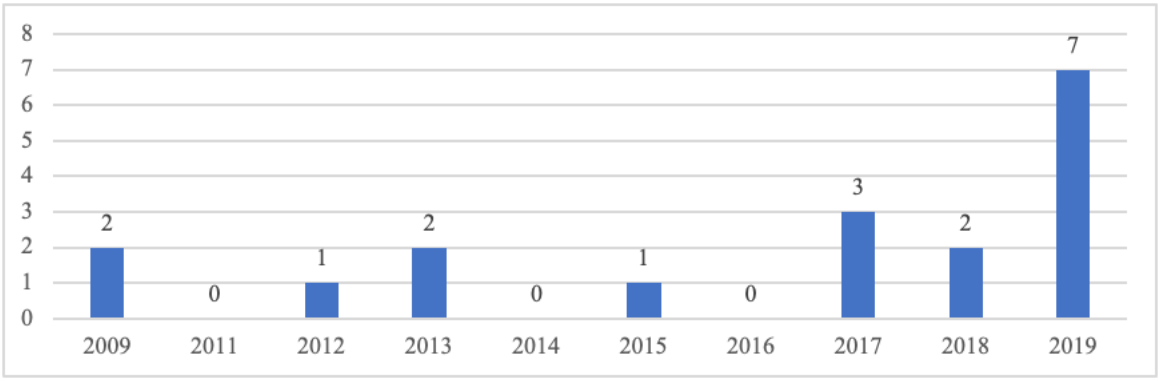
The selected studies (*N*=18) were assessed thoroughly for data extraction, which was performed manually using an extraction form to report full reference (i.e., author, year of publication, publication outlet), population of the study, context of the study, type of data collection method, theoretical model used, antecedents, mediators, moderators, outcomes, and findings of each study. Moreover, the review also reported effect sizes and coefficients as well as the direction and significance of any reported effects for potential statistical analysis. The availability of appropriate data and resources would determine the precise nature of the data analysis method. Each study was reviewed and assessed by two co-authors independently, both acted as data extractors and data checkers. Any discrepancies or disagreements were resolved through discussion. The information retrieved through the data extraction forms was thematically analyzed and synthesized to develop an integrative theoretical framework of the factors influencing consumers' intention to adopt and/or use intelligent conversational agents. Quantitative assessment through meta-analysis was deemed unviable due to the limited number of studies reporting effect sizes of the identified factors.

3. Findings

Most studies were published in 2019 (*N*=7), indicating that the topic of ICAs is only starting to garner interest amongst researchers recently (see Figure 2). These studies focused on different types of agents, including in-home voice assistants (e.g., Amazon Echo), virtual companions, virtual health counselor, social robots, digital pets, and chatbots embedded in various applications (e.g., Facebook chatbot, Slack chatbot). The usage settings range from general assistance to companionship and social support, to communication, decision support, and

customer service, as well as education. The populations included in these studies are general users/consumers, users of specific applications (e.g., Facebook users), students, and the elderly. Most studies use a survey or online questionnaire as their method, with a few using experiments in the laboratory or in the field and a few qualitative interviews. Table A1 in the Appendix presents the characteristics of the included studies.

Figure 2. Included Studies by Year of Publication



Comprehensively, this study categorized the antecedents of adoption or acceptance of ICA technologies identified from the studies into the following dimensions: usage-related factors, agent-related factors, user-related factors, attitude and evaluation factors, and other factors. Usage-related factors are associated with the processes and outcomes of using ICAs in context, assessing the agents in use. For example, perceived usefulness is considered a usage-related factor as it assesses the performance of ICAs for specific use contexts (i.e., an agent can be usable for one usage context, but not the other). Agent-related factors are associated with the characteristics of the ICAs regardless of usage context. For example, visual appearance is considered an agent-related factor as it is not dependent on any usage contexts. User-related factors are associated with the characteristics and traits of the users, such as gender and personal innovativeness. Attitude and evaluation factors represent user' attitude towards and evaluation of

the ICAs and/or their experience with the agents. The list of the factors can be found in Figure 3 while the summary of the findings is presented in Table 3.

