Uncovering Post-Adoption Insights of Voice-Based Artificial Intelligence: A Literature Review

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Abstract

The study presents a bibliometric analysis of 84 articles extracted from Scopus on users' post-adoption behavior towards Voice AI, as no such analysis has yet been done on this topic. This study epitomizes a pioneering effort to map the domain through performance analysis with R and VOS viewer software, prioritizing current insights and thematic analysis providing future research endeavours. The study presents five clusters: post-adoption consequences of Voice AI, Human-Voice AI post-adoption relationship, post-adoption concerns, Communicative and social outcomes, and Sustainable engagement with Voice AI. This review synthesizes the fragmented knowledge into one body by providing theoretical and managerial implications.

Keywords: Voice AI, Voice-based Artificial Intelligence, Post-adoption behavior, Bibliometric analysis, Thematic analysis.

Introduction

"Long-term survival and substantial success of technological firms rely on the continued use of the new technology, rather than the first adoption." (Son & Han, 2011)

Today, the world is experiencing rapid technological advancement, most prominently through the evolution of voice technology or Voice-Based Artificial Intelligence (Voice AI). Voice AI powered by machine learning and natural language processing gives a hands-free interface to users interacting with computers in their routine lives (McLean & Osei-Frimpong, 2019). From the inception of computers, it has been the science fiction dream to interact with computers (Hoy, 2018); the evolution of Voice AI made it realistic in real life. According to a report by Demandsage (2025), around 8.4 billion Voice AI devices are used globally (roughly equal to the world population), which indicates the growing importance and adoption of Voice AI by users. The journey does not end here after adopting and using voice AI- it evolves. This evolution is known as post-adoption behavior (Saga & Zmud, 1994). This post-adoption behavior brings a lot of psychological, behavioral, and emotional consequences that shape the long-term relationship

between users and Voice AI. Additionally, mere adoption and usage are insufficient to unleash the full potential of digital technologies (S. S. Kim & Son, 2009), and sustained post-adoption usage is vital for realizing their enduring value (Maier et al., 2021; Moussawi et al., 2023).

A myriad of studies conducted by the existing researchers on different aspects of post-adoption of Voice AI in various domains, including continuous usage intention (Lan et al.,2024), loyalty, emotional outcomes, and customer engagement (Maduku et al.,2024), customer experience (Kautish et al., 2023), post-adoption usage (Z. Shao et al., 2024), satisfaction (Shao & Kwon, 2021), Discontinuance (Shank et al., 2022), well-being (Prentice et al.,2023), communicative and social consequences (Aeschlimann et al., 2020), and sustainable engagement (Duque et al., 2021; Esau et al., 2022). However, with the absence of a comprehensive and systematic review of the post-adoption of Voice AI, the extant literature remains fragmented, which creates hindrances in new research (i.e., duplication of efforts, cost, time, and energy to search fragmented literature). Therefore, a comprehensive review of the post-adoption of Voice AI is a significant issue that needs to be addressed for the convenience of future researchers. To address the gap, this paper aims to synthesize and review the existing studies to answer the following research questions:

RQ1: What is the annual publication trend in the post-adoption of Voice AI?

RQ2. Which are the top publications, most influential authors, and countries' scientific production in post-adoption of Voice AI?

RQ3. What are the major themes after the adoption of Voice AI?

RQ4. What are the potential future research directions to advance the current knowledge in the post-adoption of Voice AI?

The study contributes to the existing literature in several ways. First, it presents the performance analysis of the existing studies from the Scopus database, highlighting the annual publication trends, most influential articles, most influential authors, and top countries working in this domain. Secondly, it presents thematic analysis by employing bibliographic coupling and analyzing citation patterns; the study maps the evolution of research in these areas, offering a clear structure of recent intellectual contributions. Third, the study presents the conceptual framework and identifies future research directions. The findings of this study would assist stakeholders, including managers, marketers, app developers, and advertising designers, in developing the devices and the embedded applications after considering' users' post-adoption behavior. The study also assists novice researchers and academicians by developing a conceptual framework that helps them pursue future research in this domain.

The rest of the study is organized as follows: Section 2 focuses on uncovering the background of Voice AI and post-adoption users' behavior, followed by the research methodology in Section 3. Section 4 presents the study findings, including performance and thematic analysis through bibliographic coupling. Section 5 describes the discussion and concluding part of the study.

Defining Voice AI and Users' post-adoption behavior

Voice-Based Artificial Intelligence (Voice AI)

Voice AIs are software agents responding to voice commands (Hoy,2018). These are the stand-alone devices (Amazon's Echo, Apple's Home pod, Google Home, Alibaba's Tmall Genie) or in the form of embedded applications in hardware (Alexa, SIRI, Gemini, Microsoft's Cortana, etc.) (Lee et al., 2021). The existing researchers pronounce Voice AI with different names, such as smart voice assistants (Pal et al., 2021), conversational AI (Tschopp et al., 2023), AI-powered Voice assistants (Huh et al., 2023), voice-based artificial intelligence (Patrizi et al., 2023), and virtual assistants (Jones, 2022). Voice AI primarily aims to accomplish users' routine chores via voice commands, like an assistant, including initiating phone calls, texts, or e-mails, setting alarms, obtaining answers to inquiries, reading news, controlling home devices, etc. (Shao et al., 2024). It can also perform special tasks for users, including ordering groceries, paying bills, booking a cab, scheduling appointments, and more. (Malodia et al.,

2022). These are human-like, providing personalized recommendations, contextual information, and prompt service delivery (Moussawi & Benbunan-Fich, 2021).

Users' post-adoption behavior towards Voice AI

"Marketing will soon become a battle for AI assistants' attention. The consumer will remain the target of brand-building efforts, but marketing that encourages trial and repeat purchases will be more effective when aimed at AI." (Dawar, 2020)

"Post-adoption behavior represents users' behaviors after adopting and implementing information technology." (Saga & Zmud, 1994).

