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Opportunities or Challenges? The Interplay between Artificial Intelligence and Corporate Social Responsibility Communication

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Abstract

Background: The rapid development of Artificial Intelligence (AI) offers both opportunities and challenges for its application in Corporate Social Responsibility (CSR) communication. While AI can enhance CSR initiatives, its impact on consumer relations and brand perception remains inconsistent. **Objectives:** This study aims to explore the academic landscape of AI's role in CSR communication, focusing on publication trends, key authors, research topics, and future directions. **Methods/Approach:** A bibliometric analysis was conducted on 1,094 articles related to AI and CSR communication, retrieved from the Web of Science database from 2000 to February 2024. Using CiteSpace software, the study mapped research trends by analysing disciplines, countries, institutions, authors, references, and keywords. **Results:** The United States and China lead in publication output, with key research themes including social media impact, management strategies, and consumer trust. Emerging trends point to the importance of privacy, service quality, and perceived value in AI-driven CSR initiatives. **Conclusions:** The integration of AI in CSR communication is an evolving field, with significant contributions from social media research and consumer behaviour studies. Future research should address ethical concerns and long-term effects on consumer trust and engagement.

Keywords: CSR communication; AI; Consumer; CiteSpace; bibliometric

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Introduction

Corporate Social Responsibility (CSR), as a crucial practice concerning the social impact and sustainable development of enterprises, has become one of the focal points in contemporary business. With the rapid development and extensive application of Artificial Intelligence (AI) technology, the application of AI in CSR communication presents new opportunities and challenges for businesses. Through AI technology, enterprises can effectively convey their social responsibility information, enhance their brand image, and better meet the growing expectations of consumers. However, despite some initial achievements in the application of AI in CSR communication, there remain many issues and challenges in this research field that require further exploration.

Firstly, research on AI in CSR communication is still in its infancy, especially considering that AI is a widely applicable field, and its application in CSR communication can be both methodological (Wu et al., 2024; Ruhana et al., 2024) and in terms of products and services (KAZEMI et al., 2023; Galiano-Coronil et al., 2024). As of May 2024, a search on the Scopus platform yielded only 88 research articles that simultaneously address both CSR and AI. However, only one relevant article utilising bibliometric analysis has been found so far (Thomas et al., 2024), which also does not delve into the analysis of the impact on and relationship with consumers. Therefore, this study aims to fill this gap by using bibliometric methods. Additionally, most studies remain at the theoretical exploration and case analysis level. Understanding the most pressing concerns of researchers and businesses in this field is crucial for better problem-solving and predicting future research trends. Secondly, there is inconsistency in research findings regarding consumers' attitudes, perceptions, and behavioural responses to AI technology. Some researchers believe that the application of AI makes consumers more receptive to product usage and understand corporate content (Yuan, 2018). However, others argue that consumers subjectively reject AI services, especially when they perceive that AI provides the service, as they feel a lack of warmth and sincerity, leading to opposition to its use. Moreover, a weak point in current research is the lack of long-term effects studies, with research often limited to short-term outcome evaluations and lacking tracking studies on consumers' long-term cognitive and behavioural changes. Finally, a theoretical framework for understanding the impact mechanisms and pathways of AI in CSR communication has yet to be established, lacking systematic organisation and explanation (Cheng et al., 2022).

To address these issues, this study will conduct an in-depth analysis using bibliometrics. As a quantitative research method, bibliometrics possesses characteristics of systematicity, objectivity, and scientific rigour, enabling researchers to review existing literature comprehensively and discover patterns and trends therein (Lim et al., 2022; Zhao et al., 2023). CiteSpace, developed by Professor Chaomei Chen, is a Java-based co-citation network visualisation application used to detect and reveal the research frontiers and turning points in knowledge domains (Chen, 2006), primarily applied in bibliometric research (Chen et al., 2014). This study not only employs this software to analyse the publication, country, author, and keyword distribution of research related to the impact of AI on CSR communication with consumers but also makes predictions on trends and summarises the current hotspots and issues faced by the industry and academia in this field based on these analyses.

Therefore, this study contributes significantly to the theoretical domain by addressing existing research gaps and potentially advancing further theoretical development. Moreover, it offers valuable practical insights that can aid in the formulation of targeted and effective AI application strategies and practical

recommendations for enterprise managers. These insights have the potential to foster corporate social responsibility practices and promote sustainable development.