Figure 3. List of Identified Factors

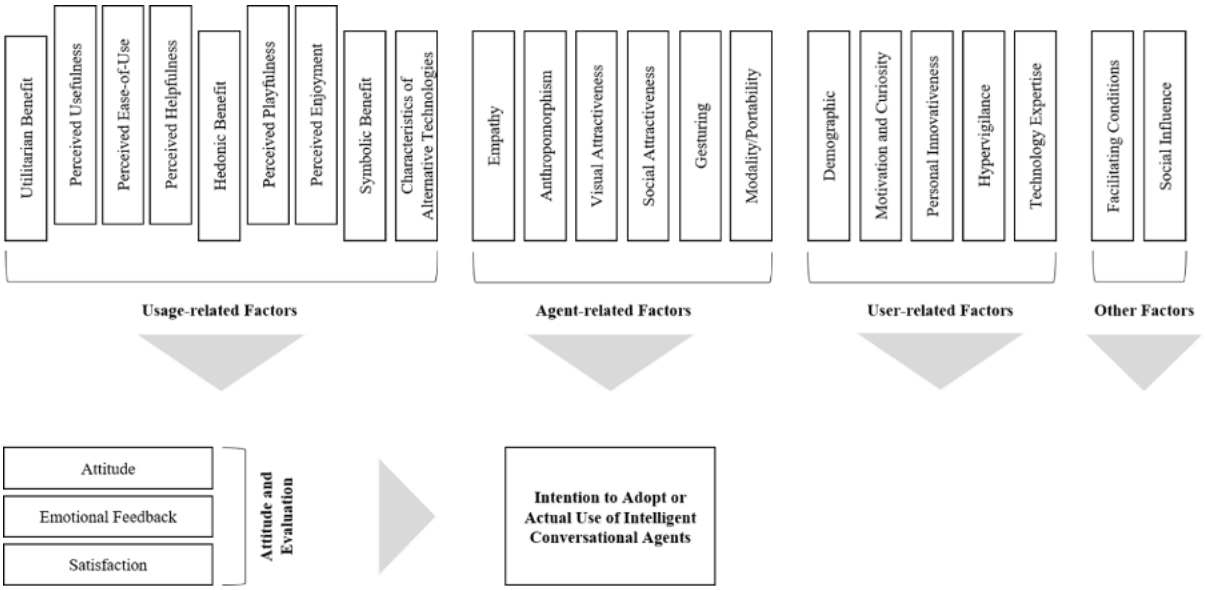


Table 3. Summary of Findings from the Included Studies

No	Study	Summary of Findings	Hypothesis	Result
1	Heerink et al., 2009	There is a significant correlation between social ability and intention to use screen agent amongst participants (elderly users). However, the correlation is not significant in the case of personal robot agent.	*Social Ability ↔ Intention to Use (+)*	*Partially Supported*
2	Pardo et al., 2009	The embodied conversational agent (ECA) group encountered fewer interaction problems compared to voice-only output. Users' impressions, however, were similar in both groups, with a slight advantage observed for the ECA group. The ECA seems to help users to better understand the flow of the dialogue and reduce confusion. Results also suggest that rejection (based on privacy and security concerns) is a dimension that may influence subjective evaluation parameters closely related to user acceptance.	n/a	n/a
3	Terzis, Moridis, & Economides, 2012	Emotional Feedback has a direct effect on Behavioral Intention to Use a Computer Based Assessment (CBA) system and on other crucial determinants of Behavioral Intention. The proposed acceptance model for Computer Based Assessment extended with the Emotional Feedback variable explains approximately 52% of the variance of Behavioral Intention.	*H1. Perceived Playfulness → Behavioral Intention to Use (+)* *H2. Perceived Usefulness → Behavioral Intention to Use (+)* H3. Perceived Usefulness → Perceived Playfulness (+) *H4. Perceived Ease of Use → Behavioral Intention to Use (+)* H5. Perceived Ease of Use → Perceived Usefulness (+) H6. Perceived Ease of Use → Perceived Playfulness (+) H7. Content → Perceived Usefulness (+) H8. Content → Perceived Playfulness (+) H9. Facilitating Conditions → Perceived Ease of Use (+) *H10. Emotional Feedback → Behavioral Intention to Use (+)* H11. Emotional Feedback → Perceived Playfulness (+) H12. Emotional Feedback → Perceived Usefulness (+) H13. Emotional Feedback → Perceived Ease of Use (+) H14. Emotional Feedback → Content (+) H15. Emotional Feedback → Facilitating Conditions (+)	*Supported* *Not supported* Supported *Supported* Not supported Supported Supported Supported *Supported* Supported Supported Supported Supported Supported
4	Wrobel et al., 2013	In the context of playing games, comparing between playing with laptop PC vs. robot vs. virtual agent, most participants reported that they preferred the laptop PC conditions. Intention to use the systems is highest on laptop, followed by robot and virtual agent. These differences, however, are not statistically significant.	n/a	n/a

No	Study	Summary of Findings	Hypothesis	Result
5	Amini, Lisetti, & Yasavur, 2013	The Drinker's Check-Up (DCU) has been reported to reduce alcohol consumption in problem drinkers. Comparing the same intervention delivered with DCU and with empathic and non-empathic ECAs, results show that the empathic virtual counselor has better acceptance than the other two systems.	n/a	n/a
6	Mäurer & Weihe, 2015	Motivated users evaluated acceptance and usefulness of *vpino*, a text-based natural language dialog system, quite positively. Users that are more open to computer-based decision support held better and more fruitful dialogs than those with a skeptical attitude; *vpino* shows good human like behavior whenever the user is serious and motivated; Users with a more hypervigilant approach to decisions particularly benefit from *vpino*.	n/a	n/a
7	Brandtzaeg & Følstad, 2017	The most frequently reported motivational factor driving chatbot use is "productivity"; chatbots help users to obtain timely and efficient assistance or information. Chatbot users also reported motivations pertaining to entertainment, social and relational factors, and curiosity about what they view as a novel phenomenon. Assuming motivations are factors/determinants of use, the findings pointed towards utilitarian and hedonic benefits, including curiosity that is linked to users' innovativeness.	n/a	n/a
8	Chi et al., 2017	Benefits are assumed as factors of acceptance or use. Most of the participants enjoyed the companionship, entertainment, reminders, and instant assistance from the digital pet. However, participants identified limited conversational ability and technical issues as system challenges. Privacy, dependence, and cost were major concerns.	n/a	n/a
9	Lee & Choi, 2017	The interactional effect of self-disclosure and reciprocity on user satisfaction was not significant, but the main effects proved to be both significant. PLS analysis results showed that perceived trust and interactional enjoyment are significant mediators in the relationship between communication variables and user satisfaction. In addition, reciprocity is a stronger variable than self-disclosure in predicting relationship building between an agent and a user. Finally, user satisfaction is an influential factor of intention to use. These findings have implications from both practical and theoretical perspective.	H1. Self-disclosure → Intimacy (+) H2. Self-disclosure → Trust (+) H3. Self-disclosure → Interactional Enjoyment (+) H4. Reciprocity → Intimacy (+) H5. Reciprocity → Trust (+) H6. Reciprocity → Interactional Enjoyment (+) H7. Intimacy → User Satisfaction (+) H8. Trust → User Satisfaction (+) H9. Interactional Enjoyment → User Satisfaction (+) *H10. User Satisfaction → Intention to Use (+)*	Not supported Supported Supported Supported Supported Supported Not supported Supported Supported *Supported*

No	Study	Summary of Findings	Hypothesis	Result
10	Tsiourti et al., 2018	Overall, users were positive with regards to accepting the agent in their households. The interaction with the system was perceived as "average" positive, but with a high variation between settings. User acceptance decreases over time due to negative evaluation of interactions, prompting the need for more variety in speech commands and overall robustness of the system (e.g., fault-free).	n/a	n/a
11	Zarouali et al., 2018	Two cognitive (i.e., perceived usefulness and perceived helpfulness) and all three affective predictors are positively related to consumers' attitude toward the chatbot brand; Attitude toward the brand explained a significant amount of variation in consumers' patronage intention; All the significant determinants also have an indirect effect on patronage intention, mediated through attitude toward the brand.	H1. Perceived Usefulness → Attitude toward Brand (+) H2. Perceived Ease of Use → Attitude toward Brand (+) H3. Perceived Helpfulness → Attitude toward Brand (+) H4. Pleasure → Attitude toward Brand (+) H5. Arousal → Attitude toward Brand (+) H6. Dominance → Attitude toward Brand (+) *H7. Attitude toward the chatbot brand → Patronage Intention (+)* H8a. Attitude toward brand mediates the effects of cognition *H8b. Attitude toward brand → patronage intention*	Supported Not supported Supported Supported Supported Supported *Supported* Partly supported *Supported*
12	Gursoy et al., 2019	Customers go through a three-step acceptance generation process in determining whether to accept the use of AI devices during their service interactions; Social influence and hedonic motivation are positively related to performance expectancy while anthropomorphism is positively related to effort expectancy. Both performance and effort expectancy are significant antecedents of customer emotions, which determines customers' acceptance of AI device use in service encounters.	H1. Social Influence → Performance Expectancy (+) H2. Social Influence → Effort Expectancy (-) H3. Hedonic Motivation → Perceived Performance Expectancy (+) H4. Hedonic Motivation → Perceived Effort Expectancy (-) H5. Anthropomorphism → Perceived Performance Expectancy (-) H6. Anthropomorphism → Perceived Effort Expectancy (+) H7. Performance Expectancy → Positive Emotions (+) H8. Effort Expectancy → Positive Emotions (-) *H9. Emotion → Willingness to accept the use of AI devices (+)* H10. Emotion → Objection to the use of AI devices (-)	Supported Not supported Supported Supported Not supported Supported Supported Supported *Supported* Supported