The fate of innovation is in the hands of the customer. Any business must maintain its customer base for business. In IT-based industries where technology has been upgraded at a breakneck pace, it is up to the marketer how to sustain the customers and what strategies should be adopted to retain them and create brand loyalty for products. It is essential to discover the users' reactions after adopting the technology. Spiller et al. (2007) highlight that in some IT industries, ISPs have reported that up to 100 percent of their customer discontinued each year. Therefore, it is essential to discover customers' reactions after adopting technology in the tech industry. An increasing body of research has recently paid attention to post-adoption consequences, including continuance usage intention, satisfaction, dissatisfaction, happiness, sadness, recommendation to others, well-being, sustainable engagement, etc. (Q. Hu et al., 2021; Moussawi et al., 2023; Son et al., 2023). In the IS domain, various studies have been conducted to capture the emerging nature of post-adoption system use, such as exploitive and explorative use (Shao Li et al., 2022), routine and innovative use (Li et al., 2013; Maier et al., 2021; Roberts et al., 2016), continued and extended use (See et al., 2019).

Table 1 Key Definitions

Sr. No.	Terms	Definition	Authors
1	Artificial Intelligence	According to McCarthy, "The science and engineering of making intelligent machines, especially intelligent computer programs."	Monostori (2014)
2	Voice based Artificial Intelligence (Voice-AI)	"Voice-AIs are the operating systems that recognize human voice and respond via integrated voices."	Subhash et al. (2020)
3	Natural Language Processing	"An area of research and application that explores how computers can be used to understand and manipulate natural language text or speech to do useful things."	Jospeph et al. (2016)
4	Post-adoption usage: Routine usage Extended usage	"Routine use represents users' regular utilization of voice AI to perform a task. Extended use represents utilization of its new functions to perform a task."	Z. Shao et al. (2024)
5	Well-being	"The presence of positive emotions and moods, the absence of negative emotions, satisfaction with life, fulfilment, and positive functioning."	Chutiyami et al. (2022)
6	Loyalty	"A deep bonded relationship between a brand and a consumer, thereby causing repetitive same brand purchases in the future."	Evanschitzky and Wunderlich (2006); Oliver (1999).
7	Satisfaction	The extent to which the user perceives the product or service meets their needs.	Hsu and Lin (2023)
8	Continued usage Intention	"An individual's intention to continue using an information system (in contrast to initial use or acceptance)."	Bhattacherjee (2001) (p.359)
9	Recommendation Intention	It is the outcome of customers' positive or negative experiences; based on it, they recommend the product or services to others through EWOM or WOM.	Lee et al. (2021)

Sr. No.	Terms	Definition	Authors
10	Customer engagement	"Customer engagement is the level of customers' physical, cognitive, and emotional presence in their relationship with the organization."	Moriuchi (2019)
11	Addiction or Habit	"In psychology, any regularly repeated behaviour that requires little or no thought and is learned rather than innate."	Britannica (1998)
12	Brand credibility	"Brand credibility refers to the degree to which a consumer believes in the trustworthiness and expertise of a brand."	Erdem and Swait, (2004)

Research Methodology

"A literature review article provides a comprehensive overview of literature related to a theme/theory/method and synthesizes prior studies to strengthen the foundation of knowledge" (Paul & Criado, 2020b). According to Paul and Criado (2020b), there are different reviews, including domain-based, structured, framework-based, bibliometric, hybrid, theory-based, and meta-analytical reviews. The present study adopts the bibliometric analysis to uncover the post-adoption consequences of Voice AI. Bibliometric reviews analyze the extensive number of existing articles by using statistical software including R, Biblioshiny, and Excel to figure out the performance in the current domain, including trends, citations, most influencing articles, authors, countries' scientific production, thematic analysis by bibliographic coupling, thematic mapping, factor analysis, and keyword co-occurrence analysis. The study used the graphical software Vos viewer for thematic analysis, suggested by Paul and Criado (2020b), and R for performance analysis of existing articles.

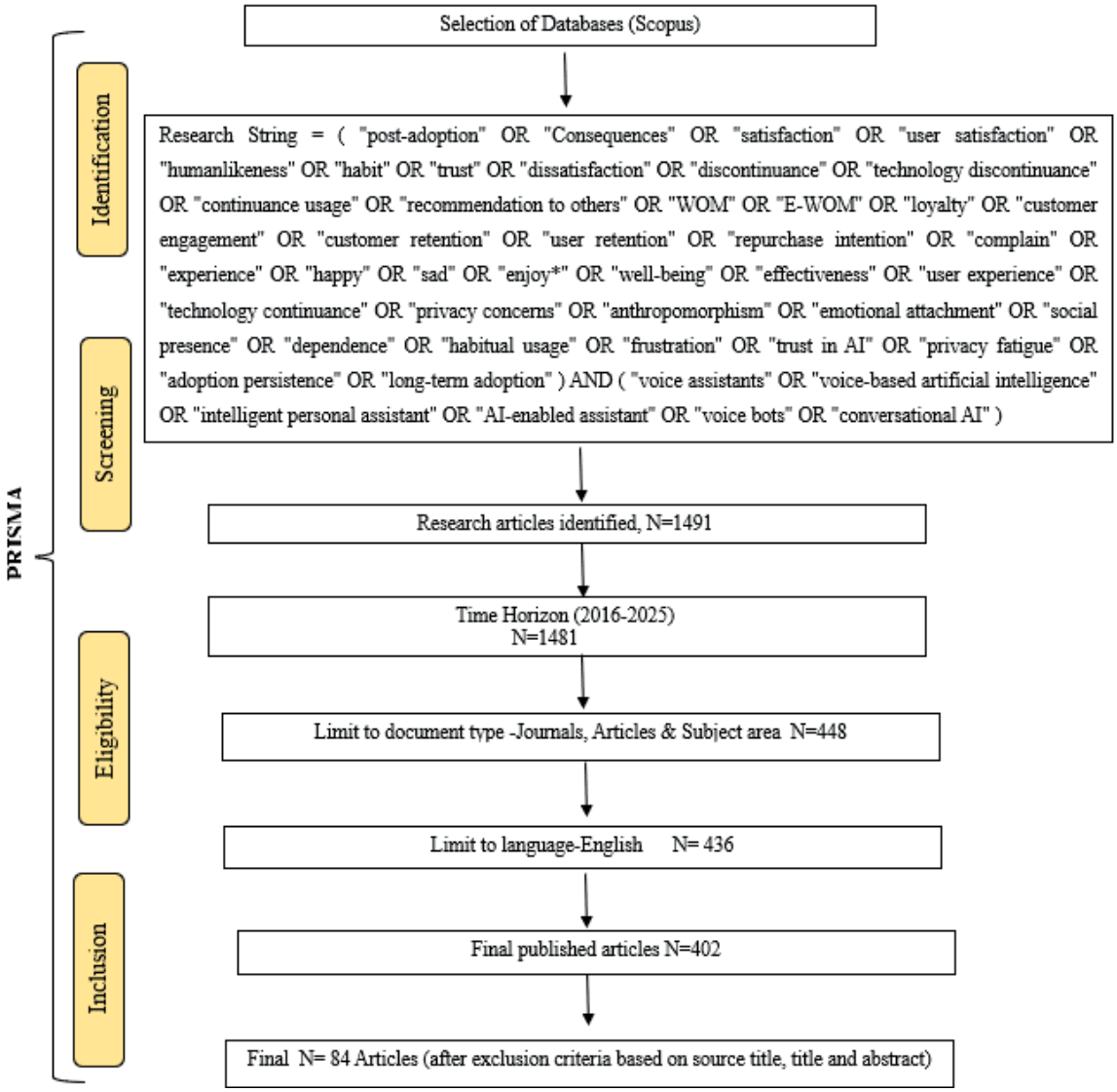
Database selection and defining search terms

