Received: 10 October 2021 | Accepted: 20 February 2022

DOI: 10.1002/mar.21654

REVIEW ARTICLE

Psychology & Marketing WILEY

Alexa, what do we know about conversational commerce? Insights from a systematic literature review

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Abstract

Conversational agents are systems with human-like features that can be deployed in service settings and are fast emerging as the future of online commerce. Considering the importance and proliferation of conversational commerce, it is opportune to take stock of the field's research from a bird's eye view to guide understanding of its current and future progress. In this regard, the goal of this study is to review the performance and intellectual structure of conversational commerce. To do so, this study conducts a comprehensive and systematic review of 722 publications on conversational commerce using the Scientific Procedures and Rationales for Systematic Literature Reviews protocol and a collection of bibliometric analysis techniques consisting of performance analysis and science mapping (e.g., content analysis, keyword co-occurrence analysis, and bibliographic coupling). In doing so, this study reveals the performance (e.g., publication and citation trends, and top sources, publications, and authors) and the major theories and themes in the intellectual structure of the field. The study concludes with a conceptual framework depicting the constructs (e.g., antecedents, mediators, moderators, consequences, and enablers) of employing conversational agents for commerce and service delivery, as well as suggestions for its future research.

KEYWORDS

anthropomorphism, artificial intelligence, conversational agent, conversational commerce, digital assistant, intelligent voice assistant

1 | INTRODUCTION

Conversational agents are "systems that mimic human conversation" using communication channels such as speech, text, facial expressions, and gestures (Laranjo et al., 2018, p. 1248), and can generally manifest as chatbots without embodiment, virtually embodied avatars, and physically embodied robots (Radziwill & Benton, 2017). The deployment of conversational agents in service settings is growing exponentially in many sectors such as banking, entertainment, healthcare, and hospitality (Bolton et al., 2018; Botanalytics, 2018; De Keyser et al., 2019; Lester et al., 2004). Specific examples of conversational agents include chatbots in schools teaching languages (Fryer & Carpenter, 2006), avatars recommending products in e-commerce (Qiu & Benbasat, 2010), and robots assisting elderly in health care (Čaić et al., 2018).

In recent years, many researchers have investigated the relational outcomes of conversational agents (Groom et al., 2009; Keeling et al., 2010; Niculescu & Banchs, 2019). However, their research is

scattered across disciplines (e.g., computer science, information systems, marketing, mass communication, psychology, and sociology), with a consolidation of investigated behaviors and equivalent effects notably missing, thereby limiting our understanding of the field (Van Doorn et al., 2017). Moreover, a comprehensive overview of the mechanisms (antecedents and enablers), modifiers (mediators and moderators), and implications (consequences) of the interactions between customers and artificial intelligence-enabled technologies with advanced cognitive engagement capabilities in the form of conversational agents remains virtually nonexistent, prompting *Psychology & Marketing* to commission special issues on *artificial intelligence technology in marketing* (Mariani & Perez-Vega, 2020) and *virtual conversational agents* (Pentina & Bailey, 2022). More importantly, the absence of a comprehensive and systematic review of conversational agent research and its utility for commerce and service delivery is a significant issue that needs to be urgently addressed for a number of pertinent reasons.

First, without a comprehensive and systematic review, the extant literature of conversational commerce will remain fragmented. When literature is fragmented, new research will become costlier (e.g., duplication of effort, time, and energy to review the same field of research) and the field itself will suffer from the opportunity cost of progressing at a faster pace (e.g., the need to do the same review before pursuing new research) (Paul et al., 2021).

Second, without a comprehensive and systematic review, the potential application and utility of conversational agents for commerce and service delivery will remain undercommunicated to practitioners. The academia–industry or theory–practice gap is a longstanding issue that can nonetheless be addressed through comprehensive and systematic reviews of the literature (Lim & Weissmann, 2021; Lim, 2021a). That is to say, comprehensive and systematic reviews serve as a one-stop document that can help academics and practitioners to gain a bird's eye view of the field whilst putting them on the same page of understanding the concept and its potential (Donthu et al., 2021c; Paul et al., 2021).

Third, a comprehensive and systematic review will require a review protocol and a powerful method capable of systematically handling and analyzing a large corpus of publications. That is to say, a comprehensive and systematic review should be replicable and representative of the progress of the field, wherein its review procedure should be transparently disclosed (Paul et al., 2021) while the performance and body of knowledge of the field are analyzed and reported in its entirety (Donthu et al., 2021c), and not as a subset, which is typically the case of small case reviews that rely on a sample rather than the population of publications in the field (Donthu et al., 2021c; Paul et al., 2021).

Noteworthily, the use of bibliometric analysis is well suited for large-scale reviews because it is a quantitative analysis that is exploratory yet data driven, thereby enabling the development of an objective evaluation of the performance of the field and the mapping of the scientific knowledge in that field in its entirety (Donthu et al., 2021c; Kumar et al., 2022a, 2022b; Mariani et al., 2022). Alternatives such as integrative and narrative reviews typically rely on qualitative analysis and thus tend to be subjective and prone to researcher bias, whereas meta-analysis, which is the other quantitative alternative to bibliometric analysis, is usually focused on a series of highly researched statistical relationships and thus discounting insights emerging from nonquantitative studies (e.g., conceptual and qualitative) in the field (Donthu et al., 2021c; Paul et al., 2021).

Similarly, the use of Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR) as a review protocol is highly suitable because (1) it provides a step-by-step procedure that can be systematically documented and transparently disclosed for replication, (2) it is derived by marketing researchers for reviews in the social sciences (as opposed to its alternative such as PRISMA, which was developed by medical researchers for reviews in the sciences), (3) it's use has been called for by past scholars for future reviews (Paul et al., 2021), and (4) it has been widely adopted and used for comprehensive and systematic literature reviews, including those relying on a bibliometric methodology and published in premier journals such as *Annals of Operations Research* (Kumar et al., 2022b), *Journal of Business Research* (Lim et al., 2022), *Public Management Review* (Palumbo & Manesh, 2022), and *Technological Forecasting and Social Change* (Kumar et al., 2022a).

Finally, a comprehensive and systematic review of conversational commerce is arguably best undertaken and published by *Psychology & Marketing* because (1) conversational commerce is a marketing phenomenon that reflects the deployment of conversational agents for value creation and service delivery in the marketplace, and in the process of doing so, influences customer behavior, which can be explained by the psychological process involving a myriad of perception and evaluation influencing factors, (2) the journal is home to psychological studies of marketing phenomenon, (3) the journal has explicitly called for papers in this area (Mariani & Perez-Vega, 2020; Pentina & Bailey, 2022), and (4) the journal has a prolific and recent track record of publishing comprehensive and systematic reviews (Hassan et al., 2022; Mariani et al., 2022), including those relying on a bibliometric methodology (Adler & Sarstedt, 2021; Donthu et al., 2021a; Khan et al., 2020), with a review on conversational commerce or conversational agents virtually nonexistent.

To address the extant gap, this paper aims to review the performance and intellectual structure of conversational commerce research. To do so, this paper will rely on the SPAR-4-SLR protocol by Paul et al. (2021) as a review protocol and a series of bibliometric analysis techniques recommended by Donthu et al. (2021c) to deliver a comprehensive and systematic review of conversational commerce. Guided by the scope of prior reviews (Donthu et al., 2021a, 2021b, 2021d; Goodell et al., 2021; Kumar et al., 2021a, 2021b, 2021c), this paper will endeavor to shed light on the answers to the following research questions pertaining to the performance and intellectual structure of conversational commerce research:

RQ1. What are publication and citation trends in conversational commerce research?

RQ2. Which are the top sources, publications, and authors in conversational commerce research?

RQ3. What are the major theories in conversational commerce research?

RQ4. What are the major themes in conversational commerce research?

RQ5. What are the antecedents, mediators, moderators, consequences, and enablers that entail in conversational commerce research?

RQ6. Which directions should future research pursue to advance conversational commerce?

By answering these research questions, this paper will be able to deliver on its promise of a comprehensive review that details the performance (RQ1–RQ2) and intellectual structure (RQ3–RQ5) and guides future scholars (RQ6) on conversational commerce research. Delineating the performance of the field is a common endeavor of bibliometric reviews—it is akin to the reporting of the profile of participants in empirical studies, though with greater analytical rigor (Donthu et al., 2021c). Similarly, the mapping of the intellectual structure or scientific knowledge in the field through a bibliometric analysis is highly valuable as it provides an objective means for identifying the main contributions (themes) of prior research, which subsequently guides future research agenda to advance the field (Kumar et al., 2022a, 2022b). Unlike integrative and narrative reviews that often rely on a single qualitative analysis to arrive at conclusions about a field, bibliometric reviews can leverage on a myriad of quantitative analytical techniques for the same purpose (e.g., co-occurrence analysis and bibliographic coupling), thereby enhancing rigor by making the triangulation of insights possible through review studies (Goodell et al., 2021; Kumar et al., 2022a). Beyond the insights typically provided by bibliometric reviews (i.e., performance analysis and science mapping of the field) (Donthu et al., 2021c), the present review also conducts a content analysis to present the theories and constructs (antecedents, mediators, moderators, consequences, and enablers) that usually avail in structured reviews (e.g., Lim et al., 2021), thereby providing both broader and finer-grained insights on the body of knowledge for conversational commerce.

The rest of the article is organized as follows. The next sections present the theoretical background of conversational commerce, followed by the review methodology and findings. The article concludes with a conceptual framework that encapsulates the antecedents, mediators, moderators, and consequences of and the enablers for employing conversational agents for commerce and service delivery, as well as suggestions for future research to enrich understanding of conversational commerce.

2 | THEORETICAL BACKGROUND

Conversational commerce is an emerging concept. Traditionally, salespeople play a central role in offline commerce by assisting customers in gaining product information and decision making (Beatty et al., 1996) and encouraging them to make in-store purchases (Crosby et al., 1990). However, with the proliferation of new-age technologies such as conversational agents and the rise of the digital era in today's contemporary marketplace, online commerce has emerged and disrupted the way service is delivered, wherein salespeople's proximity in offline commerce does not exist in online commerce. This creates a situation where customers in online commerce are left to search, evaluate, and decide on product choice and purchase on their own. However, not all customers are equally equipped to make the right product choice and purchase, and thus, more often than not, customers need assistance from salespeople to help them to better understand products to make an informed purchase decision (Barlow et al., 2004). Moreover, customers in online commerce do not experience the same shopping experience as in offline commerce, whereby the human-less machine interaction in the former is not the same as the human-rich experience in the latter. Without human assistance, interaction, and relationship, the online shopping experience may be perceived as challenging and dull, and thus, discouraging customer shopping and purchases (Reynolds & Beatty, 1999). Nonetheless, with the advancement of technology, human-like experiences can be curated in online commerce, as evidenced by conversational agents (Cassell, 2000) and their many manifestations such as humanoid synthetic agents (McBreen & Jack, 2001) and virtual agents (Abbattista et al., 2002).

Conversational agents with humanoid features such as human-like speech and gestures have been touted as the future of online commerce (Cassell, 2000). According to McGoldrick et al. (2008), conversational agents can support online commerce in three ways—that is, as an assistant, as a recommendation agent, and as a social companion—and stimulate positive effects on customer-brand relationships. This is supported by Qui and Benbasat (2009), who evidenced the utility of conversational agents as a favorably perceived assistant that enhances the purchase experience. Other studies have also indicated the deterministic effect of conversational agents in building customer relationships and trust with the brand and resulting in customer satisfaction. For instance, Notebaert (2006) demonstrated that conversational agents can increase customer confidence in online commerce, whereas Lemoine (2011) established that conversational agents can influence customer trust and improve their online shopping experience, resulting in greater customer satisfaction and spending, and Mimoun and Poncin (2015) recorded the improvements in recommendation quality, social presence, and satisfaction as a result of customers using conversational agents.