No	Study	Summary of Findings	Hypothesis	Result
13	Lu, Cai, & Gursoy, 2019	A 36-item six-dimensional SRIW scale was developed, which includes performance efficacy, intrinsic motivation, anthropomorphism, social influence, facilitating condition, and emotions. The SRIW scale demonstrates rigorous psychometric properties per findings of construct validity and reliability tests, and invariance analysis across four service industries (e.g., hotels, restaurants, airlines, and retail stores) where service robots have already been or are likely to be launched.	*H1. Performance Efficacy → Willingness to Use Service Robots (+)* *H2. Intrinsic Motivation → Willingness to Use Service Robots (+)* *H3. Anthropomorphism → Willingness to Use Service Robots (+)* *H4. Social Influence → Willingness to Use Service Robots (+)* *H5. Facilitating Conditions → Willingness to Use Service Robots (+)* *H6. Emotions → Willingness to Use Service Robots (+)*	*Supported* *Supported* *Not supported* *Not supported* *Supported* *Supported*
14	McLean & Osei-Frimpong, 2019a	Individuals are motivated by the (1) utilitarian benefits, (2) symbolic benefits and (3) social benefits provided by voice assistants, the results found that hedonic benefits only motivate the use of in-home voice assistants in smaller households. Additionally, the research establishes a moderating role of perceived privacy risks in dampening and negatively influencing the use of in-home voice assistants.	*H1. Utilitarian Benefits → Usage of in-home Voice Assistants (+)* *H2. Hedonic Benefits → Usage of in-home Voice Assistants (+)* *H3. Symbolic Benefits → Usage of in-home Voice Assistants (+)* *H4. Social Presence → Usage of in-home Voice Assistants (+)* *H5. Social Attraction → Usage of in-home Voice Assistants (+)* *H6a. Utilitarian Benefits X Perceived Privacy Risks → Usage of in-home Voice Assistants (-)* *H6b. Hedonic Benefits X Perceived Privacy Risks → Usage of in-home Voice Assistants (-)* *H6c. Symbolic Benefits X Perceived Privacy Risks → Usage of in-home Voice Assistants (-)* *H6d. Social Presence X Perceived Privacy Risks → Usage of in-home Voice Assistants (-)* *H6e. Social Attraction X Perceived Privacy Risks → Usage of in-home Voice Assistants (-)*	*Supported* *Not supported* *Supported* *Supported* *Supported* *Supported* *Supported* *Supported* *Supported*
15	McLean & Osei-Frimpong, 2019b	The findings outline eight variables related to performance of a website that motivate the use of a live chat function, accounting for 71% explained variance (see next column). The research illustrates the variables influencing such use is dependent on the context for initiating the chat discussion, namely for search/navigation support or decision support. The paper illustrates the role of online live chat as a service recovery tool and a service feedback tool.	*H1. Negative perception of website aesthetics → Use of live chat (+)* *H2. Perceived lack of customization → Use of live chat (+)* *H3. Perceived ease of use → Use of live chat (+)* *H4. Perceived usefulness → Use of live chat (+)* *H5. Perceived info quality → Use of live chat* *H6. Perceived low web credibility → Use of live chat (+)* *H7. Perceived timeliness → Use of live chat (+)* *H8. Dissatisfaction with experience → Use of live chat (+)*	*Supported* *Supported* *Supported* *Supported* *Supported* *Supported* *Supported* *Supported*
16			H1. Innovativeness → Perceived Usefulness (+)	Supported

No	Study	Summary of Findings	Hypothesis	Result
	Richad et al., 2019	Innovativeness, perceived usefulness, perceived ease of use and attitude towards using the chatbot positively affected behavioral intention.	H2. Innovativeness → Perceived Ease of Use (+)	Supported
			H3. Perceived Ease of Use → Perceived Usefulness (+)	Supported
			H4. Perceived Usefulness → Attitude Towards Using (+)	Supported
			H5. Perceived Ease of Use → Attitude Towards Using (+)	Supported
			H6. Attitude Towards Using → Behavioral Intention (+)	*Supported*
17	Rietz, Benke, & Maedche, 2019	Anthropomorphic design features have a significant effect on perceived usefulness, with a strength four times the size of the effect of functional chatbot features. Perceived usefulness and perceived ease-of-use were identified as having at least a small effect on behavioral intention, while perceived enjoyment has a negligible but positive effect on behavioral intention.	H1. Anthropomorphic chatbot design features → Perceived Enjoyment (+)	Supported
			H2. Anthropomorphic chatbot design features → Perceived Ease of Use (+)	Not supported
			H3. Anthropomorphic chatbot t design features → Perceived Usefulness (+)	Not supported
			H4. Functional chatbot design features → Perceived Ease of Use (+)	Supported
			H5. Functional chatbot design features → Perceived Usefulness (+)	Supported
			H6. Functional chatbot design features → Perceived Enjoyment (+)	Not supported
			Perceived Ease of Use → Perceived Usefulness (+)	Supported
			Perceived Ease of Use → Perceived Enjoyment (+)	Supported
			Perceived Usefulness → Behavioral Intention (+)	*Supported*
			Perceived Ease of Use → Behavioral Intention (+)	*Supported*
			Perceived Enjoyment → Behavioral Intention (+)	*Supported*
18	Yang & Lee, 2019	Perceived usefulness and enjoyment have a significant impact on usage intention of virtual personal assistant (VPA). Among the three constructs reflecting software- and hardware-based utilitarian value, content quality has the strongest impact on perceived usefulness. From the perspective of hedonic value, content quality, which is also a utilitarian attribute of VPA devices, and visual attractiveness positively affect perceived enjoyment.	*H1. Perceived Usefulness → Behavioral Intention to Use (+)*	*Supported*
			H2. Perceived Enjoyment → Behavioral Intention to Use (+)	*Supported*
			H3. Portability → Perceived Usefulness (+)	Not supported
			H4. Automation → Perceived Usefulness (+)	Supported
			H5. Content Quality → Perceived Usefulness (+)	Supported
			H6. Content Quality → Perceived Enjoyment (+)	Supported
			H7. Visual Attractiveness → Perceived Enjoyment (+)	Supported