The research aims to present an overview of the existing body of literature concerning the post-adoption consequences of Voice AI. Selecting an appropriate search string in bibliometric databases is challenging (Dhingra et al., 2023; Jain et al., 2022). The current study adopted the Scopus database to retrieve high-quality articles for extensive review. Scopus database is a multidisciplinary platform that contains various fields like management, art and humanities, computer science, psychology, marketing, social science, etc. (Kumar et al., 2023), contains high-quality papers with higher citations and provides a qualitative data extraction platform than other databases (Aghaei Chadegani et al., 2013). The following search query designed to retrieve the data from Scopus database ("post-adoption" OR "Consequences" OR "satisfaction" OR "user satisfaction" OR "human likeness" OR "habit" OR "trust" OR "dissatisfaction" OR "discontinuance" OR "technology discontinuance" OR "continuance usage" OR "recommendation to others" OR "WOM" OR "E-WOM" OR "loyalty" OR "customer engagement" OR "customer retention" OR "user retention" OR "repurchase intention" OR "complain" OR "experience" OR "happy" OR "sad" OR "enjoy*" OR "well-being" OR "effectiveness" OR "user experience" OR "technology continuance" OR "privacy concerns" OR "anthropomorphism" OR "emotional attachment" OR "social presence" OR "dependence" OR "habitual usage" OR "frustration" OR "trust in AI" OR "privacy fatigue" OR "adoption persistence" OR "long-term adoption") AND ("voice assistants" OR "voice-based artificial intelligence" OR "intelligent personal assistant" OR "AI-enabled assistant" OR "voice bots" OR "conversational AI").

Refinement and selection of articles

Identifying and selecting the most influential article is pivotal before performing the bibliometric analysis (Gora et al., 2023). The study uses filters in Scopus in the form of language, subject area, source type, document type, and source title. In terms of language, the study only selected articles written in English language. In terms of subject area, Computer science, social science, business, management & accounting have been selected. In terms of source type, journals have been selected, and in terms of document type, final published articles have been selected. Also, some journals and articles related to engineering, medical, or library science that have no relevance to the study were excluded. In the next step, some articles were screened out by reading the title and abstract. The final 84 articles were retrieved for further study.

Figure 1 PRISMA Flowchart of data collection



Results

Descriptive Statistics

Table 2: Primary information

DETAILS	RESULTS
Primary details	
Period	2019:2025
Sources (journals, books, etc)	59
Documents (Total publications)	84
Annual growth rate %	-10.91
Document average age	2.3

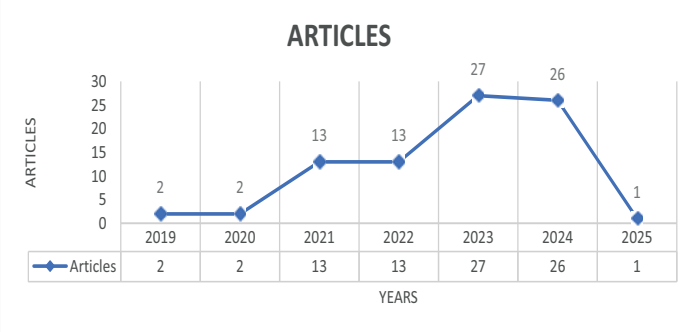
DETAILS	RESULTS
Citation Information	
Total citation	2168
Average citations per doc (TC/TP)	25.81
References	6848
Authors	
No. of Authors	286
Authors of single-authored docs	4
Author Collaboration	
Single-authored docs	5
Co-authors per doc	3.58
International co-authorships %	35.71
Document information	
Article	84
Keywords plus (ID)	286
Author's keywords (DE)	319

Table 2 indicates that the information extracted from the Scopus database entails 84 articles from 59 sources throughout 2019-2025 for final analysis. The primary information extracted from R's biblioshiny software contains 2168 total citations, with an average of 25.81 per publication citation, showing a good number of documents, 286 contributing authors, and 319 authors' keywords from 84 articles used in this study. The 6,848 references present a rich blend of existing knowledge that can be used for future research.

Annual Publications Trend

Figure 2 reflects that 2019-20 is the shallow period of publications containing two articles each in this domain. However, from 2021 to 2024, there has been a significant increase in the number of publications. The highest number of publications was in 2023, 27, and 26 in 2024, which covered the complete picture of articles on post-adoption consequences of voice AI. In 2025, one article highlighted the advanced knowledge in the current domain by proposing a 'Digital Agenticity Theory' to analyze user engagement with Voice AI (Kim &Lee, 2024).

Figure 2 Annual Publication trend



Most influencing articles

Table 3 represents the ten most influential articles, including Moriuchi (2019), who performed an empirical study on consumer engagement and loyalty after adopting voice AI; Mclean et al. (2021) examined the role of Voice AI in consumer brand engagement; Moriuchi (2021) presents the study on consumers' re-use behavior; he explained the antecedents motivate users' to re-use voice AI after adoption. Further researchers delve into the other post-adoption consequences of voice AI, including the Human-Voice AI post-adoption relationship (Pradhan et al., 2019; Whang & Im, 2021), satisfaction and loyalty (Hsu & Lin, 2023), well-being (Kang & Shao, 2023), and continuation and recommendation intention (Lee et al., 2021). Additionally, Hernandez-Ortega and Ferreira (2021) unveil the consumer love for Voice AI.