2.1 | Conversational agent

Humans are social beings that inherently require social presence and interaction to exist. In this regard, it is important that social presence and interaction are curated on platforms where humans and computers interact. Indeed, the advancement of technology holds the promise of new possibilities for human–computer interaction (Dix, 2017). Noteworthily, conversational agents—that is, humanoid-based conversational interfaces—can portray a humanized image of computers to simulate social presence and interaction with humans, mimicking human skills such as recognizing communication, responding to communication, offering feedback, and promoting conversation (Cassell, 2000). Leveraging conversational capabilities, social interaction, and visual representations,

conversational agents can improve human–computer interaction using natural language processing (Dale, 2016). Noteworthily, natural language processing-powered conversational agents can mimic sales specialists to recommend products to customers and respond to customer enquiries (Lucente, 2000). In this regard, the human–computer interaction curated through conversational agents can help customers in product search and purchase journey in a humanized environment, whereby the offline experience of customers engaging and benefitting from social interactions with salespeople can be replicated via social interactions with conversational agents in the context of online commerce.

2.2 | Conversational commerce

Conversational commerce is a notable spinoff of using conversational agents in online commerce. Due to the acceleration of digital transformation in response to the COVID-19 pandemic, online commerce has profoundly emerged as the new normal of shopping among customers, which is poised to continue in the post-pandemic era (Lim, 2021b). In essence, conversational commerce is the use of conversational agents to interact with brands and the services that they provide. In this setting, the use of conversational agents in commerce allows customers to interact with artificial intelligence and receive personalized recommendations in online commerce akin to that experienced with salespeople in offline commerce. Noteworthily, conversational commerce is transforming customer experience and improving the customer's desire to spend more time on online commerce platforms, as conversational commerce bridges the human-computer gap in online commerce by creating a humanized ecosystem where customers and technology-mediated brand representatives can chat and close deals (Piyush et al., 2016). In this regard, conversational commerce is poised to contribute to business profitability by improving customer experience and satisfaction of shopping in online commerce.

3 | METHODOLOGY

The review in this study intends to be both comprehensive and systematic. In particular, this study intends to conduct a review of the entire corpus of publications relevant to conversational commerce and to do that review using a replicable and transparent procedure, which is the gold standard for reviews today as such a review is deemed to be most exhaustive, rigorous, and reliable as compared to alternative review types such as critical reviews without a systematic review procedure (Balaid et al., 2016; Boell & Cecez-Kecmanovic, 2015; Boscari et al., 2018; Denyer & Tranfield, 2009; Donthu et al., 2021c; Gruner & Soutar, 2021; Henrique & Godinho Filho, 2020; Kitchenham, 2007; Lim & Weissmann, 2021; Paul et al., 2021; Rajeev et al., 2017; Sharma et al., 2018; Spanos & Angelis, 2016; Tranfield et al., 2003; Verma & Yadav, 2021; Wamba & Mishra, 2017; Whittemore et al., 2014). In this regard, the present study combines the techniques of a systematic literature review and a bibliometric analysis for its review. In particular, the SPAR-4-SLR protocol by Paul et al. (2021), which consists of three sequential stages in the form of assembling, arranging, and assessing, is employed as the study's review protocol as it is the most recent and rigorous review protocol from social sciences and thus represents a good alternative to the older PRISMA protocol that is often used in social sciences despite its origins from sciences. This study also uses a collection of bibliometric analysis techniques consisting of performance analysis and science mapping (i.e., content analysis, keyword co-occurrence analysis, and bibliographic coupling) that were recommended by Donthu et al. (2021c) to delineate the performance (i.e., publication and citation trend, and top sources, publications, and authors) and intellectual structure (i.e., major theories, themes, and constructs) of the field of conversational commerce because of its ability to handle and analyze a large corpus of literature in the field. The details of the systematic literature review and bibliometric analysis are illustrated in Figure 1 and discussed in the next sections.

3.1 | Assembling

The *assembling* stage consists of two sub-stages: identification and acquisition.

In terms of *identification* of documents (or publications) for review, this study concentrates on identifying documents in the *domain* of conversational commerce and the bibliometric information of those documents to answer its *research questions* involving the performance (e.g., publication and citation trend, and top sources, publications, and authors) and intellectual structure (e.g., theories, themes, and constructs) of conversational commerce research (RQ1–RQ6), which is in line with the recommendation by Donthu et al. (2021c). The *source type* of documents is limited to journals and conference proceedings as they represent key sources that intend to make a scholarly contribution to the literature—other sources such as books and book chapters tend to be more explanatory rather than contributory, and thus, they are not considered for the review, which is in line with the recommendation by Paul et al. (2021) and Ramos-Rodríguez and Ruiz-Navarro (2004). Scopus is also used as a *source quality* because of its stringent criteria for indexing publications (Garousi et al., 2019; Materla et al., 2019; Ruiz-Saenz & Martinez-Gutierrez, 2015) and is chosen over alternatives such as Web of Science due to its wider coverage of scholarly literature (Paul et al., 2021).

In terms of *acquisition*, the benefit of using Scopus as a source quality becomes even more apparent as Scopus can also be used as a *search mechanism* and for *material acquisition*. In particular, documents indexed in Scopus can be retrieved at one go using its download function, which makes it more efficient for acquiring documents for review than manual search and retrieval from alternative mechanisms such as alternative databases (e.g., EBSCO, ProQuest, and ScienceDirect), publishers (e.g., Emerald, Elsevier, IEEE Xplore, Inderscience, Sage, Springer, Taylor, and Francis), and search

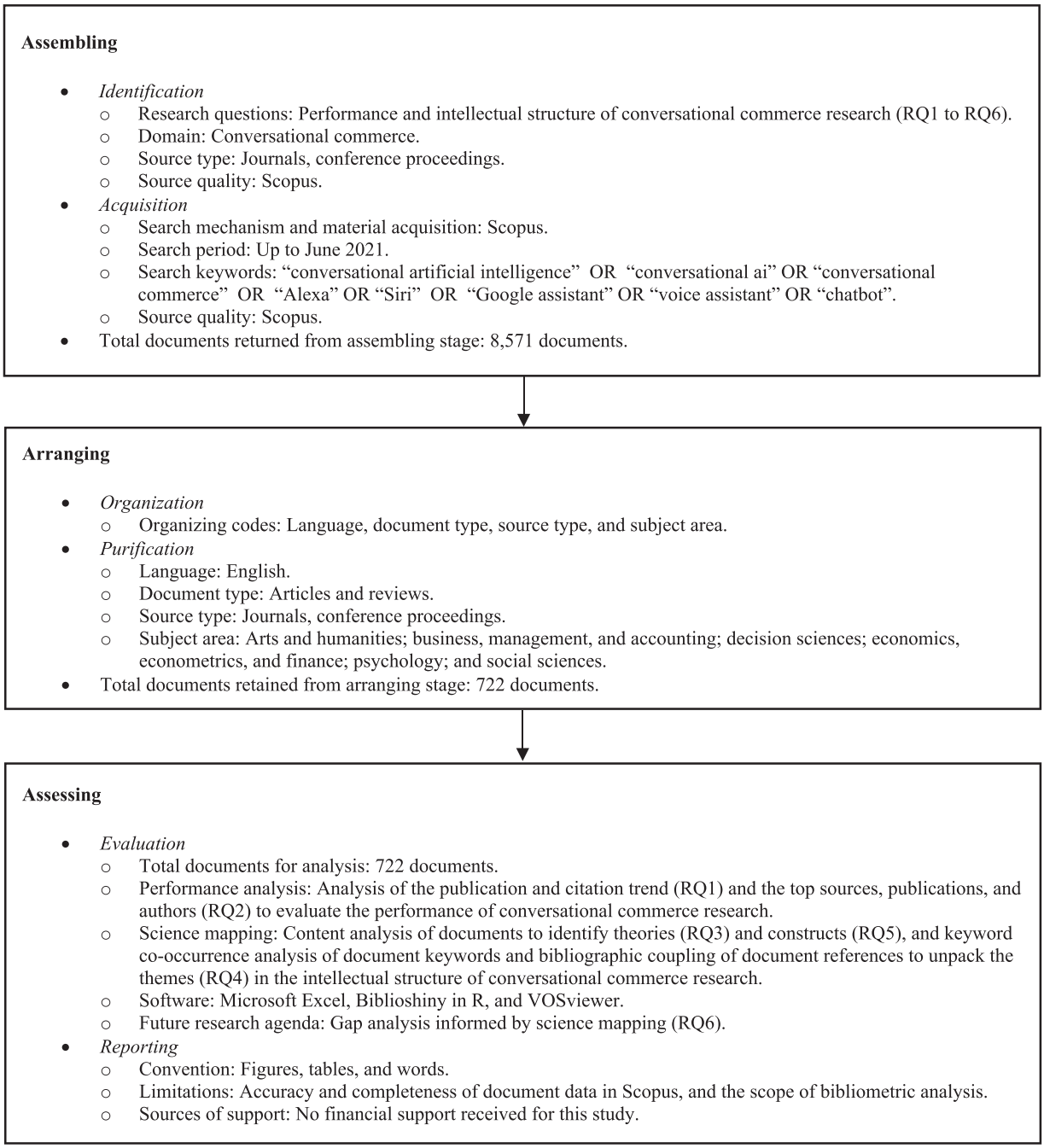

FIGURE 1 Review procedure using the SPAR-4-SLR protocol. SPAR-4-SLR, Scientific Procedures and Rationales for Systematic Literature Reviews

engines (e.g., Google Scholar) (Paul et al., 2021). The start of the *search period* was deliberately left open to retrieve as many documents as possible, though the end date is up to June 2021, which is the time the search was conducted. The *search keywords* were curated through a brainstorming session by academic experts, which included keywords relating to conversational agents (i.e., "conversational artificial intelligence" OR "conversational ai" OR "Alexa" OR "Siri" OR "Google assistant" OR "voice assistant" OR "chatbot") and commerce (i.e., "conversational commerce"). In total, 8571 documents were returned from the assembling stage.

3.2 | Arranging

The *arranging* stage consists of two substages: organization and purification.

In terms of *organization*, this study relies on the filters in Scopus as codes to sort and organize the documents. In particular, the *organizing codes* for the documents were four-fold, namely language, document type, source type, and subject area.

In terms of *purification*, this study only selected documents that are (1) written in "English" as the authors were native speakers of that

language, (2) classified as "articles" or "reviews" *document types* as they typically undergo full peer review as opposed to alternatives such "editorials" and "notes" that do not undergo the same level of peer review scrutiny, (3) published in "journals" and "conference proceedings" as alternative *source type* such as books and book chapters may not be intended to make a contribution to knowledge, and (4) classified in the *subject areas* of arts and humanities; business, management, and accounting; decision sciences; economics, econometrics, and finance; psychology; and social sciences as these areas are directly related to "commerce," thereby discounting conversational agents research that is simply computational and provides little to no implications for its application in commercial settings. These justifications for the actions taken are in line with the recommended guidelines by Donthu et al. (2021c) and Paul et al. (2021). In total, 722 documents were retained from the arranging stage.

3.3 | Assessing

The *assessing* stage consists of two sub-stages: evaluation and reporting.

In terms of *evaluation*, this study adopts an inductive approach (i.e., derive explanation from observed data patterns) (Banaeian Far & Imani Rad, 2018; Fahimnia et al., 2015; Seuring & Müller, 2008) and conducts a series of bibliometric analysis techniques that can be classified underperformance analysis and science mapping (Donthu et al., 2021c). In particular, *performance analysis* via descriptive analysis is carried out to depict the publication and citation trend (RQ1) and identify the top sources, publications, and authors (RQ2), whereas *science mapping* is performed using content analysis to identify theories (RQ3) and constructs (RQ5), and keyword co-occurrence analysis of document keywords and bibliographic coupling of document references to unpack the themes (RQ4) in the intellectual structure of conversational commerce research. While software such as Microsoft Excel was employed for descriptive and content analyses, Biblioshiny in R (Aria & Cuccurullo, 2017) and VOSviewer (Van Eck & Waltman, 2011) were used to perform and illustrate the network of themes emerging from the keyword co-occurrence analysis and bibliographic coupling, which is in line with the recommendations by Donthu et al. (2021c) for bibliometric analysis. Noteworthily, the network of relationships between document keywords and citing documents in keyword co-occurrence analysis and bibliographic coupling, respectively (Pilkington & Liston-Heyes, 1999; Small, 1973), is derived based on the data clustering principle (Chen et al., 2010) to illustrate the present state of knowledge in the field (Donthu et al., 2021c). Specifically, each cluster in a network depicts a common theme, with the nodes representing document keywords and citing documents signifying the topics (or subthemes) and the links between nodes representing their relationships within that broader theme of that cluster (Donthu et al., 2021c; Radicchi et al., 2004). The size of nodes and thickness of links reflect the prominence of what they respectively represent (Clauset et al., 2004; Donthu et al., 2021c; Leydesdorff, 2011; Radicchi et al., 2004).