3.1 Theoretical Foundation

As the types and effects of factors influencing consumer adoption of ICAs vary depending on the theoretical lenses used by the researchers, it is important to provide a review of the theoretical foundations used in these studies to situate the relevance of the identified factors in these theories. Most studies share common theoretical foundations based largely on the Technology Acceptance Model (TAM) (Davis, 1989) and its subsequent modifications, such as the TAM2 (Venkatesh & Davis, 2000), TAM3 (Venkatesh & Bala, 2008), Unified Theory of Technology Use and Acceptance (UTAUT) (Venkatesh et al., 2003), and UTAUT2 (Venkatesh, Thong, & Xu, 2012). These well-established frameworks developed in the domains of Management Information Systems (MIS) and Human-Computer Interactions (HCI) are based on the Theory of Reasoned Action (Ajzen & Fishbein, 1980) and Theory of Planned Behavior (Ajzen, 1985) developed in Psychology. Other studies rely on the following theoretical frameworks to explain the influencing factors of intention to use ICAs: Consumer Acceptance of Technology Model (CAT-Model) (Kulviwat et al., 2007), Computer Based Assessment Acceptance Model (CBAAM) (Terzis & Economides, 2011), Uses and Gratification Theory (UGT) (Katz & Blumler, 1974), Media Equation Theory and Computer as Social Actor (CASA) Paradigm (Nass & Moon, 2000; Reeves & Nass, 1996), and Uncanny Valley Theory (Mori, 1970).

As proposed in the various theoretical frameworks, several antecedents of usage intention or actual use of ICAs were identified in these studies. TAM posits that the core constructs of perceived ease-of-use, defined as the degree to which a person believes that the interaction with the system would be easy, and perceived usefulness, defined as the degree to which a person believes that using a particular system will enhance their job performance, influence attitude towards a technology, and that this formed attitude subsequently influences an individual's

intentions and behavior to use a technology (Davis, 1989). In UTAUT, behavioral intention is posited to be influenced by performance expectancy, effort expectancy, and social influence, while facilitating condition is suggested to influence actual use behavior. While these factors can be considered utilitarian benefits, hedonic benefits such as emotional experience, enjoyment, and pleasure are suggested in TAM2 (Venkatesh & Davis, 2000), UTAUT (Venkatesh, et al., 2003), and UTAUT2 (Venkatesh, Thong, and Xu, 2012) to influence intention to use technology. Similarly, the CAT-Model (Kulviwat et al., 2007) proposes cognitive (i.e., perceived usefulness, perceived ease-of-use, relative advantage) and affective (i.e., pleasure, arousal, dominance) determinants of consumers' attitude towards technology and, in turn, adoption intention. CBAAM (Terzis & Economides, 2011) combines antecedents from TAM and UTAUT, extending them to include perceived playfulness.

Uses and Gratification Theory (UGT) (Blumler & Katz, 1974) explains peoples' motivation to use technology to fulfill specific social and psychological needs, and that the use of technology depends on the expected gratification it will provide. Utilized as a foundation in qualitative research, UGT elucidates why and how users adopt ICAs, clarifying the underlying gratification users seek from such adoption, including productivity, entertainment, and curiosity. These motivations, which constitute the various benefits of using conversational agents (e.g., utilitarian, hedonic, symbolic), are considered influential to adoption.

The Media Equation Theory and Computer as Social Actor (CASA) Paradigm (Nass & Moon, 2000; Reeves & Nass, 1996) postulates that users tend to anthropomorphize machines and thus react in the same way they do to humans when interacting with technology. Relatedly, Uncanny Valley Theory (Mori, 1970) suggests that as the human likeness of ICAs increases, so does user's emotional response to the agents, but only to a point. When non-human agents start

to resemble humans too closely, they will risk eliciting negative emotional responses as users find them too eerie and uncomfortable (Mori, 1970). The characteristics of ICAs, such as their appearances and anthropomorphism, were therefore suggested in some of these theories as influencing users' acceptance of the technology.

3.2 Usage-related Factors

A dominant category of the factors influencing adoption and use of ICAs is usage-related factors. These factors encompass how the technology (e.g., ICA) is deployed and the end users' evaluations of how the technology performs in a specific usage context. Most of these factors are based on TAM and its derivatives (Venkatesh, Thong, & Xu, 2012; Venkatesh & Bala, 2008; Venkatesh et al., 2003; Venkatesh & Davis, 2000; Davis, 1989) with perceived ease-of-use and perceived usefulness identified in most studies as significant factors influencing intention to adopt and use ICAs (Rietz, Benke, & Maedche,2019; Yang & Lee, 2019; Terzis, Moridis & Economides, 2012).

Closely related to perceived usefulness, performance expectancy (i.e., the degree to which ICAs are perceived to complete certain tasks more efficiently than humans) was found to positively influence users' willingness to use ICAs (Lu, Cai, & Gursoy, 2019). Renaming performance expectancy to utilitarian benefits, McLean and Osei-Frimpong (2019a) also found them to have a direct positive effect on usage (McLean and Osei-Frimpong, 2019a). Additionally, Zarouali et al. (2018) found perceived helpfulness as a having an indirect positive effect on intention to use ICAs. Though closely related to perceived usefulness, perceived helpfulness is conceptualized as a distinct construct defined as the degree to which the responses

of the agent are perceived to be relevant, hereby resolving consumers' need for information (Johnson, Bruner, & Kumar, 2006).

Similarly, studies also found that perceived ease-of-use and perceived usefulness of alternative technologies have an opposite effect on intentions to use ICAs. That is, as users' perceived ease of use and usability of an alternative system (e.g., a website) decrease, usage intention would increase (McLean & Osei-Frimpong, 2019b). In addition to directly influencing behavior intentions, perceived ease-of-use and perceived usefulness also have positive moderating and/or mediating effects on other factors influencing intention to use or adopt ICAs. Perceived ease-of-use and perceived usefulness are both found to have a positive impact on other factors such as perceived playfulness (Terzis, Moridis, & Economides, 2012), perceived enjoyment (Rietz, Benke, & Maedche, 2019), and attitude toward using ICAs (Richad et al., 2019; Zarouali et al., 2018).

In addition to perceived ease-of-use and perceived usefulness, another antecedent of consumers' intention to use ICAs is hedonic benefit (McLean & Osei-Frimpong, 2019a). However, the analysis conducted by McLean and Osei-Frimpong (2019a) was unable to find empirical support for the hypothesized positive relationship between hedonic benefit and usage intention. Interestingly, Terzis, Moridis & Economides (2012) did find that the similar construct of perceived playfulness can explain intention to use ICAs. According to Terzis, Moridis, and Economides (2012), there are three dimensions to perceived playfulness based on Moon and Kim's (2001) extension of TAM: concentration – whether the user is concentrated on the activity, curiosity – whether the user's cognitive curiosity is aroused, and enjoyment – whether the user enjoys the interaction with the system. Different from McLean and Osei-Frimpong (2019a), Terzis, Moridis, and Economides (2012)'s study on embodied ICAs did find a positive

correlation between perceived playfulness and intention to use, and, interestingly, the effect of perceived playfulness was found to be stronger than both perceived ease-of-use and perceived usefulness. However, Rietz, Benke, and Maedche (2019) did not find a significant relationship between perceived enjoyment and behavior intention, which was observed in previous studies.