Table 3 Most influencing articles

Sr. No	Title	Authors	Year	Citations
1	Okay, Google!: An empirical study on voice assistants on consumer engagement and loyalty	Moriuchi	2019	208
2	Alexa, do voice assistants influence consumer brand engagement? – Examining the role of AI-powered voice assistants in influencing consumer brand engagement	Mclean et al.	2021	186
3	"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	162
4	Psychological determinants of users' adoption and word-of-mouth recommendations of smart voice assistants	Mishra et al.	2022	133
5	An empirical study on anthropomorphism and engagement with disembodied AIs and consumers' re-use behavior	Moriuchi	2021	119
6	"I Like Your Suggestion!" the role of human likeness and parasocial relationship on the website versus voice shopper's perception of recommendations	Whang and Im	2021	108
7	Understanding the user satisfaction and loyalty of customer service chatbots	Hsu and Lin	2023	108
8	How smart experiences build service loyalty: The importance of consumer love for smart voice assistants	Hernandez-Ortega and Ferreira	2021	72
9	The impact of voice assistants' intelligent attributes on consumer well-being: Findings from PLS-SEM and fsQCA	Kang and Shao	2023	69
10	The continuation and recommendation intention of artificial intelligence-based voice assistant systems (AIVAS): the influence of personal traits	Lee et al.	2021	68

Top Ten Most Influencing Authors

Table 4 Top Ten Most Influencing Authors

Authors	NP	H_index	G_index	TC	PY_Start
Moriuchi E	2	2	2	327	2019
Acikgoz F	2	2	2	91	2022
Ferreira I	2	2	2	86	2021
Lu Y	2	2	2	64	2021
Babakerkhell MD	2	2	2	40	2021
Pal D	2	2	2	40	2021
Guerreiro J	2	2	2	35	2023
Loureiro SMC	2	2	2	35	2023
Carolus A	2	2	2	28	2021
Jones VK	2	2	2	8	2022

The study examined the top ten most influential authors in the post-adoption of Voice AI in Table 4. Regarding productivity, the table indicates that all ten authors have contributed two articles each. Regarding citations, Moriuchi E (TC: 327) is the highly cited author, followed by Acikgoz F (TC: 91), and the rest is indicated in Table 4. However, all the top ten authors have equal H_Index and G_index.

Countries scientific production

Figure 3 depicts the geographical distribution of papers based on all authors from affiliating countries. A total of 26 countries are working in this domain, segmented as infant-stage countries (Cuba, Afghanistan, Italy, Qatar, France, Italy, Portugal), emerging countries (UK, Canada, Switzerland, Spain and top countries (USA, China, Germany, India) in post-adoption Voice AI research. The top countries are tech-oriented and focused on further research to maintain the customer base and develop strategies to sustain the customers in business.

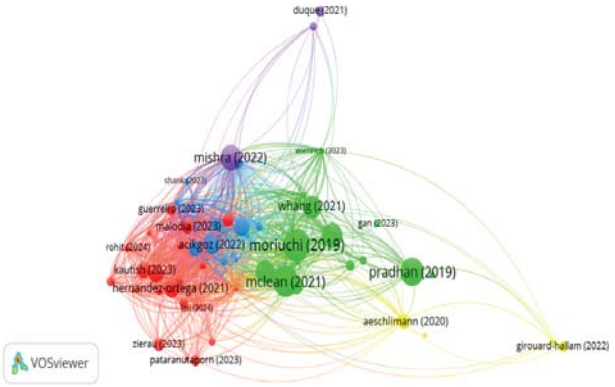
Figure 3 Geographical Representation of Leading Countries. (Generated through Google Maps)

Thematic Analysis

Bibliometric coupling of themes in post-adoption of Voice AI: Cluster analysis

Bibliometric coupling is a valuable technique in bibliometric analysis under systematic literature reviews (SLR) to identify the thematic connections and research clusters between research documents based on shared references (Jarneving, 2007; Donthu et al., 2021). It is a technique for finding conceptual similarities in shared referenced documents. When a document is cited in two or more document references, it is called bibliographically cited (Pandey et al., 2023). The technique reflects a common theme (Kessler, 1963) called 'Clusters.' Fig. 4 represents the bibliographic coupling of networks on a document basis. Out of 84 articles, 56 articles (appendix table) met the threshold limit of 05 citations, and these 56 research articles share common connections highlighting five clusters explained below:

Figure 4 Bibliographic coupling.



Source: Authors' creation using VOS viewer

Cluster 1: Post-adoption consequences of Voice AI (Red cluster)

The first red color' cluster comprises twenty-four articles discussing the users' post-adoption behavior toward Voice AI. Underpinning the cluster, the researchers, Z. Shao et al. (2024), have delved into the cognitive aspect of post-adoption behavior, exploring the nature and causes of post-adoption behavior of Voice AI. They identified three technological affordances - anthropomorphism, interactivity, and personalization that influence cognitive beliefs (users' trust and privacy concerns), which reflect the users' routine and extended usage of Voice AI.

Loyalty, love, and customer emotions are the heart of this cluster. Voice AI delivers a positive customer experience, fostering the consumer-brand relationship and driving consumers' loyalty toward brands (Huh et al., 2023). Hernandez-Ortega and Ferreira (2021) define consumers' love as the psychological mechanism that builds their passion, intimacy, and commitment, which leads to service loyalty. However, consumer well-being significantly contributes to building customer loyalty (Kang & Shao, 2022). Similarly, Maduku et al. (2024) highlight human-like features and utilitarian benefits in evoking customers' positive emotions and deepening engagement with Voice AI, which leads to stronger customer loyalty. Interestingly, interaction with voice AI builds emotional connections between users and the devices, which is not always pragmatic; it can be cool and even create fun (Guerreiro & Loureiro, 2023).

Beyond emotions, researchers deeply dive into customer experience after adopting and using Voice AI. Kautish et al. (2023) explored the online shoppers' post-adoption behavior, highlighting the effect of consumer innovativeness in the use of VAs on their electronic word of mouth (E-WOM), awe experience, and purchase intentions. Meanwhile, Mari et al. (2024) and Shao and Kwon (2021) examined consumers' level of satisfaction and behavioral intention after adopting voice assistants (vs. touch panels) in hotels. De Oliveira et al. (2022) explored that customer experience (CX) is a significant contributor to customer satisfaction and recommendation (word-of-mouth communication).