In terms of *reporting*, this study relies on a combination of figures, tables, and words to report its findings in line with the reporting *convention* recommended by Paul et al. (2021). Multiple metrics of bibliometric information are also made available through tables with accompanying notes at the bottom, where appropriate, in line with the recommendation by Donthu et al. (2021c) and explained in words to provide enriching insights and narratives on the performance and intellectual structure of conversational commerce research. Nonetheless, as with any review, the present review also has *limitations*, wherein the review is limited to the accuracy and completeness of document data in Scopus, and the scope of its bibliometric analysis (i.e., only pertinent information is reported). As per review protocols, it is also important to note that the review in this study did not receive any financial support, and no ethics clearance was required as no primary data involving human subjects were collected. Taken collectively, the review procedure and methodological considerations have been pursued based on the recommendations of authoritative guides for systematic reviews (Paul et al., 2021) and bibliometric analysis (Donthu et al., 2021c), and disclosed as transparently as possible to the best of the authors' ability.

The next sections report the findings of the review.

4 | PERFORMANCE ANALYSIS OF CONVERSATIONAL COMMERCE RESEARCH

4.1 | Publication and citation trend of conversational commerce research (RQ1)

The publication and citation trend of conversational commerce research is presented in Table 1.

In terms of *publication*, the table indicates that the coverage of conversational commerce research spanning across 45 ½ years (1976–June 2021) (NAY) consists of 722 publications (TP) that have been published in 443 different sources, out of which 474 (65.65%) publications have been cited (TCP), and a productivity average of 15.86 publications per year (PAY) (Table 1 Panel A). The modest percentage of total cited publications can be explained by the annual publication trend in Figure 2, which indicates that 471 (65.24%) publications have only appeared within the last 3 years (2019–2021).

In terms of *citation*, the table indicates that conversational commerce research published between 1976 and June 2021 have collectively garnered 5963 citations (TC), with an average of 8.259 citations per publication (TC/TP) on Scopus (Table 1 Panel B). The table also indicates that the field's *h*-index (citation impact) is 37, which suggests that 37 (*h*) publications have received at least 37 (*h*) citations each, whereas the field's *g*-index (citation influence) is nine, which suggests that nine (*g*) publications have received at least 81 (g^2) citations each. As mentioned previously, the modest citations witnessed in the field can be explained by the large portion of publications (65.24%) that have only appeared within the last three years (2019–2021).

TABLE 1 Bibliometric information of conversational commerce research

Panel A. Publication information	Statistic
Total publications (TP)	722
Total cited publications (TCP)	474
Total sources (TS)	443
Number of active years (NAY)	45 ½
Productivity per active year (PAY)	15.86
Panel B. Citation information	**Results**
Total citations (TC)	5963
Average citations per publication (TC/TP)	8.259
h-index	37
g-index	9
Panel C. Authorship information	
Number of contributing authors (including repetition) (NCA)	2,038
Number of unique authors (excluding repetition) (NUA)	1875
Authors of single-authored publications (ASA)	177
Authors of co-authored articles (ACA)	1698
Single-authored publications (SA)	188
Co-authored publications (CA)	534
Collaboration index (CI = NCA – TP ÷ TP)	1.82
Part D. Document information	
Article (Empirical)	691
Reviews (nonempirical)	31
References	33,674
Keywords	2467

Note: Period of coverage = 1976–June 2021.

In terms of *authorship*, the table indicates that a total of 2038 authors (including repetition) (NCA) or 1875 unique authors (excluding repetition) (NUA) have contributed to conversational commerce research, out of which 177 unique single authors (ASA) have contributed to 188 single-authored publications (SA) and 1698 unique co-authors (ACA) have contributed to 534 co-authored publications (CA) (Table 1 Panel C). The dominance of co-authors and co-authored publications corroborate the collaboration index in the field, wherein each lead author collaborates with an average of 1.82 coauthors (CI).

In terms of *document*, the table indicates that 691 (95.71%) publications are articles (empirical) while only 31 (4.29%) publications are reviews (nonempirical), encapsulating 33,674 references and 2467 keywords that will be used for science mapping in this study (Table 1 Panel D).

4.2 | Top sources for conversational commerce research (RQ2)

The top 10 sources for conversational commerce research that have accumulated the highest number of citations are presented in Table 2. The table indicates that *Computers in Human Behavior* has attracted the highest number of citations (TC: 746) and published the greatest number of publications (TP: 17). The table also indicates that this journal is also the most impactful and influential journal, as indicated by its *h*-index (17) and *g*-index (11), despite publishing research on conversational commerce only very recently (Start_PY: 2015). The average number of citations received by this journal is also the highest (C/Y: 106.57), which signifies the journal's leadership in conversational commerce research. Noteworthily, the table indicates that the majority of sources (40%) in the top 10 sources for conversational commerce research according to citation impact are in the areas of computers and digitalization (i.e., *Computers in Human Behavior*, *Proceedings of the ACM on Human-Computer Interaction*,

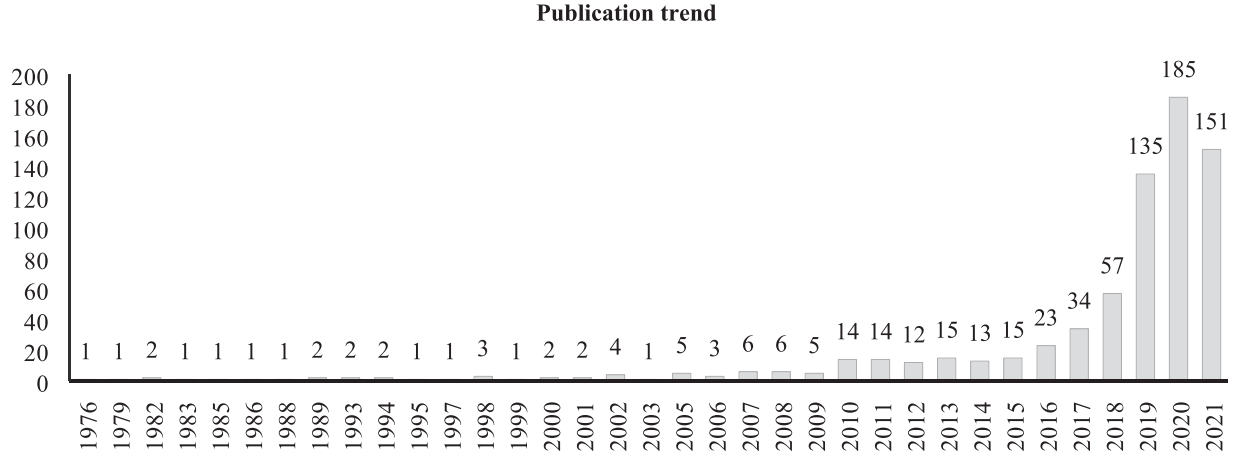

FIGURE 2 Annual publication trend of conversational commerce

TABLE 2 Top sources for conversational commerce research

Journal	TC	*h*	*g*	TP	Start_PY	C/Y
Computers in Human Behavior	746	17	11	17	2015	106.57
Knowledge-Based Systems	238	7	5	7	2007	15.87
Proceedings of the ACM on Human-Computer Interaction	182	11	5	11	2018	45.50
Journal of Business Research	104	9	5	9	2020	52.00
Frontiers in Psychology	96	5	3	5	2017	19.20
Cyberpsychology, Behavior, and Social Networking	92	3	3	3	2018	23.00
International Journal of Human-Computer Interaction	91	5	3	5	2015	13.00
Business Horizons	81	3	3	3	2019	27.00
Communication Research	81	1	1	1	2016	13.50
Digital Investigation	73	2	2	2	2017	14.60

Abbreviations: C/Y, citations per year; *g*, *g*-index; *h*, *h*-index; Start_PY, start of publication year; TC, total citations; TP, total publications.

TABLE 3 Top publications for conversational commerce research

Article	Author(s)	Year	TC	C/Y
Real conversations with artificial intelligence: A comparison between human-human online conversations and human-chatbot conversations	Hill et al.	2015	204	29.14
Alexa, Siri, Cortana, and more: An introduction to voice assistants	Hoy	2018	192	48.00
The return of the chatbots	Dale	2016	147	24.50
Living up to the chatbot hype: The influence of anthropomorphic design cues and communicative agency framing on conversational agent and company perceptions	Araujo	2018	133	33.25
Alexa, are you listening? Privacy perceptions, concerns and privacy-seeking behaviors with smart speakers	Lau et al.	2018	119	29.75
Bringing chatbots into education: Towards natural language negotiation of open learner models	Kerlyl et al.	2006	98	6.53
Example-based dialog modeling for practical multi-domain dialog system	Lee et al.	2009	94	7.23
Bots as language learning tools	Fryer and Carpenter	2006	90	5.63
Humanizing chatbots: The effects of visual, identity and conversational cues on humanness perceptions	Go and Sundar	2019	87	29.00
Theoretical importance of contingency in human-computer interaction: Effects of message interactivity on user engagement	Sundar et al.	2016	81	13.50

Abbreviations: C/Y, citations per year; TC, total citations.

International Journal of Human-Computer Interaction, and *Digital Investigation*), with equal representation of sources (20% each) in the areas of business (i.e., *Business Horizons* and *Journal of Business Research*), communication and knowledge management (i.e., *Communication Research* and *Knowledge-Based Systems*), and psychology (i.e., *Frontiers in Psychology* and *Cyberpsychology, Behavior, and Social Networking*), thereby highlighting the multidisciplinary scope of conversational commerce.

4.3 | Top publications for conversational commerce research (RQ2)

The top 10 publications for conversational commerce research that have attracted the highest number of citations are presented in Table 3. The table indicates that Hill et al.'s (2015) publication, which compares and contrasts human–human versus human–chatbot conversations in the online environment, is the most impactful publication with the highest total of 204 citations. The authors found that people tend to engage with a chatbot for a longer period as compared to humans (Hill et al., 2015). The table also indicates that Hoy's (2018) publication, which introduces conversational agents, is the second most impactful publication with the second-highest total of 192 citations, and the most influential publication with the highest average of 48 citations per year. The author sought to clarify the characteristics, features, privacy and security issues, and workings of voice assistants such as Alexa, Siri, and Cortana (Hoy, 2018). The other top publications on the list highlight the return of chatbots, which are more powerful today than in the past due to the advent of

artificial intelligence (Dale, 2016), the anthropomorphism and interactivity aspects of chatbots (Araujo, 2018; Go & Sundar, 2019; Lee et al., 2009; Sundar et al., 2016), as well as the benefits (e.g., engagement and learning) and concerns (privacy) with conversational agents (Fryer & Carpenter, 2006; Kerlyl et al., 2006; Lau et al., 2018).

4.4 | Top authors for conversational commerce research (RQ2)

The top 15 authors for conversational commerce research are presented in Table 4. In terms of *productivity*, the table indicates that 12 authors have contributed three articles each, and three authors have contributed two articles each. In terms of *citations*, the table indicates that Sundar (TC: 219), Bull (TC: 148), Kerley (TC: 148), and Araujo (TC: 135) are the most-cited authors in the field, whereas Sundar (C/Y: 36.50) and Araujo (C/Y: 33.75) receives the highest average citations per year. In terms of *diversity*, the table indicates mixed contributions from academics (e.g., Ali, Araujo, Atwell, Bull, Dwivedi, Fryer, Kerly, Lopatovska, Moriuchi, Sundar, Thompson, Tsai, and Zarouali) and practitioners (e.g., Adams and Følstad) from Eastern (e.g., India, Japan, South Africa, and Taiwan) and Western (e.g., the Netherlands, the United Kingdom, and the United States) countries or territories. Nonetheless, research from Western countries appear to be more than Eastern countries, with a notable absence of authors from Oceanic countries, signaling the need to improve the diversity and inclusion of authors in conversational commerce research.