Social factors related to usage may also be important antecedents to use or acceptance of ICAs. For example, McLean and Osei-Frimpong (2019a) found symbolic benefit had a positive correlation with usage intention of in-home voice ICAs. In their research McLean and Osei-Frimpong (2019a) draw upon the work of Goodin (1977) to define symbolic benefit as the extent to which an individual perceives to gain a symbolic reward such as making a favorable impression on others (Richad et al., 2019; Zarouali et al., 2018). These findings suggest that usage of ICAs will increase when users perceive that their association with the technology will improve their social status or image.

Lastly, there is a final sub-group of usage-related factors influencing acceptance of ICAs that relate to the relative service quality of an encounter with alternative technology solutions. Negative perceptions of a website's servicescape characteristics, such as perceived ease-of-use and perceived usefulness, which have already been discussed, are found to increase the usage intention of ICAs (McLean & Osei-Frimpong, 2019a). Based upon the Web-Site Success (WSS) factors developed by Liu and Arnett (2000) and Torkzadeh and Dhillon (2002), and Information System Success dimensions of Delone and McLean (2003), additional website servicescape characteristics found to be significant by McLean and Osei-Frimpong (2019a) include perceived website aesthetics, perceived customization, perceived timeliness, perceived information quality, and perceived website credibility. Aesthetic cues include the design, color scheme, and layout of a website (Martin et al., 2015), while customization refers to the degree to which an individual's

preferences are met (Gummerus et al., 2004; Zeithaml et al., 2000) and timeliness is the meeting of expectations for the time required to complete a task (Dixon & Verma, 2013). Information quality is based upon the accuracy, relevance, and up-to-datedness of information provided and is closely related to information usefulness (Flanagin & Metzger, 2007) and website credibility is a related subjective evaluation of the trustworthiness of information often based upon surface characteristics (Flanagin & Metzger, 2007). Among the above servicescape factors identified by McLean and Osei-Frimpong (2019a), timeliness is found to have the greatest influence, suggesting that users' impatience and dissatisfaction with the time need to get information from traditional websites may be another crucial factor driving the adoption of ICAs.

3.3 Agent-related Factors

This review identified several agent-related factors influencing intention to use ICAs. In general, these factors reflect the designed appearance, movement, likability, and social behavior of ICAs. Most of these factors were found to have an indirect effect on intention to use ICAs. In terms of appearance, Yang and Lee (2019) found visual attractiveness of product design and user interfaces to positively impact perceived enjoyment, and, consequently, intention to use ICAs. Besides sole aesthetics, another major consideration was found to be anthropomorphism, the degree to which ICAs exhibit human-like physical characteristics such as a head, face, arms, or hands (Lu, Cai, & Gursoy, 2019). Lu, Cai and Gursoy (2019) found that high levels of anthropomorphism negatively affected users' acceptance of service robots. Similarly, Brandtzaeg and Følstad (2017) and Tsiourti et al. (2018) found that users, when presented with highly anthropomorphized agents, had higher expectations for the interaction than when presented with less human-like agents. When human-like agents subsequently failed to meet the users'

expectations, intention to use plummeted. Comparing between voice-only and embodied ICAs designed to display gestures and other behaviors to emulate face-to-face communication, Pardo et al. (2009) reported similar findings, in that embodied ICAs may generate higher expectation amongst users, leading to users being less impressed with the embodied ICAs' performance. The discussions around agents' appearance are largely centered on the Media Equation Theory or CASA paradigm (Nass & Moon, 2000; Reeves & Nass, 1996) and the seminal work of Mori (1970), the Uncanny Valley Theory.

Additionally, several studies noted anthropomorphism to include physical actions (e.g., gesturing) as well as behavioral and perceptual factors, such as empathy and social ability. First, Amini, Lisetti and Yasavur (2013) found strong evidence of the positive effect of empathy (i.e., agents' empathizing ability) on users' intention to use ICAs. In a similar vein, McLean and Osei-Frimpong (2019a) hypothesized and subsequently proved a positive effect between agents' social presence as well as its social attractiveness on usage. Comparing between personal robots and screen agents, Heerink et al. (2009) found a significant positive correlation between social ability, defined as ability to employ human-like cues and communication modalities, and intention to use screen agents in the context of eldercare. However, the correlation is not significant in the case of personal robot agent. Yang and Lee (2019) looked at the portability of voice-based ICAs (e.g., Google Home, Amazon Echo) and concluded that being able to move agents around does not influence perceived usefulness nor intention to use. Finally, Wrobel et al. (2013) focused on modality of the agents, comparing laptop PC, robot, and virtual agent in terms of users' intention to use these agents to play games. They found that intention to use was higher in the laptop PC condition. Relatedly, studying interactions with conversational digital pets, Chi et al. (2017) reported users having difficulties developing human-pet relationship due the agent

lacking pet-like features (e.g., something to pat). This is considered a challenge for user acceptance of the ICA.

3.4 User-related factors

Several user-related factors were identified to impact usage intention and acceptance of ICAs. These included demographic factors such as gender, age, and household size, users' expertise with technology, as well as several psychological factors reflecting users' current or inherent mental and emotional states (i.e., cognitive/utilitarian or emotional/hedonic) and intrinsic motivation (Gursoy et al., 2019; Lu, Cai, & Gursoy, 2019). In terms of demographics and technology expertise, McLean and Osei-Frimpong (2019a) found gender, age, and familiarity with technology (regardless of the degree of familiarity) to have no effect on the use of ICAs but noted that household size positively impacted acceptance with the effect being strongest in the case of larger households (three or more persons). In terms of psychological factors, Brandtzaeg and Følstad (2017) and Tsiourti et al. (2018) found users' level of curiosity to be a key factor in predicting their engagement with novel technology, including ICAs. In these studies, curiosity refers to users' inherent characteristics as opposed to the reactions to interaction with ICAs (i.e., interacting with an ICA sparks curiosity). In a similar vein, Lu, Cai and Gursoy (2019) found intrinsic motivation to be positive antecedents of users' willingness to use service robots. Richad et al. (2019) found users' personal innovativeness to positively impact their attitude towards using ICAs, leading to positive behavioral intention, while Gursoy et al. (2019) established that hedonic motivation positively impacts performance expectancy of ICAs but has a negative impact on the perceived effort expectancy of their use. Lastly, Mäurer and Weihe (2015) found that users' hypervigilance (i.e., their inner state of increased alertness) as it relates to decision-

making (i.e., users with a more hurried and anxious approach to decisions) positively impacted their evaluation of acceptance and usefulness of ICAs.