The users' desire to continue usage of Voice AI in the future is another key post-adoption consequence discussed by different researchers, including Saavedra et al. (2023), who highlight the impact of process and outcome quality on continued intention to use Voice AI; Lan et al. (2024) discussed the effect of language style and service context on continuous usage intention; Pal et al. (2021) evaluates the determinants of continuous usage intention instead of adoption intention. In the same way, Pataranutaporn et al. (2023) highlight post-adoption consequences by defining the belief that using Voice AI can increase trustworthiness, empathy, and effectiveness.

Cluster 2: Human-Voice AI post-adoption relationship (Green cluster)

The second green cluster contains sixteen articles defining humans' perceptions of their relationship with Voice AI. "Is Conversational AI a tool, or is AI not just a tool" (Tschopp et al., 2023)? Is it a servant? An assistant? a kid? a friend? A companion, partner, or else? Tschopp et al. (2023) defined that the users perceive voice AI as a companion partner or peer-like rather than merely as a servant. People are more attracted to voice AI, which has human-like features (anthropomorphism), which impact customer engagement and subsequently impact customer re-use behavior (Moriuchi, 2020). Hu et al. (2021) suggest that a higher human perception of voice AI shows greater trust toward it.

The heart of the cluster is the relationship that users presume with voice AI. Pradhan et al. (2019) delve into the study of Voice AI as a "Phantom Friend" or "Just a Box with Information." They discussed that users perceive voice AI as a human while interacting socially; otherwise, they presume it as an object during routine tasks. Wienrich et al. (2023) found that those who use these devices more frequently attributed it as a friend reported more enjoyment during interaction and perceived more empathy for Voice AI. Similarly, Whang and Im (2020) highlight that people perceive VAs as pseudohuman agents that detach from service providers while shopping.

Furthermore, consumers develop social relationships with Voice AI due to the social presence (someone else present near around), intelligence (understanding intimate information of users, i.e., when they wake, go to sleep, cook, relax, etc.), and social attractions (friendliness) (Mclean et al., 2020). Beyond this, further researchers explored the behavioral pattern of Voice AI for home health and well-being monitoring (Lima et al., 2023). Ossadnik et al. (2023) claimed that the presence of Voice AI in the workplace is perceived as a human co-worker.

Cluster 3: Post-adoption key concerns of Voice AI (Blue Cluster)

The third 'blue cluster' comprises six articles that uncover the users' key concerns after adopting Voice AI, including privacy concerns, security, perceived risk, fraud, third-party data transfer, etc. Privacy has a negative impact on users' attitudes towards the usage of Voice AI (Acikgoz et al., 2023); the more the user has privacy cynicism, the less likely they will use the devices in the future (Acikgoz & Vega, 2021). Cao and wang (2022) find the drivers influencing the users' decisions to conceal or reveal private information to Voice AI. Shank et al. (2022) claimed that users are worried about sharing personal information with voice AI devices due to the fear of pirating personal information, directing future usage discontinuance. The other researchers discussed that perceived security and technological anxiety have a negative impact on satisfaction and continuance intention to use Voice AI (Lee et al., 2021; Jones, 2022; Mou & Meng, 2023).

Cluster 4: Communicative and social outcomes of post-adoption of Voice AI (Yellow cluster)

The fourth 'green cluster' contains four articles unveiling the two perspectives. First is the communicative interaction

with Voice AI, where Aeschlimann et al. (2020) highlight that children have different expectations of answers from both Voice AI and humans. Yet, they share less information with it than human beings. Second, are the social consequences, where children are more likely to share personal information with humans than with Voice AI. It shows that children have trust issues with the device as they more trust on mom than Voice AI (Murray, 2021). In line with this, Girouard-Hallam and Danovitch (2022) conducted a study to find why trust is an issue among children while interacting with Voice AI and why they cannot trust its' communicative outcomes. They found that age is the vital factor influencing the children's trust; they highlight that upper-age children have more trust in Voice AI outcomes than lower-age children.

Cluster 5: Sustainable engagement with Voice AI (Purple cluster)

The last 'Purple cluster' contains five articles that unveil the users' sustainable engagement with Voice AI. Duque et al. (2021) highlight that the device enhances the well-being (Prentice et al.,2023) and independence of older adults by providing automatic content delivery and building a unique relationship with them, which can be a sustainable engagement of older adults with voice AI. It offers immense support to them in their regular chores. Voice AI can foster sustainable customer engagement by enhancing emotional and functional user experiences and promoting positive word-of-mouth recommendations (Lopatovska et al., 2019; Mishra et al., 2021).

Conceptual Framework

Figure 5 Users' Post-adoption behavior towards Voice AI- conceptual framework (Authors' creation)