5 | SCIENCE MAPPING OF CONVERSATIONAL COMMERCE RESEARCH

5.1 | Theories for conversational commerce research (RQ3)

The theories that have been used in conversational commerce research are presented in Table 5. The table indicates that conversational commerce research has relied on a plethora of theories across myriad fields such as communication (e.g., communication accommodation theory, communication privacy management theory, and humor theory), information technology (e.g., technology acceptance model and the original and updated version of the unified theory of acceptance and use of technology), law (e.g., contextual integrity theory), marketing (e.g., coolness model), psychology (i.e., the most—e.g., big five factors of personality, expectancy theory of motivation, flow theory, stimulus-organism-response model, theory of boundary regulation, theory of mind, theory of planned behavior, theory of reasoned action, and uncanny valley theory), and sociology (e.g., parasocial relationship theory, social agency theory, and social response theory), with the oldest theory on the list originating in 1956 (i.e., parasocial relationship theory) and the latest in 2014 (i.e., coolness model). The theories from psychology appear to be older as compared to theories from other fields such as information technology and marketing. While these theories are no doubt useful to provide a theoretical foundation for conversational commerce research, future research is encouraged to use context to develop new

TABLE 4 Top authors for conversational commerce research

Author	Author affiliations	NP	TC	PY_start	C/Y
Sundar SS	The Pennsylvania State University, United States	3	219	2016	36.50
Araujo T	University of Amsterdam, Netherlands	3	135	2018	33.75
Fryer LK	Kyushu Sangyo University, Japan	3	93	2017	18.60
Thompson A	Kyushu Sangyo University, Japan	3	93	2017	18.60
Zarouali B	University of Amsterdam	3	67	2018	16.75
Lopatovska I	Pratt Institute, United States	3	63	2018	15.75
Moriuchi E	Rochester Institute of Technology, United States	3	34	2019	11.33
Tsai M-H	National Taiwan University of Science and Technology, Taiwan	3	20	2019	6.67
Dwivedi YK	Swansea University, Swansea United Kingdom	3	18	2021	18.00
Følstad A	SINTEF Applied Research, Norway	3	16	2019	5.33
Adams R	Human Sciences Research Council, Pretoria, South Africa	3	11	2019	3.67
Ali S	University of Kashmir Srinagar, India	3	11	2016	1.83
Bull S	University of Birmingham, United Kingdom	2	148	2007	9.87
Kerly A	University of Birmingham, United Kingdom	2	148	2007	9.87
Atwell E	University of Leeds, United Kingdom	2	80	2005	4.71

Abbreviations: C/Y, citations per year; Start_PY, start of publication year; TC, total citations.

TABLE 5 Theories in conversational commerce research

Year	Field	Theory	Origin	Example
1956	Sociology	Parasocial relationship theory	Horton and Wohl (1956)	Whang and Im (2021)
1964	Psychology	Expectancy theory of motivation	Vroom (1964)	Chopra (2019)
1970	Psychology	Uncanny valley theory	Mori (1970)	Balakrishnan and Dwivedi (2021)
1974	Psychology	Stimulus-organism-response model	Mehrabian and Russell (1974)	Hernandez-Ortega and Ferreira (2021)
1975	Psychology	Theory of reasoned action	Fishbein and Ajzen (1975)	Hasan et al. (2021)
1975	Psychology	Theory of boundary regulation	Altman (1975)	Ahmad et al. (2020)
1979	Communication	Communication accommodation theory	Giles and Smith (1979)	Lubold et al. (2021)
1989	Information technology	Technology acceptance model	Davis (1989)	Vimalkumar et al. (2021)
1990	Psychology	Big five factors of personality	Goldberg (1990)	Bawack et al. (2021)
1990	Psychology	Theory of planned behavior	Ajzen (1991)	Hwang and Kim (2021)
1992	Psychology	Flow theory	Trevino and Webster (1992)	Poushneh (2021b)
2000	Communication	Humor theory	Meyer (2000)	Lopatovska (2020)
2000	Sociology	Social response theory	Nass and Moon (2000)	Poushneh (2021a)
2002	Communication	Communication privacy management theory	Petronio (2002)	Ha et al. (2021)
2001	Psychology	Theory of mind	Scholl and Leslie (2001)	Balakrishnan and Dwivedi (2021)
2003	Information technology	Unified theory of acceptance and use of technology	Venkatesh et al. (2003)	Moriuchi (2021)
2003	Sociology	Social agency theory	Mayer et al. (2003)	Aeschlimann et al. (2020)
2004	Law	Contextual integrity theory	Nissenbaum (2004)	Ahmad et al. (2020)
2012	Information technology	Unified theory of acceptance and use of technology 2	Venkatesh et al. (2012)	Hwang and Kim (2021)
2014	Marketing	Coolness model	Sundar et al. (2014)	Ashfaq et al. (2021)

theory, which can be done using a grounded theory methodology (Charmaz, 2014).

5.2 | Keyword co-occurrence of themes in conversational commerce research (RQ4)

This study carries out a keyword co-occurrence analysis to unpack the major themes that avail in the intellectual structure of conversational commerce research. In essence, a keyword co-occurrence analysis discerns the intellectual structure of a field through the mapping of keywords that authors enlisted for their publications, wherein the homogenous clustering of keywords in a keyword co-occurrence analysis reveals thematic convergences in that field (Andersen, 2019; Börner et al., 2003; Callon et al., 1983; Donthu et al., 2021c; Zupic & Cater, 2015). The network of keywords is derived and visualized using VOSviewer and presented in Figure 3. In total, four thematic clusters emerged from the keyword co-occurrence analysis, as indicated through the colors in the network, wherein the red cluster denotes the theme of *conversational agent manifestations in conversational commerce*, the yellow cluster encapsulates the theme of *voice assistants in conversational commerce*, the green cluster reflects the theme of *customer behavior in conversational commerce*, and the blue cluster signifies the theme of *technological enablers of conversational commerce*.

To provide an objective assessment of the themes emerging from keyword co-occurrence, this study statistically computes and reports on bibliometric information pertaining to occurrence (OC), degree (DG), average publication year (APY), and average citation (AC) (-Table 6). Specifically, OC denotes the frequency a keyword occurs, whereas DG indicates the number of connections that a keyword has with other keywords, APY reflects the hotness (more recent) or coldness (least recent) of a keyword, and AC signifies the average impact of a keyword (Andersen, 2019; Byington et al., 2019; Donthu et al., 2021c; Waltman et al., 2010).

The next sections provide a sharp and succinct encapsulation of the topics (keywords) organized through sensemaking (Donthu et al., 2021d) and associated bibliometric peculiarities for each thematic cluster that emerged through the keyword co-occurrence analysis (Donthu et al., 2021c).

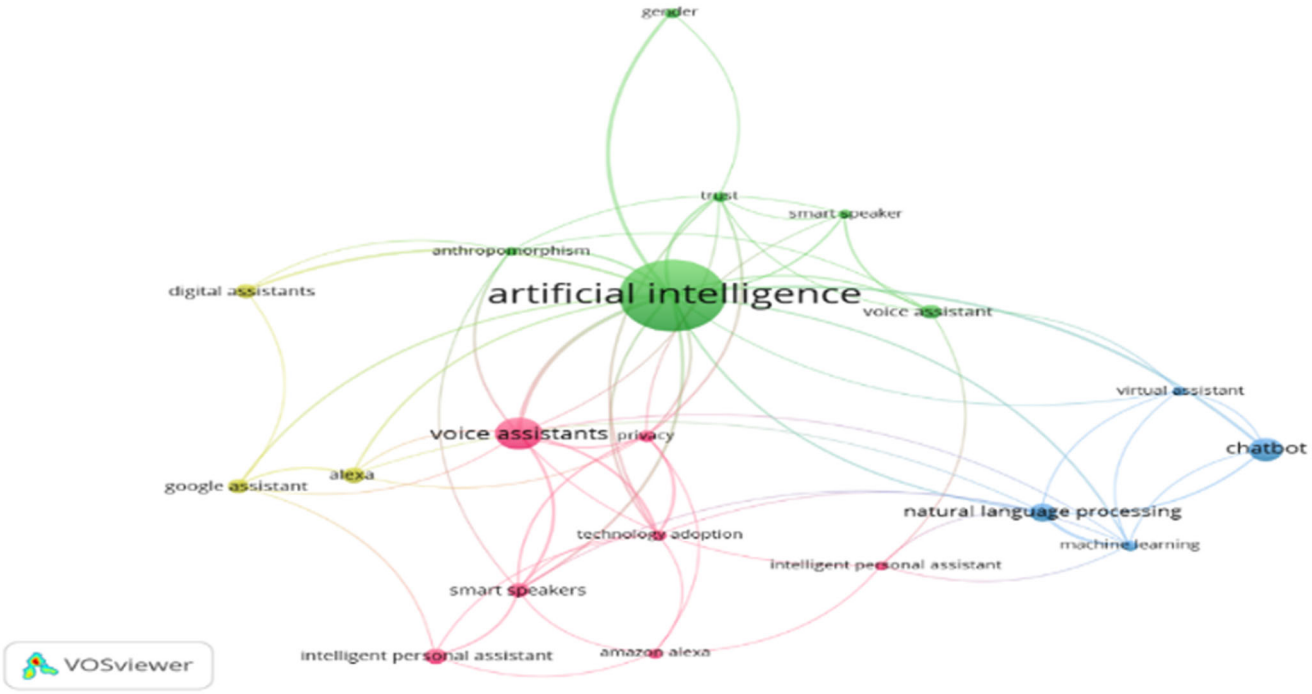

FIGURE 3 Keyword co-occurrence of themes network. *Notes*: Cluster 1 (Red) = Conversational agent manifestations in conversational commerce. Cluster 2 (Yellow) = Voice assistants in conversational commerce. Cluster 3 (Green) = Customer behavior in conversational commerce. Cluster 4 (Blue) = Technological enablers of conversational commerce

5.2.1 | Cluster 1: Conversational agent manifestations in conversational commerce

The first keyword co-occurrence thematic cluster concentrates on research pertaining to the forms and functionalities of conversational agents in conversational commerce and is made up of five major keywords (or topics). This cluster sheds light on a plethora of "conversational agents" such as "Amazon Echo," "digital personal assistants," "intelligent personal agents," and "smart speakers." The most frequently explored conversational agent in this cluster is smart speakers (OC: 8), followed by Amazon Echo (OC: 4), digital personal assistants (OC: 4), and intelligent personal assistants (OC: 4). The most connected and cited conversational agent is smart speakers (DG: 12; AC: 16.63), which is unsurprising given that smart speakers are a conversational agent hardware to conversational agent software such as Amazon Echo, digital personal assistants, and intelligent personal assistants. All keywords (topics) in this cluster are relatively "hot", as indicated by their very recent average publication year (APY: 2018.50–2019.75).

5.2.2 | Cluster 2: Voice assistants in conversational commerce

The second keyword co-occurrence thematic cluster encapsulates research on the forms and functionalities of voice assistants in conversational commerce and is made up of five major keywords (or topics). More specifically, this cluster sheds light on a variety of "voice assistants" "technology" such as "Alexa," "Google assistant," and "Siri." The concept of voice assistants is explored most frequently (OC: 18), most connected (DG: 13), and most cited (AC: 22.17) in this cluster. Among the voice assistants, Amazon's Alexa is most popular (OC: 9), followed by Google assistant (OC: 8) and Apple's Siri (OC: 4). Interestingly, Microsoft's Cortana is absent, which can be explained by the sparse use of the topic as a keyword in the literature. All keywords (topics) in this cluster are recent, which can be observed through their average publication year (APY: 2018.75–2019.78).