3.5 Attitude and Evaluation Factors

Several attitude and evaluation factors were identified from the included studies, some of them as mediating the effects of the previously discussed antecedents (usage-, agent-, and user-related factors) on intention to use or acceptance of ICAs. These factors include users' attitude and emotional reactions toward the use of ICAs and satisfaction/dissatisfaction with the ICAs. Zarouali et al. (2018) estimated the link between attitude and intention to use a Facebook chatbot. In their study, attitude toward brands providing the chatbot (i.e., instead of attitude towards the chatbot) was conceptualized and assessed as a mediating variable between cognitive and affective determinants and intention to use chatbots. The elements of cognitive determinants included in this study are in line with the previously discussed usage-related factors (i.e., perceived usefulness, perceived ease-of-use, and perceived helpfulness). The affective determinants represent users' emotional feedback while interacting with a chatbot, measured through the pleasure, arousal, and dominance (PAD) dimensions of emotion (Mehrabian & Russell, 1974). The findings indicated that attitude toward brands providing a chatbot strongly influences intention to use the chatbot in a positive way. Lu, Cai, and Gursoy (2019) define and assess the determinants of willingness to use intelligent service robots amongst general users. In addition to the user- (e.g., intrinsic motivation), usage- (e.g., performance efficacy/utilitarian benefits) and agent-related factors (e.g., anthropomorphism), emotion (i.e., users' emotional states while interacting with the ICAs, which is akin to the measures used in Zarouali et al.'s [2018] study) was considered an influencing factor with direct effects on acceptance. That is,

higher expectation of positive emotions while using ICAs leads to higher willingness to the use the ICAs.

Drawing on the media equation theory (Nass & Moon, 2000; Reeves & Nass, 1996), Lee and Choi (2017) demonstrated how the relationship between user and ICAs (i.e., usage-related factors) determine user satisfaction and intention to use the ICAs. Using Amazon Echo and a movie recommendation system as their research context, they found a strong positive relationship between satisfaction of using the system and intention to use it again in the future. In this case, satisfaction with using ICAs mediates the relationships between usage-related factors and intention to use the ICAs. Consistent with the discussion in usage-related factors regarding the characteristics of alternative technologies, McLean and Osei-Frimpong (2019b) showed that dissatisfaction with the customer service through a website increased the use a live chat function. In this vein, dissatisfaction with an alternative (traditional) means of online customer service (i.e., a website) positively influence intention to use ICAs. Dissatisfaction with other (alternative) technologies was conceptualized and tested as having a direct effect on the use of ICAs.

3.6 Other factors

Two factors that are not part of the previous categories, both of which are elements of the UTAUT and UTAUT2 models (Venkatesh, et al., 2003; Venkatesh, Thong, & Xu, 2012), were tested in the included studies: facilitating conditions (i.e., available resources that would facilitate the use of technology) and social influence (i.e., the extent to which users' social networks believe they should use the technology). Lu, Cai, and Gursoy (2019) found facilitating conditions to positively influence willingness to ICAs, while social influence was not.

3.7 General Discussion

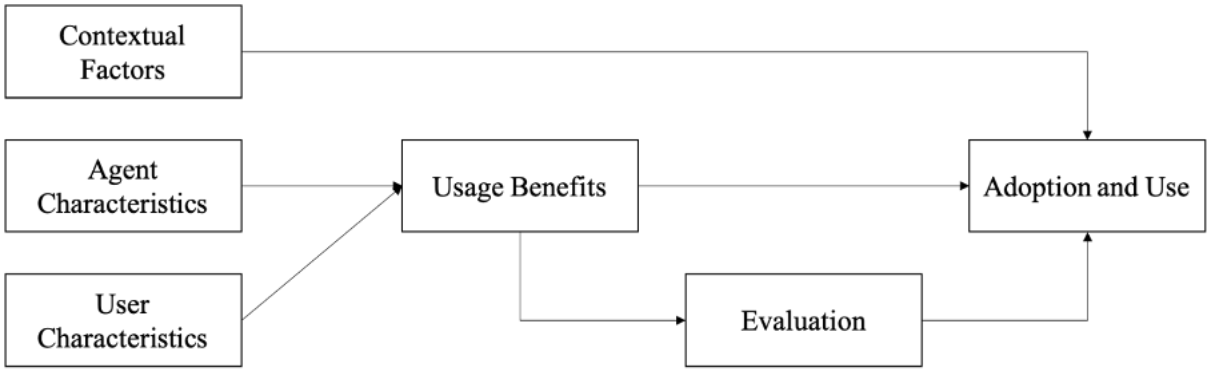
This systematic review aimed to identify factors that influence consumer adoption and use of ICAs from relevant empirical studies identified in extant literature. This review has extracted a range of factors that drive, facilitate, and hinder the adoption of ICAs in various consumption settings. To explain the successful cognitive engagement between ICAs and their users, this review suggests the crucial role of usage-related factors as they represent the *reasons* for usage and, thus, engagement, i.e., the benefits of using ICAs for consumers. However, to *enable* and *ease* the cognitive engagement process, important psychological (user-related) factors, such as motivation and curiosity, personal innovativeness, and hypervigilance (i.e., as hindrance) are met with the features of ICAs (agent-related factors) that are conducive to sustained human–machine engagement, including empathy, social attractiveness, gesturing, anthropomorphism, etc. It is important to note that most studies dealt with one-to-one human-machine engagement, even for interactions that requires specific social behavior (ICAs as companions). Therefore, the social aspects of cognitive engagement with ICAs mainly refer to user–ICA socialness. Factors such as social influence that explains users' social network was not found significant in influencing adoption of ICAs. Overall, these factors contribute to consumer evaluation of ICAs and eventually their willingness to adopt and use ICAs in various service settings.

Based on the review results, two guidelines are provided in the next sections: (1) a collective model of consumer adoption of ICAs, summarizing the influential factors, to provide a theoretical foundation for future research on ICAs adoption and (2) a design framework for ICAs-as-a-Service to guide the future development of ICAs for marketing, customer relationship management, and other services.