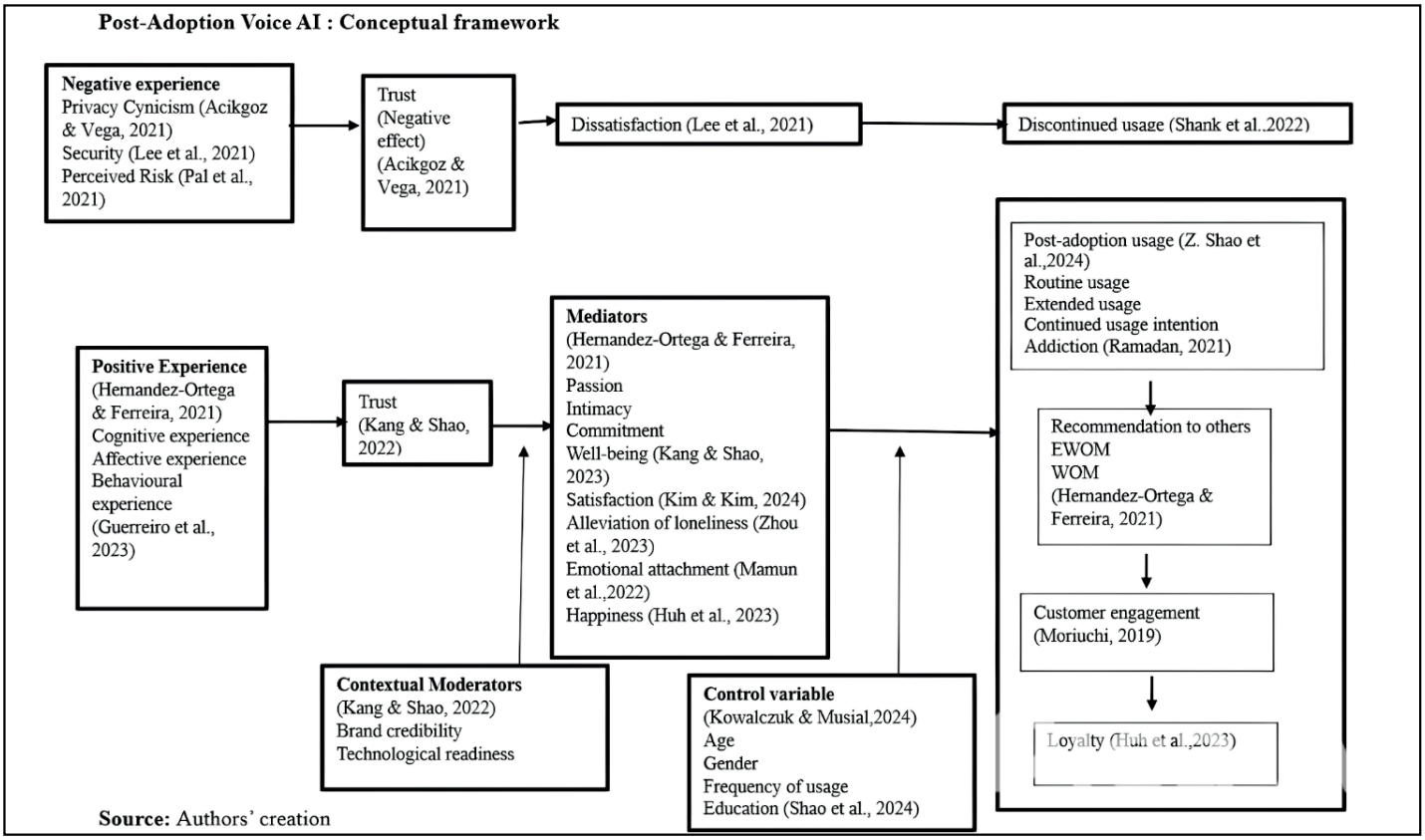


Figure 5 presents the conceptual framework designed by the authors based on the thematic discussion, highlighting the intricate relationship among users' experiences, mediators, moderators, and long-term consequences. The framework identifies the influence of positive and negative experiences on users' post-adoption consequences. After the first adoption of the Voice AI product, users have positive and negative experiences.

The researchers highlight negative experiences, i.e., Privacy cynicism (Acikgoz & Vega, 2021), security (Lee et al., 2021), and perceived risk (Pal et al., 2021) build adverse effects on trust (Ackigoz & vega, 2021). This leads to dissatisfaction (Lee et al., 2021), which resists users from using voice AI devices in the future (Shank et al., 2022). Conversely, positive experiences build trust towards voice AI (Kang & Shao, 2022). This trust fosters satisfaction (Kim & Kim, 2024), emotional attachment (Mamun et al., 2024), and increased passion, intimacy, and commitment toward voice AI(Hernandez-Ortega & Ferreira, 2021). Thus, trust positively influences post-adoption consequences in the presence of some mediators. Mediators are factors that explain the process through which two factors are related, exemplifying that passion, intimacy, commitment (Hernandez-Ortega & Ferreira, 2021), satisfaction(Kim & Kim, 2024), emotional attachment (Mamun et al., 2024), alleviation of loneliness (Zhou et al., 2023), well-being (Kang & Shao, 2023), and happiness (Huh et al., 2023) exert positive impact on post-adoption consequences.

The post-adoption consequences result from the interaction of antecedents, mediators, and moderators. Figure 5 shows that after first adopting the product, if the users are happy and satisfied, they will continue the usage in the future as routine usage or extended usage (Z. Shao et al.,2024), which directs their behavior to recommend the products to others through electronically (EWOM) or through word-of-mouth promotion commencing with customer engagement (Moriuchi, 2019) and culminating in customer loyalty (Huh et al., 2023).

The contextual moderators, brand credibility, and technological readiness (Kang & Shao, 2022) also impact the relationship between trust and mediators. Additionally, the control variables, age, gender (Kowalczuk & Musial,2024), Frequency of usage, and education (Shao et al., 2024), impact the post-adoption consequences.

Summary of clusters and future research directions on post-adoption of Voice AI

Table 5 Summary of clusters and future research directions on post-adoption of Voice AI

Cluster No.	Themes	Findings	Future Directions
1. **(Red cluster)**	**Post-adoption consequences of Voice AI**	The cluster insights the complete picture of customer experience, emotions, love, happiness, coolness, satisfaction, recommendation intention through WOM, E-WOM, trust, and belief, which builds loyalty.	• Who is more loyal? Identify the role of age in service loyalty. • Explore the possible marketing strategies that need to be designed to bridge the gap from usage to re-usage intention.
2. **(Green cluster)**	Human-voice AI post-adoption relationship	The cluster defines the complete picture of man and machine relations: how do humans perceive VAs as their friend, companion, servant, assistant, or merely like a box?	• Investigate the role of emotional advertising in consumer-brand relationships. • Examine how reliance on Voice AI affects interpersonal relationships. Does its presence enhance or diminish human-to-human interaction?
3. (Blue Cluster)	Post-adoption key concerns of Voice AI	The cluster highlights that key issues like privacy cynicism, security, and third-party data transfer must be addressed while designing Voice AI.	• Is there a privacy issue with one brand or all? Designed a comparative study to identify the privacy concerns with different Voice AI brands. • Has celebrity endorsement changed customers' minds from negative to positive perceptions of voice AI? Identify the role of celebrity endorsement or influencer marketing in user-switching behavior.

Cluster No.	Themes	Findings	Future Directions
4. (Yellow cluster)	Communicative and social outcomes of post-adoption of Voice AI	The cluster insights into the Communicative and social outcomes of post-adoption of VBAI highlight that children have trust issues while interacting with VBAI. Yet, upper-aged children feel more trust than lower-aged.	• Why do children have more trust in their mom than Alexa? Does age matter? • What marketing strategies enhance the children's trust and engagement during interaction with voice AI?
5. (Purple cluster)	Sustainable engagement with Voice AI	The cluster insights the sustainable engagement of users with Voice AI, commencing with customer satisfaction and culminating in customer loyalty.	• What factors mediate the relationship between routine usage and users' sustainable engagement with voice AI? • Explore the impact of marketing efforts on customers' sustainable engagement with voice AI.