The structure of this study is as follows: The first part introduces the current research status, purpose, and significance of studying the impact of AI on CSR communication with consumers. The second part consists of a literature review on the Application of AI technology in CSR, as well as a review of the literature on Consumer attitudes toward AI for CSR communication. The third part introduces the research methods and presents the specific research process. The fourth part involves data analysis, including results on authors, publications, countries, keywords, and trends. The fifth part proposes conclusions and discussions, covering major findings, contributions, limitations, and future research pathways.

Literature review

Application of AI technology in CSR

Artificial Intelligence (AI) technology has become a cornerstone in the evolution of business practices, with its applications permeating various domains, including Corporate Social Responsibility (Dogru & Keskin,2020). The prevalence of AI in businesses and organisations is highlighted by its ability to mimic human intelligence, enabling machines and models to predict outcomes and provide insights that inform strategic decision-making2. In the realm of CSR, the integration of AI is particularly significant as it aligns business operations with Environmental, Social, and Governance (ESG) factors, addressing the urgent global issues of environmental and social equality (Gore et al., 2023; Atanasov et al., 2023).

AI tools such as Natural Language Processing (NLP), data analytics, and machine learning are instrumental in helping businesses understand the impacts of their CSR efforts. By leveraging these technologies, organisations can develop and implement sustainable practices that contribute to their growth while also fulfilling their social and environmental responsibilities1. The transformative power of AI extends beyond CSR, affecting various sectors and industries, from finance to marketing, and reshaping the landscape of business management and operations (Lakhan, 2022).

In summary, the application of AI in the CSR domain is a testament to the technology's potential to foster sustainable growth and enhance the efficacy of CSR initiatives. As businesses continue to integrate AI into their economic models, they are better equipped to coordinate actions with ESG factors, ensuring a responsible and sustainable approach to growth (Gore et al., 2023; Lakhan, 2022).

Consumer attitudes toward AI for CSR communication

Consumer attitudes towards companies using AI technology for Corporate Social Responsibility (CSR) communication are multifaceted and influenced by various factors such as trust, perceived usefulness, and ethical considerations. Trust plays a pivotal role in the acceptance of AI technologies, as demonstrated by a study that found trust to significantly affect the intention to use AI voice assistants, with perceived usefulness and attitude towards the technology acting as mediators (Choung et al., 2023). This indicates that for companies to use AI in CSR communication effectively, they must ensure that their AI systems are perceived as useful and trustworthy.

The concept of initial trust, along with perceived risk, has been shown to be critical in the public's acceptance of automated vehicles (Zhang et al., 2019). This suggests that in the context of CSR communication, initial trust in the AI system could be a key determinant of its acceptance. Companies should aim to build this trust by

demonstrating the usefulness of the AI system and minimising perceived risks associated with its use.

Ethical implications are also a significant concern for consumers when it comes to AI in marketing, which would extend to CSR communication (Gonçalves et al., 2023; Du & Xie, 2021). Perceived risk has a notable impact on attitudes towards AI, ethical concerns, and perceived trust. Therefore, companies must address ethical issues transparently to foster consumer acceptance of AI-driven CSR initiatives.

Furthermore, the nature of consumer-AI interactions is influenced by factors such as trust, empathy, attachment, and anthropomorphism (Pop et al., 2023; Wu et al., 2024). Companies should consider these factors when designing AI systems for CSR communication to ensure that the interactions are perceived positively by consumers.

Lastly, public opinion towards AI varies by demographic and region, with differences in trust levels observed across gender, socioeconomic status, and geographic location (Zhang, 2021). Companies should be mindful of these differences when using AI for CSR communication to tailor their approach to different segments of the population.

In conclusion, for companies to successfully use AI technology for CSR communication, they must build trust and address ethical concerns while considering the demographic and regional differences in attitudes towards AI. Ensuring the AI system is perceived as useful and minimising perceived risks are also crucial for consumer acceptance and trust in this communication approach.