5.2.3 | Cluster 3: Customer behavior in conversational commerce

The third keyword co-occurrence thematic cluster focuses on research pertaining to customer behavior in conversational commerce and is made up of seven major keywords (or topics). This cluster sheds light on a range of customer behavior toward conversational agents. Noteworthily, the appearance of "anthropomorphism" (OC: 5) and "gender" (OC: 6) in this cluster signifies customers' attribution of human characteristics to conversational agents, whereas the appearance of "privacy" (OC: 7), "trust" (OC: 6), and "satisfaction" (OC: 4) reflects customer concerns that need to be addressed in order for "technology adoption" (OC: 6) of conversational agents such as "digital assistants" (OC: 8) in conversational commerce to diffuse and proliferate. Indeed, "technology adoption" (AC: 28.17; DG: 10) and "privacy" (AC: 15.57; DG: 9) are the most cited and linked keyword (or topic) in this cluster, which highlights their centrality in existing

TABLE 6 Bibliometric information on the keyword co-occurrence of themes

Themes and keywords	OC	DG	APY	AC
Cluster 1 (Red): Conversational agent manifestations in conversational commerce				
Smart speakers	8	12	2019.50	16.63
Amazon Echo	4	6	2018.50	16.25
Digital personal assistants	4	6	2019.25	13.00
Conversational agents	4	4	2019.75	12.50
Intelligent personal assistants	9	7	2019.22	8.22
Cluster 2 (Yellow): Voice assistants in conversational commerce				
Voice assistants	18	13	2019.78	22.17
Technology	4	2	2018.75	4.50
Siri	4	6	2018.75	3.00
Alexa	9	8	2019.78	0.33
Google assistant	8	6	2019.50	0.13
Cluster 3 (Green): Customer behavior in conversational commerce				
Technology adoption	6	10	2019.33	28.17
Privacy	7	9	2019.86	15.57
Digital assistants	8	4	2019.50	7.50
Gender	6	3	2019.83	1.00
Anthropomorphism	5	6	2020.40	3.80
Trust	6	8	2020.83	0.67
Satisfaction	4	4	2020.50	0.50
Cluster 4 (Blue): Technological enablers of conversational commerce				
Chatbot	13	4	2018.92	10.23
Machine learning	6	8	2019.67	9.00
Intelligent personal assistant	5	5	2019.40	4.80
Virtual assistant	5	5	2018.80	3.80
Natural language processing	10	9	2019.60	1.80
Artificial intelligence	40	21	2019.80	6.25
Virtual assistants	4	5	2019.00	5.50

Abbreviations: AC, average citation; APY, average publication year; DG, degree; OC, occurrence.

research on customer behavior in conversational commerce. The keywords (topics) in this cluster are also the hottest among all clusters, as seen through their average publication year (APY: 2019.33–2020.83).

5.2.4 | Cluster 4: Technological enablers of conversational commerce

The fourth and final keyword co-occurrence thematic cluster revolves around research that investigates the technological enablers of conversational commerce and is made up of seven major keywords (or topics). More specifically, this cluster sheds light on backend technology such as "artificial intelligence" (OC: 40), "machine learning" (OC: 13), and "natural language processing" (OC: 10) in conversational agents such as "chatbot" (OC: 13), "intelligent personal assistant" (OC: 5), and "virtual assistant(s)" (OC: 9) used in conversational commerce. Noteworthily, "artificial intelligence" (DG: 21) and "natural language processing" (DG: 9) are central machine learning (AC: 9.00) concepts that empower conversational agents to interact and perform human-like services for customers in conversational commerce. Thus, it is no surprise that these keywords (topics) are most interconnected in the cluster. Most often, these technological enablers are researched in tandem with "chatbots" (AC: 10.23) and "virtual assistants" (AC: 5.50) in conversational commerce. All keywords (topics) in this cluster are relatively "hot," as indicated by their very recent average publication year (APY: 2018.80–2019.80).

5.3 | Bibliographic coupling of themes in conversational commerce research (RQ4)

The present study conducts bibliographic coupling as an alternative bibliometric analysis technique to triangulate the findings from the keyword co-occurrence analysis (Goodell et al., 2021). Unlike keyword co-occurrence analysis that employs keywords, bibliographic coupling uses document references for its analysis (Donthu et al., 2021a). In bibliographic coupling, documents with common referencing patterns converge and form bibliographic couples that reflect a common theme (Kessler, 1963). Both bibliographic coupling and keyword co-occurrence analysis clusters "citing" documents and "current" keywords, as opposed to alternative bibliometric analysis techniques such as co-citation analysis, which groups "cited" documents and thus reflect past rather than current content in the field (Boyack & Klavans, 2010; Byington et al., 2019; Donthu et al., 2021c). In this regard, the bibliographic coupling is a suitable alternative to keyword co-occurrence analysis to triangulate current literature insights in the field (Goodell et al., 2021; Donthu et al., 2021). Noteworthily, the bibliographic coupling of conversational commerce publications reveals five major thematic clusters, discussed in the following subsections (Table 7).

5.3.1 | Cluster 1: Human interaction with conversational agents

The first cluster concentrates on human interaction with conversational agents. The top 10 most cited articles in this cluster are Hoy (2018), Luo et al. (2019), Ho et al. (2018), Marchesi et al. (2019), Coniam (2014), Burden (2008), Rhee and Choi (2020), Bergen (2016), Huang et al. (2020), and Iovine et al. (2020) with 192, 67, 60, 36, 25, 16, 12, 13, 11, and 10 citations, respectively. Hoy's (2018) article, which introduces voice assistants' characteristics, features, privacy, and security issues, received the highest citations (TC: 192) in this cluster. Recent publications in this cluster revolve around designing human-centric conversational agents

TABLE 7 Top articles in the bibliographic coupling of themes

Themes and top articles	Author(s)	Citations
Cluster 1: Human interaction with conversational agents		
Alexa, Siri, Cortana, and more: An introduction to voice assistants	Hoy (2018)	192
Frontiers: Machines versus humans: The impact of artificial intelligence chatbot disclosure on customer purchases	Luo et al. (2019)	67
Psychological, relational, and emotional effects of self-disclosure after conversations with a chatbot	Ho et al. (2018)	60
Do we adopt the intentional stance toward humanoid robots?	Marchesi et al. (2019)	36
The linguistic accuracy of chatbots: Usability from an ESL perspective	Coniam (2014)	25
Deploying embodied AI into virtual worlds	Burden (2008)	16
Effects of personalization and social role in voice shopping	Rhee and Choi (2020)	12
'I'd blush if I could': Digital assistants, disembodied cyborgs, and the problem of gender	Bergen (2016)	13
Challenges in building intelligent open-domain dialog systems	Huang et al. (2020)	11
Conversational recommender systems and natural language: A study through the converse framework	Iovine et al. (2020)	10
Cluster 2: Enabling designs and technologies for conversational agents		
Real conversations with artificial intelligence: A comparison between human-human online conversations and human-chatbot conversations	Hill et al. (2015)	204
Bringing chatbots into education: Towards natural language negotiation of open learner models	Kerlyl et al. (2006)	98
Example-based dialog modeling for a practical multi-domain dialog system	Lee et al. (2009)	94
Bots as language learning tools	Fryer and Carpenter (2006)	90
Using corpora in machine-learning chatbot systems	Shawar and Atwell (2005)	68
A computer-assisted English learning chatbot	Jia (2009)	60
Language course: An experimental comparison of chatbot and human task	Fryer et al. (2017)	58
A conversational agent for learner modeling	Kerly et al. (2007)	50
Using artificial intelligence to create value in insurance	Riikkinen et al. (2018)	35
The design and implementation of XiaoIce, an empathetic social chatbot	Zhou et al. (2020)	31
Cluster 3: Voice assistants and smart speakers in conversational commerce		
Alexa, are you listening? privacy perceptions, concerns, and privacy-seeking behaviors with smart speakers	Lau et al. (2018)	119
"Phantom friend" or "just a box with information": Personification and ontological categorization of smart speaker-based voice assistants by older adults	Pradhan et al. (2019)	21
Asking more of Siri and Alexa: Feminine persona in service of surveillance capitalism	Woods (2018)	14
One voice fits all? Social implications and research challenges of designing voices for smart devices	Cambre and Kulkarni (2019)	11
User interactions with "Alexa" in public, academic space	Lopatovska and Oropeza (2018)	10
A scoping review of patient-facing, behavioral health interventions with voice assistant technology targeting self-management and healthy lifestyle behaviors	Sezgin et al. (2020)	7
Designing with GAZE: Tama – A gaze-aware smart speaker platform	McMillan et al. (2019)	6
Marketing via smart speakers: What should Alexa say?	Smith (2020)	6
Amazon: Surveillance as a service	West (2019)	6
Externalized domestication: Smart speaker assistants, networks, and domestication theory	Brause and Blank (2020)	3
Cluster 4: Anthropomorphism in conversational agents		
Living up to the chatbot hype: The influence of anthropomorphic design cues and communicative agency framing on conversational agent and company perceptions	Araujo (2018)	133

(Continues)

TABLE 7 (Continued)

Themes and top articles	Author(s)	Citations
Humanizing chatbots: The effects of visual, identity and conversational cues on humanness perceptions	Go and Sundar (2019)	87
Theoretical importance of contingency in human-computer interaction: Effects of message interactivity on user engagement	Sundar et al. (2016)	81
The media inequality: Comparing the initial human-human and human-AI social interactions	Mou and Xu (2017)	57
Should machines express sympathy and empathy? Experiments with a health advice chatbot	Liu and Sundar (2018)	51
Predicting consumer responses to a chatbot on Facebook	Zarouali et al. (2018)	37
AI-based chatbots in customer service and their effects on user compliance	Adam et al. (2020)	35
Customer service chatbots: Anthropomorphism and adoption	Sheehan et al. (2020)	17
I believe in a thing called bot: Perceptions of the humanness of "chatbots"	Westerman et al. (2019)	10
Speech interface reformulations and voice assistant personification preferences of children and parents	Yuan et al. (2019)	9
Cluster 5: Customer behavior in conversational commerce		
Privacy concerns for the use of a voice-activated personal assistant in the public space	Moorthy and Vu (2015)	79
Hey Alexa … examine the variables influencing the use of artificial intelligent in-home voice assistants	McLean and Osei-Frimpong (2019)	65
Chatbot e-service and customer satisfaction regarding luxury brands	Chung et al. (2020)	59
Okay, Google! An empirical study on voice assistants on consumer engagement and loyalty	Moriuchi (2019)	27
Assessing long-term user experience on a mobile health application through an in-app embedded conversation-based questionnaire	Biduski et al. (2020)	18
Understanding the attitude and intention to use smartphone chatbots for shopping	Kasilingam (2020)	15
Understanding the adoption of voice-activated personal assistants	Coskun-Setirek and Mardikyan (2017)	12
Chatbots in retailers' customer communication: How to measure their acceptance?	Rese et al. (2020)	9
Influence of artificial intelligence (AI) on firm performance: The business value of AI-based transformation projects	Wamba et al. (2020)	9
Understanding consumers' acceptance of automated technologies in service encounters: Drivers of digital voice assistants' adoption	Fernandes and Oliveira (2021)	8

that can understand user needs and emotions, wherein chatbots with human-like features in recommender systems can enhance user interaction (Iovine et al., 2020). Huang et al. (2020) echoed Luo et al.'s (2019) finding on the efficacy of chatbots and emphasized the need to develop more intelligent open-dialog systems to foster long-term customer engagement, which is in line with Ho et al. (2018), who compared customer outcomes resulting from interaction with a chatbot and a human, and found that the emotional, relational, and psychological dispositions remained the same regardless of whether customers interact with a machine or a human, and thus, indicating that conversational agents can be a viable substitute to human agents. In addition, research in this cluster highlights the impact of social roles that conversational agents can exert in their social interaction with customers. Rhee and Choi (2020) used the persuasion theory to explain the impact of personalized conversation on product involvement through a friendly voice bot and found significant improvement in customer interaction due to the social role played by the voice bot. Similarly, Marchesi et al. (2019) examined the intentional stance towards humanoid robots and found the significance of mentalistic explanations in chatbot-customer interactions. More importantly, Coniam (2014) highlighted the importance of linguistic accuracy in chatbots as they shape relational outcomes in chatbot-customer interactions. Finally, the deployment of artificial intelligence-enabled chatbots using avatars has also been touted to revolutionize the future of conversational commerce as the rapid penetration of technology is a precursor that human interaction with humanoid robots will become more common in the future (Burden, 2008).