4. Theoretical Implications: A Collective Model

Based on the theoretical frameworks used in the studies and the identified factors described previously, this study contributes to literature on consumers cognitive engagement with ICAs by suggesting a collective model measuring users' adoption and use of ICAs (see Figure 4). The main antecedent of user adoption and use is usage benefits, which is the extent to which using ICAs brings various benefits to its users. Thus, the construct manifests in users' perception of the levels of benefits gained from using ICAs. These benefits include utilitarian, hedonic, and symbolic benefits, consistent with those referring to Uses and Gratification Theory, suggesting its operationalization into a multidimensional construct (i.e., second-order construct) consisting of several first-order variables. Based on the analyzed studies, usage benefits could have a direct effect on adoption and use (e.g., intention to or actual use) as well as an indirect effect through attitude and evaluation of the conversational agent (e.g., user satisfaction).

Figure 4. A Collective Model Measuring User Adoption and Use of ICAs



Importantly, from the findings of the included studies, it can be suggested that usage benefits are influenced by the characteristics of the ICAs and those of the users. For example, ICAs' appearance and social/conversational ability (to generate perceptions that ICAs can act "independently", which is a manifestation of agency) will contribute positively to hedonic

benefits of using ICAs in social usage settings (e.g., companionship). At the same time, these benefits will be affected by the extent to which users are intrinsically motivated to interact with the ICAs and/or their degree of technology self-efficacy (i.e., expertise) when using the ICAs.

Relatedly, the studies collectively suggest the role of usage context in the model as findings indicate different levels of acceptance of ICAs designed to assist with users' productivity compared to those intended to provide companionship or build (social) relationship. While these differences may be reflected in the relative importance of the various usage benefits (e.g., more important role of utilitarian benefits in productivity context), indicating the moderating effects of usage context on the relationship between usage benefits and agent acceptance, contextual factors such as social norm surrounding specific usage (i.e., whether such usage is socially acceptable) can also influence acceptance directly, independently from the perceived benefits. Additionally, facilitating conditions, which can be considered a contextual factor, play an important role in bringing about actual usage behavior.

Overall, it is worth noting that the proposed collective model in its entirety is highly context-dependent, in that the variables to be included in the model will depend on usage settings. While some factors can be relevant to any context (e.g., usefulness, ease of use, user motivation, conversational ability, etc.), other factors may be more relevant to certain contexts than others (e.g., empathetic/social ability, appearance, etc.). In other words, it is expected that the operationalization of the model in future empirical research will vary. Moreover, relationships amongst the variables can be explained by several well-established theoretical frameworks (e.g., TAM, UTAUT, CASA Paradigm, Uncanny Valley Theory, etc.). For example, CASA Paradigm can explain the effect of social ability (i.e., agent characteristic) on hedonic benefits (i.e., usage benefits), while the effect of hypervigilance (i.e., user characteristic) on

perceived helpfulness (i.e., usage benefit) can be explained by cognitive decision-making theories. Importantly, however, the collective model proposed herein places emphasis on the roles agent- and user-related factors play in bringing about the perceived benefits of using ICAs (i.e., as antecedents instead of correlates of usage benefits).

Several directions for future research, with specific considerations of the psychological factors shaping the cognitive engagement between users and ICAs, can be suggested. Firstly, in the context of implementing ICAs to build social relations with their users (e.g., ICAs as companions), future research can delve into ways to improve ease of interactions between users and ICAs, by increasing users' motivation and curiosity. This can be done with general consumers and those who tend to reject technological innovation (e.g., consumers with low level of technology expertise or those with high degree of fear of novel products). Relatedly, targeting consumers with a higher tendency of adopting new technology, future research could explore how cognitive engagement between ICAs and users, which may result in positive emotional reactions, will influence the social life of users (e.g., consumers relying on ICAs first for social belonging needs). These studies can also be conducted by varying the characteristics of ICAs (e.g., appearances, modality, social ability, etc.), i.e., through lab or field experiments, to better understand the role of cognitive engagement with machine companions in different facets of consumer behavior.

Secondly, in the context of implementing ICAs as assistants, especially with regards to increasing productivity (e.g., more relevant product search, more effective customer service), future research should be directed to finding the relative importance of (and the right balance between) goal attainment (e.g., finding products/solutions as quickly as possible) and social interactions (e.g., being empathetic). Similarly, these studies can be conducted with consumers

who have varying characteristics, including their psychological characteristics and needs. The results can then be incorporated into the design of ICAs to improve their intelligence in terms of user recognition and personalization of services (also see strategic business implications in the following section). Finally, future studies should explore how consumers position ICAs as an agent (i.e., whether as an independent agent or representation of a brand/company) in various settings, and how this influences the perceived benefits and ultimately intention of using ICAs.

5. Strategic Business Implications

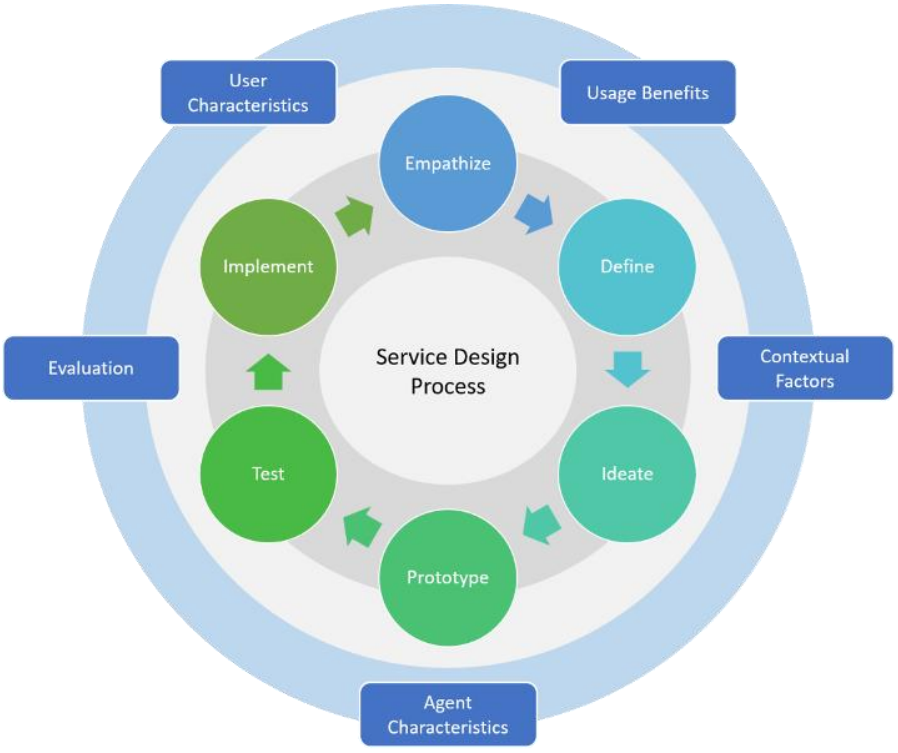
Based on the identified influencing factors of adoption and use of ICAs, this study suggested several strategic business implications for firms and organizations planning to adopt and implement this technology. These include implications for service design, personalization, and customer relationship management.