Methodology

Research approach

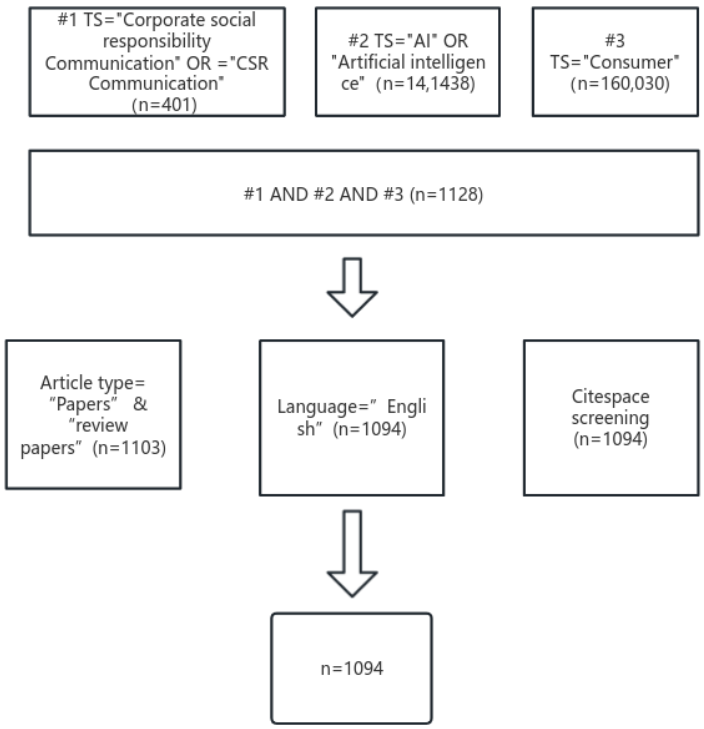
In this study, we will utilise CiteSpace 6.2.R3 software for literature analysis. CiteSpace is a widely employed tool for academic literature analysis (XIE et al., 2018; Chen, 2000; An & Xing, 2023). CiteSpace has been acknowledged for its macro analysis capabilities, with a focus on literature and periodicals, and its potential for future integration with various visual analysis tools to achieve more accurate results (XIE et al., 2018). Thus, it furnishes a reliable analytical foundation for in-depth exploration of the impact of Artificial Intelligence (AI) on consumer satisfaction within Corporate Social Responsibility (CSR) communication. Several factors were considered when selecting CiteSpace software as our literature analysis tool. Firstly, CiteSpace offers robust visualisation capabilities, facilitating the intuitive presentation of citation relationships, collaborative networks, and thematic evolution among publications. This visualisation capability enables us to comprehend the interconnections among literature more intuitively and swiftly capture research domain hotspots and trends. Secondly, CiteSpace supports network analysis, aiding in the discovery of associative patterns among publications, such as citation relationships and collaborative networks. Through network analysis, we can delve deeper into the connections among literature, identifying latent research topics and pivotal nodes to guide our research direction and focus (An & Xing, 2023). Thirdly, CiteSpace enables time-series analysis of literature data, assisting us in tracking the developmental trajectory and evolutionary trends of research domains, which is crucial for understanding the fluctuation patterns and trends of AI's impact on consumer satisfaction within CSR communication, thereby facilitating a more accurate grasp of the timeliness and forefront of our research. Lastly, CiteSpace supports the export of analysis results in various formats, such as images and tables, facilitating the intuitive presentation of analysis results in research reports or papers. Additionally, the process of using CiteSpace is recordable, ensuring the reproducibility of the research process and

enhancing the scientific rigour and credibility of our study (Chen, 2006). In summary, we have chosen CiteSpace software as our literature analysis tool because of its powerful visualisation and analysis functionalities, which can assist us comprehensively and thoroughly explore the impact of AI on consumer satisfaction within CSR communication, thereby providing reliable data support and analytical foundation for our research.

Data source and screening

This study utilises the Web of Science Core Collection as the data collection platform. Editions selected include the Science Citation Index Expanded (SCI-EXPANDED) from 2000 to February 2024, the Social Sciences Citation Index (SSCI) from 2006 to the present, and the Arts & Humanities Citation Index (AHCI) from 2008 to the present. The data collection process is depicted in Figure 1, with priority given to the titles, abstracts, and keywords of the literature to ensure thoroughness and credibility. The search period spans from January 1, 2000, to February 20, 2024, using the following search criteria: #1 TS="Corporate social responsibility Communication" OR ="CSR Communication" AND #2 TS="AI" OR "Artificial intelligence" AND #3 TS="Consumer", resulting in a total of 1128 articles. Non-journal articles were excluded from the analysis. Other languages are deemed not applicable to this study except English. After screening, 1094 articles meeting the criteria are compiled.