Discussion, implications, and limitations of the study

Discussion

In recent years, an increasing body of research has turned attention towards the post-adoption consequences of Voice AI. The current study aims to conduct a bibliometric analysis of 84 existing articles on users' post-adoption behavior toward Voice AI and provide future research direction, mainly in marketing. Four research questions are designed in the introduction section and taken into consideration throughout the study. The results show growth in the post-adoption consequences research after 2020; the leading country is the USA, and the most influential author is "Moriuchi E," with 327 citations in this domain. The current study mainly focused on thematic analysis, wherewith Vos viewer software, five clusters framed to take a deep dive into this domain. The first cluster has twenty-four articles from 2021 to 2024 that discussed the post-adoption consequences of voice AI, examining how continued interaction with Voice AI devices leads to long-term engagement, customer satisfaction, dissatisfaction, brand love, brand loyalty, continuance usage intention, a recommendation to others (E-WOM, WOM,), happiness, trustworthiness, effectiveness, customer engagement, and emotional attachment. The second cluster has sixteen articles discussing the human relationship with voice AI after adoption. It highlights that post-adoption is not merely using the technology in the long-term but building an attachment to it. The third cluster has six articles addressing users' key concerns, such as privacy, security, and fraud, after adopting voice AI; these must be considered while designing the products in the future. The fourth cluster has four articles reflecting voice AI's communicative and social outcomes. The fifth cluster has five articles, the most important area being users' sustainable engagement with voice AI. Additionally, based on thematic analysis, the study provides a conceptual framework that clarifies the post-adoption consequences relationship between antecedents, mediators, and moderators. The study also describes a summary of clusters in a table with future research directions, guiding marketers and researchers to conduct future research in this domain.

Implications of the study

The research theoretically contributes to the existing literature by presenting a comprehensive review of the users' post-adoption behavior toward voice AI. Through the synthesis, the fragmented knowledge and the identifications of key themes enhance our understanding of how users interact with voice AI technologies. The study identifies five key themes discussed: the post-adoption consequences, human-voice AI post-adoption relationship, key concerns, communicative and social outcomes, and sustainable engagement with voice AI directs the new dimensions of research in the future. The current research outcomes present a structured framework contributing to the existing literature that explains the interplay between users' experiences (post-adoption positive or negative), trust, satisfaction, and long-term engagement with voice AI. It reflects the relationship among antecedents, mediators, moderators, and post-adoption consequences,

which assists further researchers and academicians in understanding and reframing their research frameworks in the extended domain. Also, the study provides different future research directions to novice researchers in this domain.

The research is equally beneficial from practical aspects as it delivers insights to marketers, app developers, advertising designers, developing the devices as well as the embedded applications after considering the users' post-adoption behavior. The thematic cluster 1 defines the post-adoption consequences that direct the marketer to understand the users' behavior towards voice AI. Cluster 2 highlights the human relationship with voice AI, which guides the advertiser to insert the emotional appeal and design the product that is emotionally attached to users. Cluster 3 reflects the key concerns and guides the application developers to create the software to ensure data transfer transparency and safety and remove the fear of data piecing. Cluster 4 suggests improving the vocal expression to connect the users with voice AI in the future. The fifth cluster suggests focusing on service delivery, which leads to users' sustainable engagement with voice AI. Future research gives insights into how marketers can integrate effective marketing strategies, including influencer marketing, celebrity endorsement, etc., with voice AI technologies that can transition users' negative experiences to positive experiences.

Limitations of the study

The study did a comprehensive review for future research in this field. Nevertheless, the study was exposed to several limitations. First, the study is confined to one database, Scopus, which may lessen the number of articles for the study. Therefore, different databases, such as Google Scholar, Web of Science, PubMed, and diamension.ai, can be used in the future. Second, the study focused on two types of analysis: performance and thematic analysis; future studies can enhance the review analysis by adding framework-based review or factorial analysis. Third, the study solely compiles articles in the post-adoption domain; generally, future studies can be conducted to understand the users' post-adoption behavior of voice AI in specific domains like banking, hospitals, homes, education, etc.

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Appendix

Table: Summary of bibliographic coupling articles

Cluster	*Title*	*Sub-themes*	*Themes*	*Citations*
Cluster 1 (Red)	"Oh, happy day!" Examining the role of AI-powered voice assistants as a positive technology in the formation of brand loyalty	Brand loyalty	**Post-adoption consequences of Voice AI**	Huh et al. (2023)
	A practical experience on the amazon Alexa integration in smart offices	User experience		Bogdan et al. (2021)
	Abstract or concrete? The effects of language style and service context on continuous usage intention for AI voice assistants	Continuous usage intention		Lan et al. (2024)
	A Review of Subjective Scales Measuring the User Experience of Voice Assistants	User Experience		Faruk et al. (2024)
	Exploring antecedents impacting user satisfaction with voice assistant app: A text mining-based analysis on Alexa services	User satisfaction		Kumar et al. (2023)
	The impact of voice assistants' intelligent attributes on consumer well-being: Findings from PLS-SEM and fsQCA	Well-being		Kang and Shao (2022)
	Do AI-powered digital assistants influence customer emotions, engagement and loyalty? An empirical investigation	Loyalty, emotions, customer engagement		Maduku et al. (2024)
	Relational cohesion between users and smart voice assistants	Engagement, Pleasure, satisfaction		Hernández-Ortega et al. (2021)