5.3.2 | Cluster 2: Enabling designs and technologies for conversational agents

The second cluster encapsulates research on design and technological enablers of conversational commerce. The top 10 most cited articles in this cluster are Hill et al. (2015), Kerlyl et al. (2006), Lee

et al. (2009), Fryer and Carpenter (2006), Shawar and Atwell (2005), Jia (2009), Fryer et al. (2017), Kerly et al. (2007), Riikkinen et al. (2018), and Zhou et al. (2020) with 204, 98, 94, 90, 68, 60, 58, 50, 35 and 31 citations, respectively. Hill et al.'s (2015) article, which compared human-human versus human-chatbot conversations in the online environment and found a higher propensity to engage with a chatbot than humans, received the highest citations (TC: 204) in this cluster. To design different kinds of conversational agents for conversational commerce, various modeling techniques play an instrumental role. Lee et al. (2009) proposed a generic dialog modeling framework using an example-based approach to solve multipurpose systems such as car navigation and TV program assistance. Similarly, Shawar and Atwell (2005) discussed corpus-based learning techniques and presents a program for learning multiple languages such as English and French through a spoken dialog diversity corpus, whereas Jia (2009) presented a computer-assisted English language learning chatbot based on textual knowledge and reasoning. Noteworthily, conversational agents that are well designed have utility across different contexts. In the context of conversational agents as service providers to customers (or learners) in the education industry, Kerlyl et al. (2006) discussed the application of conversational agents in the learning environment and highlighted the utility of intelligent tutoring systems to enhance the open learner model. Fryer and Carpenter (2006) extended the usage of chatbots to foreign language learning and observed students' comfort in learning with chatbots. In a more recent study, Fryer et al. (2017) found that the attention span while learning with chatbots is shorter due to mechanized processes, and that a blend of human-machine environments can improve learning productivity, wherein human partners are responsible for developing the course interest and not the chatbots. Dizon (2017) extended research in this area through the second language learner's perspective using Alexa and highlighted the significance of indirect pronunciation in improving the learner's effectiveness. Similarly, Moussalli and Cardoso (2020) examined the role of Alexa in learning a second language, and evidenced its utility to facilitate seamless learning while Tai and Chen (2020) showed that Google Assistant can reduce speech anxiety and enhance user engagement in the case of second language learning for adolescents. Furthermore, research on enabling designs and technologies for conversational agents is also seen making inroads into industries other than education. For example, Riikkinen et al. (2018) developed a conceptual framework to support value creation using chatbots in the case of insurance services, whereas Hsiao and Chang (2019) documented the opportunities that conversational agents create for logistics and transportation services, and Large et al. (2017) highlighted the value of in-vehicle digital voice assistants in enhancing the driver's experience (Large et al., 2017). Other scholars such as Burns and Igou (2019) reviewed the literature to understand the usage of voice assistants in accounting and offered suggestions for designing domain-specific voice assistants in the future, whereas scholars such as Zhou et al. (2020) documented the development of a social chatbot by Microsoft called XiaoIce to satisfy the human need for affection, companionship, and communication, and thus, showing that conversational agents can also offer hedonic value like social companionship for humans besides utilitarian value relating to learning and task performance.

5.3.3 | Cluster 3: Voice assistants and smart speakers in conversational commerce

The third cluster focuses on voice assistants and smart speakers in conversational commerce. The top 10 most cited articles in this cluster are Lau et al. (2018), Pradhan et al. (2019), Woods (2018), Cambre and Kulkarni (2019), Lopatovska and Oropeza (2018), Sezgin et al. (2020), McMillan et al.(2019), Smith (2020), West (2019), and Brause and Blank (2020) with 119, 21, 14, 11, 10, 7, 6, 6, 6, and 3 citations, respectively. Lau et al.'s (2018) article, which shed light on privacy perceptions, concerns, and privacy-seeking behaviors with smart speakers, received the highest citations (TC: 119) in this cluster. The research in this cluster highlights that many firms today are engaging in voice assistants and smart speakers to curate a more seamless experience for customers, triggering the rise of a new type of communication between brands and customers, wherein predictive/prescriptive analytics of data gathered is used to enhance and personalize customer experience (Smith, 2020). Indeed, numerous evidence avail in this cluster to demonstrate the utility and impact of voice assistants and smart speakers in conversational commerce. For example, Cambre and Kulkarni (2019) examined the social consequences of voice design and highlighted the instrumental role of user, device, and context in voice design. Lopatovska and Oropeza (2018) investigated user adoption of Alexa and revealed the significant role of Alexa in capturing user attention. Brause and Blank (2020) studied the usage of smart speakers such as Amazon Echo and Google Home for the smart domestic environment and revealed the utility of smart speakers in companionship, health care, and peace of mind, among others. This corroborates Ramadan, Farah, et al. (2021), who found that voice assistants can play a significant role in offering companionship and freedom to the disabled. Similarly, Pradhan et al. (2019) conducted a study on older adults and voice assistants and found that the socioemotional desires of older adults highlight the importance of anthropomorphism. Besides that, the research in this cluster also showed that offering companionship through voice assistants can also be used to improve customer outcomes in the healthcare industry. For example, Sezgin et al. (2020) reviewed the literature on voice assistants for behavioral health interventions and found that the field is continuously evolving to support behavioral interventions using voice assistants and smart speakers. With the growing popularity of voice assistants, new and advanced versions of smart speakers with gaze actuation are becoming a reality (McMillan et al., 2019). However, smart speakers like Amazon's Echo unfurls not only enormous applications in customers' lives but also subjected to privacy issues, as Lau et al. (2018), who investigated customers' perception of privacy concerns with smart speakers, and found a lack of user understanding of risk related to privacy, which in turn, promotes surveillance capitalism, which is an ecosystem where firms use

customers' data to increase their profits. Nevertheless, West (2019), who studied the surveillance capabilities of the firm to collect customer data through voice assistants like Alexa, noted the utility of such surveillance in improving efficiency, while Woods (2018) suggested that using a feminine persona in voice assistant surveillance can assuage surrounding anxieties.

5.3.4 | Cluster 4: Anthropomorphism in conversational agents

The fourth cluster includes research on anthropomorphism in conversational agents. The top 10 most cited documents in the cluster are Araujo (2018), Go and Sundar (2019), Sundar et al. (2016), Mou and Xu (2017), Liu and Sundar (2018), Zarouali et al. (2018), Adam et al. (2020), Sheehan et al. (2020), Westerman et al. (2019), and Yuan et al. (2019) with 133, 87, 81, 57, 51, 37, 35, 17, 10, and 9 citations, respectively. Araujo's (2018) article, which examined the importance of anthropomorphism in digital assistants to influence attitude, satisfaction, and emotional connection with the user, received the highest citations (TC: 133) in this cluster. The research in this cluster highlighted that conversational agents express different personality traits and communication attributes when interacting with customers (Mou & Xu, 2017), wherein chatbots' sympathy and empathy expressions are favored over the unemotional provision of advice (Liu & Sundar, 2018). Noteworthily, anthropomorphic conversational agents has been found to be capable of satisfying customer desire and need for human interaction (Sheehan et al., 2020) across customer segments (Yuan et al., 2019). Nevertheless, Westerman et al. (2019) found significant differences in the conversational agent responses when conversed with various typos and capitalized fonts, whereas Chérif and Lemoine (2019) noted that customers feel a stronger impression of social presence if they interact with a voice assistant with a human voice than a synthetic one. Indeed, the notion of social presence is important as it also mediates the influence of anthropomorphic design on user compliance (Adam et al., 2021). This corroborates a recent study by Moriuchi (2021), who found that expectation positively impacts the voice assistant's user experience. Cho et al. (2019) added that modality, task differences, and device can influence customer's perception of human likeliness of conversational agents, whereas other scholars shed light that perceived contingency mediates the effect of message interactivity on attitude (Sundar et al., 2016), and user expectations for message interactivity increase with the identification of agents as human (Go & Sundar, 2019). More importantly, customer's attitude toward the conversational agent needs to be carefully shaped and taken care as it can predict and explain a significant variation in customer intention to engage in commercial endeavors (e.g., patronage and purchase) (Zarouali et al., 2018).

5.3.5 | Cluster 5: Customer behavior in conversational commerce

The fifth and final cluster revolves around customer behavior in conversational commerce. The top 10 most cited articles in this cluster are Moorthy and Vu (2015), McLean and Osei-Frimpong (2019), Chung et al. (2020), Moriuchi (2019), Biduski et al. (2020), Kasilingam (2020), Coskun-Setirek and Mardikyan (2017), Rese et al. (2020), Wamba et al. (2020), and Fernandes and Oliveira (2021) with 79, 65, 59, 27, 18, 15, 12, 9, 9, and 8 citations, respectively. The research in this cluster show that AI technologies empowering conversational agents such as chatbots and virtual assistants lead to several benefits, such as improving firm performance and process improvements, resulting in improved customer behavior (Wamba et al., 2020). Indeed, customer service today has become increasingly interactive and engaging with the use of conversational agents (Chung et al., 2020). The highest cited article in this cluster, Moorthy and Vu (2015), showed that customers today are willing to share private information with conversational agents. Other scholars such as Vimalkumar et al. (2021) added that customers' perception of privacy influences digital assistants' adoption and thus, highlighting the pivotal role of trust in the adoption of and engagement with conversational agents. This corroborates the work of Rese et al. (2020), who found that privacy concerns negatively influence usage intention, though they also noted that the authenticity of conversation, perceived usefulness, and enjoyment positively influence acceptance towards a voice assistant. These findings are also in line with Coskun-Setirek and Mardikyan (2017), who used the technology adoption model to advocate the role of perceived ease of use and usefulness for building behavioral intention to use digital assistants, and Kasilingam (2020), who found that perceived usefulness, ease of use, enjoyment, price consciousness, personal innovativeness, and perceived risk influence the attitude towards chatbots. On the motivation front, Chopra (2019) used Vroom's expectancy theory of motivation to explain the motivation of young consumers to use artificial intelligence-enabled technologies for shopping decisions, while McLean and Osei-Frimpong (2019) highlighted motivations such as utilitarian, symbolic, and social benefits impact the adoption of digital assistants. Other scholars such as Moriuchi (2019) found that customer engagement partially mediates the influence of perceived usefulness on customer loyalty for both transactional and non-transactional activity, whereas Han and Yang (2018) revealed that task attraction, social attraction, physical attraction, and privacy risk are additional influencing factors for digital assistant adoption, Ashfaq et al. (2021) emphasized the positive influence of functional, hedonic, and economic value on consumer attitude, and Fernandes and Oliveira (2021) suggested that investment in relational, functional, and social elements can improve the adoption of digital assistants in conversational commerce.

6 | TOWARDS A CONCEPTUAL FRAMEWORK FOR CONVERSATIONAL COMMERCE (RQ5)

The science mapping through keyword co-occurrence analysis and bibliographic coupling sheds light on the triangulation of major themes in conversational commerce research (Table 8). To provide additional depth beyond the major themes in the field, a content analysis of articles in the field was conducted to develop a conceptual framework that details the antecedents, enablers,

TABLE 8 Summary of conversational commerce research

Performance analysis • Field performance • Based on bibliometrics	Keyword co-occurrence analysis • Body of knowledge • Based on keywords	Bibliographic coupling • Body of knowledge • Based on citing publications	Conceptual framework • Body of knowledge • Based on factors
Performance	*Themes*	*Themes*	*Factors*
Publication activity • Total of 722 articles published between 1976 and June 2021. Top sources • Most citations: *Computers in Human Behavior* (746 citations). • Most publications: *Computers in Human Behavior* (17 publications) Top publications • Hill et al. (2015) • (204 citations) Top authors • Most citations: Sundar SS (219 citations) • Most publications: Sundar SS, Araujo T, Fryer LK, and Thompson A (three publications each)	Cluster 1 (Red): Conversational agent manifestations in conversational commerce • Smart speakers • Amazon Echo • Digital personal assistants • Conversational agents • Intelligent personal assistants Cluster 2 (Yellow): Voice assistants in conversational commerce • Voice assistants • Technology • Siri • Alexa • Google assistant Cluster 3 (Green): Customer behavior in conversational commerce • Technology adoption • Privacy • Digital assistants • Gender • Anthropomorphism • Trust • Satisfaction Cluster 4 (Blue): Technological enablers of conversational commerce • Chatbot • Machine learning • Intelligent personal assistant • Virtual assistant • Natural language processing • Artificial intelligence • Virtual assistants	Cluster 1: Human interaction with conversational agents Cluster 4: Anthropomorphism in conversational agents Cluster 3: Voice assistants and smart speakers in conversational commerce Cluster 5: Customer behavior in conversational commerce Cluster 2: Enabling designs and technologies for conversational agents	Antecedents of conversational commerce: 1. Utilitarian attributes • Ease of use • Functional intelligence • Usefulness • Privacy risk 2. Hedonic attributes • Agent disclosure (human/bot) • Attraction • Coolness • Cuteness • Enjoyment • Human voice (human/bot) • Self-expressiveness Mediators of conversational commerce: • Anthropomorphism/human likeness • Desire • Parasocial interaction • Perceived control • Performance expectancy • Privacy concern • Trust Moderators of conversational commerce: 1. Situational moderators • Brand involvement • Situational severity • Situational surprise 2. Personal moderators ➢ Psychographic characteristics • Personal expectation • Personal innovativeness • Price consciousness • Self-esteem • Technology expertise ➢ Demographic characteristics • Age • Gender Consequences of conversational commerce: 1. Attitudinal acceptance 2. Intention • Behavioral intention • Continuance intention • Purchase intention • Word-of-mouth intention 3. Actual use behavior 4. Experience 5. Satisfaction 6. Post-usage behavior • Addiction • Continuance • Loyalty