Firstly, businesses can take into consideration the user-, agent- and usage-related factors as requirements for the design of services using ICAs (i.e., ICAs as a service solution). Be it for customer service and recommendation engine (i.e., ICAs as an automated business-to-customer communication channel, see, e.g., Aljukhadar, Trifts, & Senecal, 2017) or for assistance and companionship (i.e., ICAs as assistive technology), businesses can leverage the most relevant factors underlying user needs for such a service (i.e., usage benefits) to design a user-centered conversational interface. Moreover, businesses can utilize agent-related factors such as appearance, gestures, and other behaviors to create moments of delight for users throughout the service experience. For example, this study found that elderly customers felt more comfortable communicating with more socially communicative conversational agents. This informs the

design features of ICAs for elderly care, assistance, and companionship, to engender positive evaluation and overall acceptance of these agents.

As illustrated in Figure 5, following a cyclical design thinking process suggested by Gibbons (2016), the findings of this study inform what to consider in each stage of the designing process. Key to designing ICAs as a service is to empathize with users and understand the benefits they seek from using ICAs (e.g., companionship, enjoyment). The contextual factors (e.g., social influence) will be particularly relevant in the idea generation stage, while the physical characteristics of ICAs (e.g., anthropomorphism) will play an important role in the prototyping stage, where a range of ideas are transformed into their tactile representation (e.g., a humanoid robot with anthropomorphic design). User evaluation factors (e.g., reaction, satisfaction), along with user characteristics (e.g., intrinsic motivation), are important to consider during testing and implementation stages.

Figure 5. Design Implications of ICAs



Secondly, businesses can take advantage of these influential factors to personalize their services through ICAs. In particular, user-related and attitudinal factors will allow businesses to learn the varying preferences of customer groups (e.g., elderly users, students, specific app users, etc.), and how they respond to or interact with ICAs in various usage settings (e.g., productivity, play, social interaction, etc.). Again, context-dependency is critical here as the same user groups may have different preferences and expectation on agent performance used for different purposes. Importantly, the studies analyzed herein suggest that instead of demographic characteristics such as gender and age, businesses should use users' psychological factors such as levels of curiosity and intrinsic motivation as a basis for personalization. Evidence shows that these psychological factors are key to predict users' engagement with ICAs (Brandtzaeg & Følstad, 2017; Tsiourti et al., 2018). Utilizing this information will allow businesses to deliver contextualized and personalized services to reach the right target customers, enhancing overall customer experience.

Lastly, a conversational user interface can be a desired solution for customer relationship management (CRM). Businesses can utilize factors associated with effective human-machine interaction to create persuasive ICAs capable of strengthening relationships with customers. Depending on the ICAs' features, the ubiquitous nature of ICAs can be conducive to not only anytime–anywhere customer service (e.g., giving real-time instructions to customers), but also sustained conversations (e.g., via chat) with customers. Therefore, not only can ICAs provide rapid responses to customer queries and offer resolutions to service issues, as findings in these studies suggest, they also can stimulate positive attitude and emotional feedback from users through engaging in routine conversations (Terzis, Moridis, & Economides, 2012; Heerink et al., 2009). ICAs can also learn from sustained interactions with customers to better understand

customers and identify opportunities to introduce new services, upsell and cross-sell products, etc.

6. Conclusion, Limitations, and Future Research

This study conducted a systematic review to provide an in-depth analysis of the factors influencing consumers' acceptance and willingness to use ICAs. Eighteen relevant academic articles were examined to identify antecedents of adoption or acceptance of ICA technologies. The review identified 23 factors, which can be categorized into: usage-related factors (i.e., utilitarian benefits such as perceived usefulness, perceived ease of use, perceived helpfulness, hedonic benefits such as perceived playfulness and perceived enjoyment, symbolic benefit and characteristics of alternative technologies), agent-related factors (i.e., empathy, anthropomorphism, visual attractiveness, social attractiveness, gesturing, modality/portability), user-related factors (i.e., demographic, motivation and curiosity, personal innovativeness, hypervigilance, technology expertise), attitude and evaluation factors (i.e., attitude, emotional feedback, satisfaction), and other factors (i.e., facilitating conditions, social influence).

Among these factors, the most frequently reported factor influencing users' acceptance and willingness to use ICAs is its utilitarian benefits. This is especially relevant in usage settings where the ICAs aid users with their productivity, such as helping users to obtain timely information and efficient assistance. Users are also reported to be influenced by the entertainment, social and relational factors associated with interactions with ICAs. This is especially true in usage settings where ICAs are designed to offer companionship and relationship building through social interaction and entertainment (e.g., play). Furthermore, with regards to social interactions, results show the significant roles of appearance, empathetic and

social ability as manifests of "agency" in the technology (i.e., capacity to act "independently") in building positive attitude and evaluation. The ability to employ human-like cues and communication modalities, for example, was found to significantly influence intention to use ICAs amongst elderly users. By integrating the theoretical frameworks and operationalizations used in relevant empirical studies to identify and assess factors influencing user acceptance of ICAs, this study contributes to a collective conceptualization of factors of acceptance. This holistic understanding was made possible as the studies analyzed different usage contexts (e.g., healthcare, education, service industry) and different types of ICAs (e.g., chatbots, voice assistants, digital avatars, embodied agents such as robots). This study proposed a collective model to represent key drivers of user's willingness to adopt and use this technology in various settings. Future research can refer to and utilize the model and include the most relevant factors to represent the constructs suggested therein, of which will be highly context-dependent.

Despite its contribution, this study has some limitations, particularly related to the emerging nature of the research topic. Firstly, to achieve the research goals, the scope of the literature search was limited to studies assessing intention to use or adopt ICAs. Other studies using different outcome variables, such as satisfaction or evaluation, were excluded. Future studies may extend the scope to identify other factors. Secondly, although our search approach covered the most commonly used terms and included forward and backward searches, the search terms may not have captured all the types of conversational agents. Future research may use additional attributes as their search terms, such as "digital assistants," "smart speakers," or "bots," to capture other applications of conversational agents. Moreover, the literature review revealed that the existing studies investigating the factors influencing consumers' acceptance and use of ICAs are dominated by references to the Technology Acceptance Model (TAM) and its

subsequent modifications. Studies giving more consideration to the interaction dimensions, specifically the linguistic context of interaction, were absent. Therefore, future research can focus on empirical studies assessing the linguistic aspect of ICAs, including the ability to distinguish context-dependent messages and generate reasonable responses, and how it plays a role in influencing users' adoption and intention to use ICAs. Finally, it is expected that future research will empirically test the collective model of the antecedents of users' adoption and use of conversational agents proposed in this study.

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