Cluster	*Title*	*Sub-themes*	*Themes*	*Citations*
	Examining the role of consumer motivations to use voice assistants for fashion shopping: The mediating role of awe experience and eWOM	Customer experience		Kautish et al. (2023)
	I am attracted to my Cool Smart Assistant! Analyzing Attachment-Aversion in AI-Human Relationships	Emotions		Guerreiro and Loureiro (2023)
	Can Alexa serve customers better? AI-driven voice assistant service interactions	Customer experience		Malodia et al. (2022)
	Curb your enthusiasm: Examining the customer experience with Alexa and its marketing outcomes	customer experience		De Oliveira et al. (2022)
	To talk or to touch: Unraveling consumer responses to two types of hotel in-room technology	customer experience		Fan et al. (2021)
	Empathic voice assistants: Enhancing consumer responses in voice commerce	customer experience		Mari et al. (2024)
	Voice bots on the frontline: Voice-based interfaces enhance flow-like consumer experiences & boost service outcomes	customer experience		Zierau et al. (2022)
	Hey Google, I trust you! The consequences of brand anthropomorphism in voice-based artificial intelligence contexts	Consumer brand engagement		Patrizi et al. (2023)
	How smart experiences build service loyalty: The importance of consumer love for smart voice assistants	Loyalty, brand love		Hernandez-Ortega and Ferreira (2021)
	Consumer engagement in chatbots and voicebots. A multiple-experiment approach in online retailing context	Consumer engagement		Rohit et al. (2024)
	Exploring the Determinants of Users' Continuance Usage Intention of Smart Voice Assistants	Continuance Usage Intention		Pal et al. (2021)
	Influencing human–AI interaction by priming beliefs about AI can increase perceived trustworthiness, empathy and effectiveness	Trustworthiness, empathy and effectiveness		Pataranutaporn et al. (2023)
	Effects of voice assistant recommendations on consumer behaviour	Post-adoption behaviour		Flavián et al. (2022)
	Uncovering post-adoption usage of AI-based voice assistants: a technology affordance lens using a mixed-methods approach.	Post-adoption usage		Z. Shao et al. (2024)
	Hello Alexa! Exploring effects of motivational factors and social presence on satisfaction with artificial intelligence-enabled gadgets	Satisfaction		Shao and Kwon (2021)
	Impact of process and outcome quality on intention for continued use of voice assistants	Continuance Usage Intention		Saavedra et al. (2023)
Cluster 2 (Green)	Design and user experience analysis of AR intelligent virtual agents on smartphones	Relationship		Gan et al. (2022)

Cluster	*Title*	*Sub-themes*	*Themes*	*Citations*
	Dual humanness and trust in conversational AI: A person-centered approach	Humanness and trust	**Human-voice AI post-adoption relationship**	Hu et al. (2021)
	Discovering Behavioral Patterns Using Conversational Technology for In-Home Health and Well-being Monitoring	Interaction and Behavioral Patterns		Lima et al. (2023)
	"Alexa, You're Really Stupid": A Longitudinal Field Study on Communication Breakdowns Between Family Members and a Voice Assistant	Interaction between Alexa and family		Mavrina et al (2022)
	Alexa, do voice assistants influence consumer brand engagement? – Examining the role of AI powered voice assistants in influencing consumer brand engagement	consumer brand engagement		Mclean et al. (2020)
	Okay, Google!: An empirical study on voice assistants on consumer engagement and loyalty	Consumer relation with brand		Moriuchi (2019)
	An empirical study on anthropomorphism and engagement with disembodied AIs and consumers' re-use behavior	Human-like features		Moriuchi (2020)
	Man or machine – or something in between? Social responses to voice assistants at work and their effects on job satisfaction	Man or machine		Ossadnik et al. (2023)
	"Phantom friend" or "just a box with information": personification and ontological categorization of smart speaker-based voice assistants by older adults	Friend" or "just a box		Pradhan et al. (2019)
	Servant by Default? How Humans Perceive Their Relationship With Conversational AI	Servant or companion		Tschopp et al. (2023)
	"I Like Your Suggestion!" the role of human likeness and parasocial relationship on the website versus voice shopper's perception of recommendations	Human likeness		Whang and Im (2020)
	The Trustworthiness of Voice Assistants in the Context of Healthcare Investigating the Effect of Perceived Expertise on the Trustworthiness of Voice Assistants, Providers, Data Receivers, and Automatic Speech Recognition	Human likeness		Wienrich et al. (2021)
	The role of emotional attachment in IPA continuance intention: an emotional attachment model	Emotional attachment		Mamun et al. (2022)
	"Ask Google Assistant Where to Travel" Tourists' Interactive Experiences With Smart Speakers: An Assemblage Theory Approach	Human-VBAI interaction		Jiménez-Barreto et al. (2022)
	Why people use virtual assistants: Understanding engagement with Alexa	Relationships		Jones (2022)
	Long-Term Effects of Perceived Friendship with Intelligent Voice Assistants on Usage Behavior, User Experience, and Social Perceptions	Friendship		Wienrich et al. (2023)

Cluster	*Title*	*Sub-themes*	*Themes*	*Citations*
Cluster 3 (Blue)	The Role of Privacy Cynicism in Consumer Habits with Voice Assistants: A Technology Acceptance Model Perspective	Privacy Cynicism	**Post-adoption key concerns of Voice AI**	Acikgoz and Vega (2021)
	Consumer engagement with AI-powered voice assistants: A behavioral reasoning perspective	Privacy Cynicism		Acikgoz et al. (2023)
	Revealing or concealing: privacy information disclosure in intelligent voice assistant usage- a configurational approach	privacy information		Cao and Wang (2022)
	The continuation and recommendation intention of artificial intelligence-based voice assistant systems (AIVAS): the influence of personal traits	Perceived security, technological anxiety		Lee et al. (2021)
	Alexa, it is creeping over me – Exploring the impact of privacy concerns on consumer resistance to intelligent voice assistants	privacy concerns		Mou and Meng (2023)
	Discontinuance and Restricted Acceptance to Reduce Worry after Unwanted Incidents with Smart Home Technology	Discontinuance		Shank et al. (2022)
Cluster 4 (Yellow)	Communicative and social consequences of interactions with voice assistants	Communicative and social consequences	**Communicative and social outcomes of post-adoption of Voice AI**	Aeschlimann et al. (2020)
	The effect of an artificial agent's vocal expressiveness on immediacy and learning	Communicative outcomes		Fountoukidou et al. (2021)
	Children's Trust in and Learning From Voice Assistants	social consequences (Trust)		Girouard-Hallam and Danovitch (2022)
	Who Is More Trustworthy, Alexa or Mom?: Children's Selective Trust in a Digital Age	social consequences (Trustworthy)		Murray (2021)
Cluster 5 (Purple)	Automation, well-being and Digital Voice Assistants: Older people and Google devices	Sustainable engagement	**Sustainable engagement with Voice AI**	Duque et al. (2021)
	Trust your guts: fostering embodied knowledge and sustainable practices through voice interaction	Sustainable practices		Esau et al. (2022)
	User recommendations for intelligent personal assistants	Sustainable engagement		Lopatovska et al. (2019)
	Engaging with intelligent voice assistants for well-being and brand attachment	well-being		Prentice et al. (2023)
	Psychological determinants of users' adoption and word-of-mouth recommendations of smart voice assistants	Long-term engagement		Mishra et al. (2021)