(Continues)

Enablers of conversational commerce:
1. Artificial intelligence
   - Machine learning
   - Natural language processing
2. Design
   - Personalization
   - Predictive/prescriptive analysis

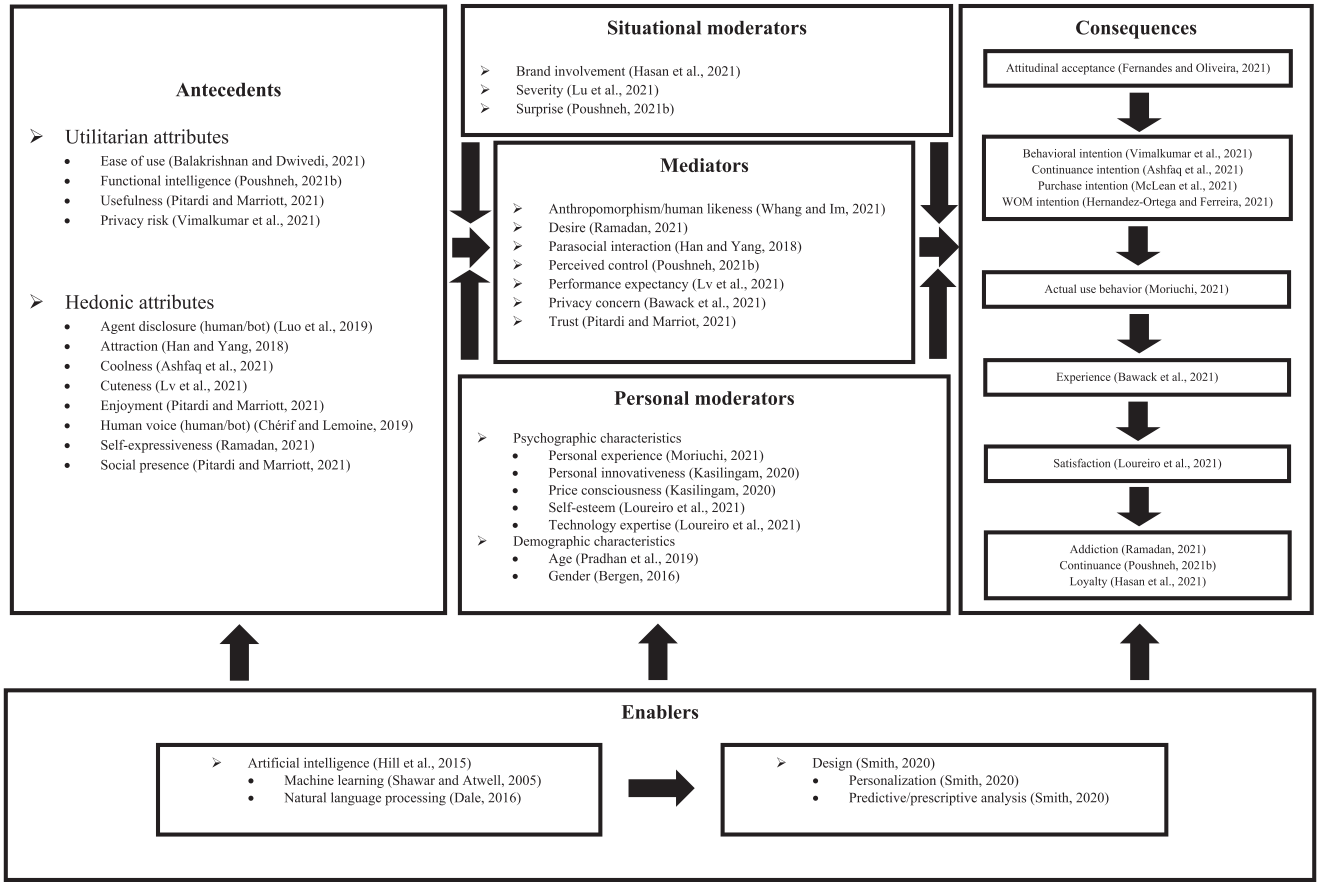

FIGURE 4 Conceptual framework for conversational commerce

mediators, moderators, and consequences of conversational commerce, as presented in Figure 4. Noteworthily, despite its comprehensiveness, this conceptual framework should not be viewed as all-encompassing or definite; instead, it should be viewed as a source of foundational knowledge that future research can build upon and expand accordingly. Even in the corpus of articles in the present review, not all factors could be included and mapped onto this conceptual framework as they may be in a development stage where their relationships with other factors have not been hypothesized or tested.

Antecedents are determinants of consequences, and their effects on consequences can be mediated or moderated by other factors. Two categories of antecedents are prominent in conversational commerce, namely utilitarian and hedonic attributes. Utilitarian attributes relate to aspects of function and utility such as ease of use (Balakrishnan & Dwivedi, 2021), functional intelligence (Poushneh, 2021b), usefulness (Pitardi & Marriott, 2021), and privacy risk (Vimalkumar et al., 2021), whereas hedonic attributes relate to aspects of emotion and pleasure such as agent disclosure (human/bot) (Luo et al., 2019), attraction (Han & Yang, 2018), coolness (Ashfaq et al., 2021), cuteness (Lv et al., 2021), enjoyment (Pitardi & Marriott, 2021), human voice (human/bot) (Chérif & Lemoine, 2019), self-expressiveness (Ramadan, 2021), and social presence (Pitardi & Marriott, 2021).

Mediators are factors that explain the process through which two factors are related, for example, antecedents and consequences. Among the mediators that exemplify why or how antecedents exert impact on consequences in conversational commerce include

anthropomorphism or human likeness (Whang & Im, 2021), desire (Ramadan, 2021), parasocial interaction (Han & Yang, 2018), perceived control (Poushneh, 2021b), performance expectancy (Lv et al., 2021), privacy concern (Bawack et al., 2021), and trust (Pitardi & Marriot, 2021).

Moderators are factors that affect the strength and direction of relationship between two factors, for example, antecedents and consequences, antecedents and mediators, and mediators and consequences. Two categories of moderators are prominent in conversational commerce, namely situational moderators and personal moderators. Situational moderators relate to conditions in the environment such as brand involvement (Hasan et al., 2021), severity (Lv et al., 2021), and surprise (Poushneh, 2021b), whereas personal moderators relate to characteristics associated to the psychographic characteristics of the individual such as personal experience (Moriuchi, 2021), personal innovativeness (Kasilingam, 2020), price consciousness (Kasilingam, 2020), self-esteem (Loureiro et al., 2021), and technology expertise (Loureiro et al., 2021), as well as the demographic characteristics of the individual such as age (Pradhan et al., 2019) and gender (Bergen, 2016).

Consequences are factors that result from the influence of antecedents, mediators, and moderators. Noteworthily, the consequences in conversational commerce manifest through a process involving attitudinal acceptance (Fernandes & Oliveira, 2021); intentions such as behavioral intention (Vimalkumar et al., 2021), continuance intention (Ashfaq et al., 2021), purchase intention (McLean et al., 2021), and word-of-mouth intention (Hernandez-Ortega & Ferreira, 2021); actual use behavior (Moriuchi, 2021); experience (Bawack et al., 2021); satisfaction (Loureiro et al., 2021); and post-usage behavior such as addiction (Ramadan, 2021), continuance (Poushneh, 2021b), and loyalty (Hasan et al., 2021).

Last but not least, conversational commerce would not exist without its *enablers*. Two prominent categories of enablers exist in conversational commerce: artificial intelligence and design. Artificial intelligence enabling conversational commerce consists of machine learning (Shawar & Atwell, 2005) and natural language processing (Dale, 2016), whereas design enabling conversational commerce encapsulates personalization (Smith, 2020) and predictive and prescriptive analysis (Smith, 2020).

7 | REFLECTIONS AND WAYS FORWARD (RQ6)

To this end, this comprehensive and systematic review of conversational commerce research has provided a state-of-the-art overview of the performance and intellectual structure of the field. Noteworthily, this review reveals that conversational commerce research is not new, spanning a presence of over 45 years since 1976. To conclude, this review presents a summary of its key takeaways and implications before offering suggestions for future research and acknowledging its limitations.

7.1 | Key takeaways

There are several key takeaways from this review on conversational commerce research (Table 8).

First, this review found a total of 722 articles on conversational commerce published between 1976 and June 2021 (RQ1). While the publication activity indicates that the field is relatively rich on the surface, a deeper scrutiny of publication trend revealed that over 65% of articles are published only within the last three years (2019–2021). This trend may be attributed to the emergence of the Fourth Industrial Revolution (IR 4.0) that began and proliferated during this period (Lim, 2019), wherein this industrial revolution rallies the use of artificial intelligence across myriad application areas, including in conversational commerce. Thus, it is unsurprising that many scholars have sought to pursue research in this area, though they remain largely focused on understanding the technology itself, and thus, overlooking the potential of expanding its application areas and impact assessment for commerce, which suggest that there is still much room for research in this field.

Second, this review revealed that *Computers in Human Behavior* is the top source for conversational commerce research with the most citations (746) and publications (17) (RQ2). Thus, it is no surprise that the top publication in the field has appeared in this journal (i.e., Hill et al., 2015). Noteworthily, the top 10 sources that have published conversational commerce research are in the domains of computers and digitalization, business, communication and knowledge management, and psychology, which point to the multidisciplinary scope of conversational commerce. In this regard, future research that intends to contribute to the field of conversational commerce is encouraged to engage in multidisciplinary collaborations as doing so would enable the research to receive strong expert input across disciplines relevant to conversational commerce.

Third, this review showed that Sundar is the most cited author (219 citations), and he is joined by Araujo, Fryer, and Thompson as the most productive authors with three publications each (RQ2). Though this review also found diverse contributions from academics and practitioners from Eastern and Western countries or territories, it also noted a high concentration of research among academics and Western countries as compared to their practitioner and Eastern counterparts. In this regard, future research that involve collaboration with practitioners and that shed light on Eastern developments on conversational commerce are highly encouraged to promote greater diversity, inclusivity, and representation of insights in the field.

Fourth, this review unpacked a plethora of theories that have been applied in conversational research (RQ3). These theories come from diverse disciplines, such as communication (e.g., communication accommodation theory, communication privacy management theory, and humor theory), information technology (e.g., technology acceptance model, unified theory of acceptance and use of technology), law (e.g., contextual integrity theory), marketing (e.g., coolness model), psychology (five factors of personality, expectancy theory of motivation, flow theory, stimulus-organism-response model, theory of boundary regulation, theory of mind, theory of planned behavior, theory of reasoned action, and uncanny valley theory), and sociology

(e.g., parasocial relationship theory, social agency theory, and social response theory). The diversity in theories serves as another point of reaffirmation that the field of conversational commerce is not discipline-specific but rather multidisciplinary in nature, and thus, requires multidisciplinary collaborations.

7.2 | Theoretical contributions and implications

The main theoretical contributions of the present review to the field of conversational commerce are two-fold.