Figure 1
Data Collection and Screening Process



Source: Author's work

These publications cover 158 disciplinary fields, with business, management, environmental studies, and electrical engineering accounting for 65% of the total. Table 1 presents a detailed classification of literature by research disciplines.

Table 1
Top 10 research disciplines in this field

Ranking	Web of Science Categories	Record Count	% of 1,094
1	Business	382	34.93
2	Management	148	13.54
3	Environmental Studies	89	8.17
4	Engineering Electrical Electronic	77	7.00
5	Environmental Sciences	71	6.50
6	Computer Science Information Systems	69	6.30
7	Green Sustainable Science Technology	66	6.00
8	Communication	55	5.00
9	Telecommunications	49	4.50
10	Computer Science Artificial Intelligence	43	3.93

Source: Author's work

Parameter setting and analysis

This study employs CiteSpace 6.2.R3 software to detect the frequency or occurrence rate of the keywords "AI" and "corporate social responsibility communication" in the domain of "consumers". The purpose of using this software is to understand the research hotspots and development trends in this field. The time slice is set from January 2000 to February 2024.

When setting the parameters, several factors were considered to enhance the effectiveness of the analysis: Firstly, the node types were specified as authors, institutions, countries, keywords, and references. This setting allows for comprehensive consideration of various entities involved in the research domain, including individual contributors, institutional affiliations, geographical distributions, as well as specific terminologies and reference usage. Secondly, the value of "TopN" is set to 50. By selecting the top 50 nodes based on certain criteria (e.g., citation counts), the analysis focuses on the most influential and prominent elements within the network, facilitating a better understanding of key figures and topics in the field. Thirdly, in the g-index calculation, the value of parameter K is set to 10. This adjustment aids in capturing the overall impact and significance of publications by considering both the number of citations received by individual articles and the distribution of these citations among the entire set of articles. Lastly, the network is pruned by selecting "pathfinder" and "pruning merged networks". This trimming process helps refine the network structure, removing redundant or less relevant connections and focusing on core relationships and patterns.

These parameter settings in CiteSpace were selected based on previous research and the recommendations of Professor Chaomei Chen, the developer of the software (Chen, 2016), aiming to ensure a comprehensive and in-depth analysis of the research landscape regarding AI and corporate social responsibility communication in the consumer domain. By adopting these parameters, we aim to reveal the development trends and key research topics in this field over the specified period, providing meaningful insights.