First, this review makes a macro-contribution to theory by delineating the main streams of research on conversational commerce, namely *human interaction with conversational agents*, *enabling designs and technologies for conversational agents*, *voice assistants and smart speakers in conversational commerce*, *anthropomorphism in conversational agents*, and *customer behavior in conversational commerce*. While the understanding of research philosophy is essential to guide how research is designed, the understanding of the main streams of research in a field is essential for developing and strengthening the theoretical positioning of research. Noteworthily, prospective authors interested in carrying out new research on conversational commerce can identify the stream of research that they are most interested in, and following that, to find a gap worth addressing and positioning the novelty of their intended contribution accordingly. Thoughtful ideas to extend each stream of research on conversational commerce are provided in a later section of this paper.

Second, this review makes a micro-contribution to theory by offering a conceptual framework that encapsulates the mechanisms (antecedents, enablers), modifiers (mediators, moderators), and implications (consequences) of conversational commerce, as well as by presenting the theories that have been used in the field. While many of the constructs in the conceptual framework have been independently studied in the past, prospective authors interested in carrying out new research on conversational commerce may consider pursuing investigations that (1) add new construct categories, (2) extend the list of constructs in underexplored categories (e.g., demographic characteristics, situational moderators), (3) examine a broader collection of constructs from the same category (e.g., psychographic characteristics), or (4) study the influence of different categories on conversational commerce, among others, to understand the psychological processes in conversational commerce. Similarly, future research could (1) employ any one of the theories uncovered through this review to provide a stronger theoretical foundation for study, (2) use a new and relevant theory with good potential to provide rich insights but has yet to receive attention in conversational commerce, or (3) utilize a combination of theories to support investigations with constructs emerging across multiple categories.

7.3 | Managerial contributions and implications

The main managerial contributions of the present review to the practice of conversational commerce are three-fold.

First, this review contributes to practice by helping managers learn more about conversational commerce. More specifically, managers interested to learn more about conversational commerce can do so through the top articles in the field that were revealed through this review. General insights can be found from the field's overall top publications listed in Table 3, whereas specific insights regarding *human interaction with conversational agents*, *enabling designs and technologies for conversational agents*, *voice assistants and smart speakers in conversational commerce*, *anthropomorphism in conversational agents*, and *customer behavior in conversational commerce* can be obtained from the top publications for each major stream of research in the field in Table 7.

Second, this review contributes to practice by providing a data-driven directory of experts that managers can consider for expert advice on conversational commerce. More specifically, managers interested to gain expert advice on conversational commerce can do so by contacting the top authors in the field, which can be found in Table 4. With the advent of digital and mobile technologies, these experts could now be accessed by anyone and from anywhere around the world, though not necessarily at any time. As it is likely that experts are busy people, managers are encouraged to consider reciprocal win-win relationships (e.g., collaboration opportunities) before respectfully contacting experts for their advice.

Third, this review contributes to practice by offering an overview of the considerations that managers should take into account when pursuing conversational commerce. More specifically, this review categorizes, maps, and sheds light on the mechanisms (antecedents, enablers), modifiers (mediators, moderators), and implications (consequences) of conversational commerce through a large-scale content analysis of the field's research. The existence of myriad variables suggests that engaging in conversational commerce is a complex endeavor. Therefore, managers are encouraged to consider the variables in the conceptual framework in Figure 4 when designing and implementing conversational agents for commercial purposes in the marketplace.

7.4 | Future research directions

There are several potentially fruitful avenues for future research that prospective researchers could consider, and these avenues are organized according to major themes revealed through this review.

7.4.1 | Human interaction with conversational agents

Human-human interaction tends to be easier and more comfortable for most people due to empathy and sympathy-laden emotions that exist in such interactions. However, this may not always be the case for human-machine interaction, which can be monotonous or emotionless. In this regard, the future and success of conversational commerce will depend on and thus require making human

interactions with conversational agents smooth and interactive (Huang et al., 2020). While some scholars show that customers perceive conversational agents as less empathetic (Luo et al., 2019), other scholars reveal that customers' emotional, psychological, and relational evaluations remain the same regardless of interaction with humans or machines (Ho et al., 2018). In this regard, future research remains necessary to untangle conflicting findings, which can be done when causal investigations are undertaken to explain the conditions in which evaluations differ and do not differ between human-human and human–machine interaction in conversational commerce. Besides that, this review also witnessed research interest in the roles that conversational agents can play in conversational commerce, such as assistant or a companion (Rhee & Choi, 2020). While such research is in line with the need to humanize conversational agents to promote better human–machine interaction in conversational commerce, it is unclear whether the roles played by conversational agents remain constant or vary according to service settings and touchpoints in the customer journey. In this regard, future researchers could explore the different roles (e.g., assistant, companion) that conversational agent could assume and the ensuing effectiveness in empowering customer effectiveness (e.g., accomplishing shopping goals) and persuading desired customer behavior (e.g., loyalty) across different service settings (e.g., education, hospitality) at various touchpoints (e.g., prepurchase, purchase, and postpurchase) in the customer journey. Thus, the following future research questions (FRQs) are proposed:

FRQ1. What are the conditions that explain the similarities and differences between human-human and human-machine interaction, and how can conversational commerce design and engage in conversational agents where human-machine interaction espouses the positive aspects of human-human interaction in addition to leveraging the advantages of machines so as to ensure that conversational commerce provides a superior experience for customers of the future?

FRQ2. What are the roles that conversational agents can play and how should they be deployed across the different service settings and the various touchpoints in the customer journey?

7.4.2 | Enabling designs and technologies for conversational agents

Conversational commerce has wide applications across industries such as banking, education, entertainment, healthcare, and hospitality (Bolton et al., 2018; Botanalytics, 2018; De Keyser et al., 2019; Lester et al., 2004). Innovations on designing conversational agents for insurance (Riikkinen et al., 2018), transportation and logistics (Hsiao & Chang, 2019), language learning (Dizon, 2017; Fryer et al., 2017), driving assistance (Large et al., 2017), and accounting (Burns & Igou, 2019) have also shown utility in providing customer services in ways that lead to efficient and effective customer experiences and outcomes. However, different conversational agents exist, and the same can be said about industries and service offerings. While conversational agents such as Amazon Alexa, Google Assistant, Siri, and Cortana have been popularly examined (Dizon, 2017; Moussalli & Cardoso, 2020), the unique characteristics of the design and technology underpinning each conversational agent and their suitability for implementation as well as performance across industries and service offerings remain less visible. In this regard, future research is encouraged to explore the peculiarities of designs and technologies that enable conversational agents and to engage in comparative assessments on the congruence and effectiveness of ensuing design and technology typologies of conversational agents for conversational commerce across industries and service offerings. Thus, the following future research questions (FRQs) are proposed:

FRQ3. What are the designs and technologies as well as their associated characteristics that (could) underpin different conversational agents, and how can they be logically organized to form a state-of-the-art typology of conversational agents?

FRQ4. How do different conversational agents fare or perform, and which types of conversational agents are more and less congruent or suitable across different industries and service offerings?

7.4.3 | Voice assistants and smart speakers in conversational commerce

Voice assistants have proliferated increasingly as a result of the emergence of smart speakers, and together, they ease life and form contemporary lifestyles by facilitating various technology-mediated tasks such as ordering food, playing music, and searching a query on the internet, and thus, giving rise to a new form of communication between brands and customers (Smith, 2020). There is also growing research on user adoption of voice assistants and smart speakers across different settings such as education (Lopatovska & Oropeza, 2018), domestic use (Brause & Blank, 2020), and health intervention (Sezgin et al., 2020). However, with the rise in demand for voice assistants and smart speakers, customer concerns for privacy have also spiraled (Lau et al., 2018), leading to a new stream of research on surveillance capability and capitalism, as well as the personalization–privacy paradox (West, 2019), which remain in infancy. The literature has so far remained relatively silent on whether or not customers are aware of surveillance capitalism and how they would perceive it under different scenarios, as well as the ways in which firms can improve their surveillance capability and ethically engage in surveillance capitalism that customers can accept and live with. Thus, the following future research questions (FRQs) are proposed:

FRQ5. How do customers perceive surveillance capitalism, and under what conditions will they be willing to agree or accept to be part of surveillance capitalism?

FRQ6. What are the different values that surveillance capitalism can offer, and how can firms enhance surveillance capability and ethically engage in surveillance capitalism to safely navigate the personalization–privacy paradox?

7.4.4 | Anthropomorphism in conversational agents

Anthropomorphism is a major factor that influence customer adoption of and engagement in conversational commerce (Araujo, 2018). Noteworthily, anthropomorphic conversational agents have been found to be able to satisfy customers desire and need for human interaction (Sheehan et al., 2020). However, many scholars have noted that little focus has been given to customers' perceived humanness of conversational agents, and that future research needs to provide greater insights into the factors responsible for shaping that perception and improving the human likeness of conversational agents (Cho et al., 2019; Westerman et al., 2019). Other scholars have also emphasized the need for conversational agents research to be explicitly linked and investigated with commercial outcomes (McLean et al., 2021). Thus, the following future research questions (FRQs) are proposed:

FRQ7. What are the factors that shape customer perceptions of humanness in conversational agents, and how can these factors translate into actionable strategies to enhance the human likeness of conversational agents for commercial purpose?

FRQ8. What is the impact of anthropomorphism of conversational agents on commercial outcomes such as purchase, sales, new product development, and market expansion in the short and long run?

7.4.5 | Customer behavior in conversational commerce

Customer behavior is a large area of research that may be intertwined with research across different themes. However, most studies that fall under this broad theme would relate to emerging customer behavior that has not reached sufficient maturity to establish itself as a major or standalone theme. Consistent with the conceptual framework developed herein this review, there is ample room for future research to explore and examine customer behavior that is new or less understood in the context of conversational commerce. For example, extant research on customer behavior in conversational commerce appears to be limited to one-to-one human–machine interaction and thus limited to individual purchase and consumption scenarios among customers, and thus, future research could explore the ways in which customer behavior in conversational commerce could manifest in group and social settings, such as group buying (Lim, 2017) and sharing consumption (Lim & Yap, & Makkar, 2021; Lim, 2020). Similarly, future research on customer behavior in conversational commerce could also explore the feasibility of implementing conversational agents for commercial purpose in business customer settings (Lim, 2017), which could rely on contemporary techniques such as neuromarketing (e.g., eye tracker and wearables) for validation (Lim, 2018), and thus, moving beyond consumer customer settings, which have received the most attention in previous research. Thus, the following future research questions (FRQs) are proposed:

FRQ9. How do customers perceive and react to conversational agents in group and social settings in conversational commerce?

FRQ10. How do business customers behave toward conversational agents in conversational commerce, how do they differ from consumer customers, how can they be engaged, and how can their experience be enhanced?

7.5 | Concluding remarks and limitations

This review makes clear that conversational commerce is the future of commerce, wherein human-machine interaction via conversational agents will be the new normal. The COVID-19 pandemic has accelerated the progress of technology adoption across all communities around the world, and thus, it is unlikely that the world will return to the state of technology resistance before the pandemic (Lim, 2021b). In this regard, this review should serve as a useful entry into the world of conversational commerce, as well as an impetus for new research in the field. Nevertheless, this review remains limited in several ways. For example, this review is limited to the insights that could be revealed through a bibliometric analysis, which is typically on the breadth rather than the depth of knowledge in the field. Thus, future reviews that use alternative review methods (e.g., critical reviews and framework-based reviews) that dive into each major theme to uncover finer-grained insights are encouraged (Paul et al., 2021). In addition, given that the present review is limited to insights from an exploratory review design, future reviews that wish to engage in confirmatory investigations could consider conducting a meta-analysis (Palmatier et al., 2005, 2006). Besides that, this review is limited to insights from scholarly literature retrieved from Scopus. Thus, future reviews that incorporate practice insights using alternative sources such as government white papers and industry reports are encouraged. Taken collectively, this review should be useful to gain a one-stop overview of conversational commerce research, as well as the potential insights from scholarly research that are likely to emerge in the future.

ACKNOWLEDGMENTS

Open access publishing facilitated by Swinburne University of Technology, as part of the Wiley - Swinburne University of Technology agreement via the Council of Australian University Librarians.

DATA AVAILABILITY STATEMENT

Data is available from the corresponding author on reasonable request.

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How to cite this article: Lim WM, Kumar S, Verma S, Chaturvedi R (2022). Alexa, what do we know about conversational commerce? Insights from a systematic literature review. *Psychology & Marketing*, 39, 1129–1155. https://doi.org/10.1002/mar.21654