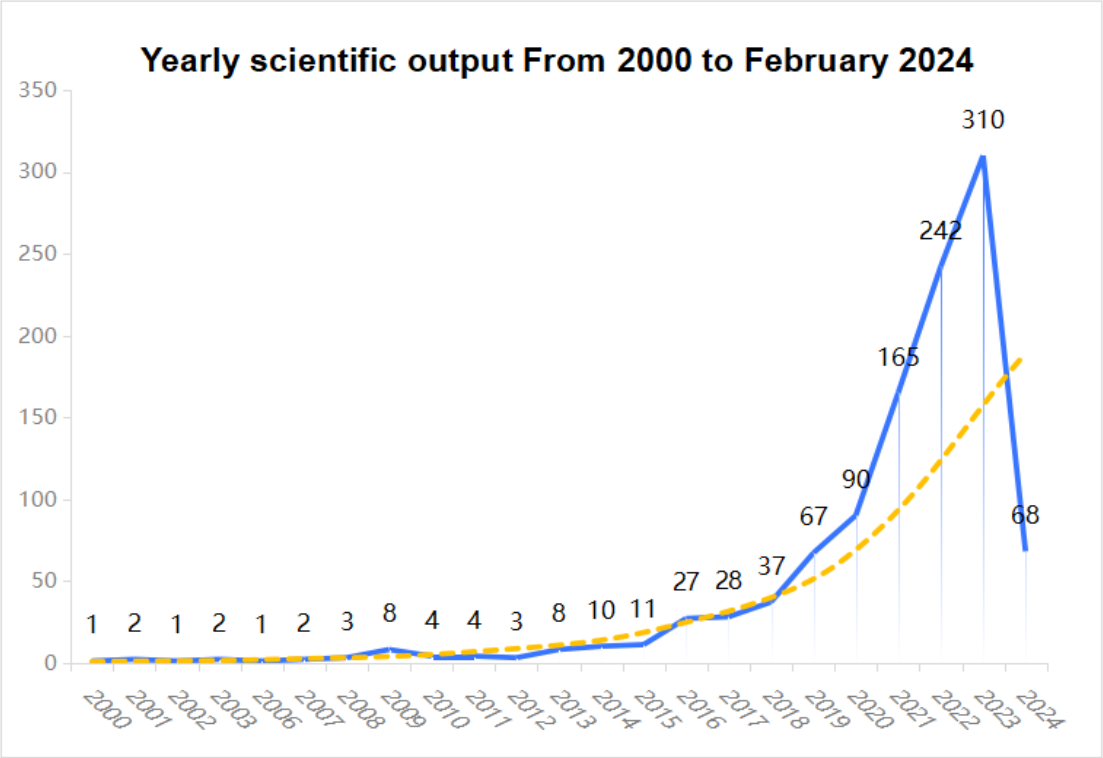
Bibliometric analysis

Publication trend

According to the data depicted in Figure 2, there is a stable growth trend in the number of publications concerning artificial intelligence (AI) within the domain of

consumer corporate social responsibility communication. As evidenced by the fitted curve, this field gradually garnered attention from the academic community in the early 21st century. Prior to 2012, scholars showed relatively low interest in this area, with an average of only 2.8 articles published annually. However, from 2013 to 2018, there was a substantial increase in the number of relevant articles, the average number of publications per year is about six. In contrast, during the period from 2019 to 2023, the quantity of related publications experienced a significant surge, reaching its peak in 2023.

Figure 2
Yearly scientific output from 2000 to February 2024



Source: Author's work

The data collected for this analysis concluded on February 17, 2024, and thus does not encompass complete statistical information for the year 2024. Nevertheless, based on the observed trend, we can anticipate a continued increase in the number of publications in this field, aligning with the stable growth trend depicted by the fitted curve formula. To predict the number of publications in 2024 based on the provided data, we can use a trend analysis method. One common approach is linear regression, where we fit a straight line to the data points and use it to estimate future values (Bianchi et al., 1999). Average Growth Rate = [(Final Year Publications / Initial Year Publications) ^ (1 / Number of Years)] - 1 = [(310 / 1)^(1 / 23)] - 1 = 0.2178 or 21.78%. Predicted Publications in 2024 = 2023 Publications * (1 + Average Growth Rate) = 310 * (1 + 0.2178) ≈ 377.8. Therefore, based on the trend analysis using linear regression and the average annual growth rate, the predicted number of publications in 2024 is approximately 378. These figures reflect the increasingly close and significant relationship between artificial intelligence and consumer corporate social responsibility communication, generating widespread attention and discussion within the academic community.

Country/region analysis

According to the country collaboration network generated by CiteSpace software, the United States, China, and the United Kingdom are the top three countries in terms of the number of published papers in this field (Table 2). Among them, the United States ranks first with 312 papers, accounting for approximately 28.5% of the total literature, demonstrating its strong capabilities and influence in this field. China closely follows, with a total of 228 published papers, accounting for 20.8% of the total, indicating that Chinese scholars also possess a high level of research competence and productivity in this field. Additionally, countries such as Australia, India, and South Korea have gradually increased their research investment in this field and have achieved certain results.

In terms of research timeline in each country, the United States not only leads in the number of published papers but also initiates the research as soon as possible (beginning in 2000). Following this, Chinese scholars conducted preliminary research and began publishing related papers. Countries such as the United Kingdom, Spain, Germany, and France conducted relevant research almost before 2010, hence maintaining a stable and continuous increase in publication volume. In contrast, Australia, India, Italy, and South Korea started their research relatively later, with the first batch of research concentrated around 2015. These data reflect differences in the understanding and investment levels of each country regarding the importance of this field.

Table 2

The top 10 countries with the highest number of publications

Ranking	Country	Count	Year	Most cited authors
1	USA	312	2000	Bhattacharya, C B
2	CHINA	228	2002	Kim, S
3	ENGLAND	106	2008	Lu, Vinh Nhat
4	AUSTRALIA	83	2014	Wirtz, J
5	INDIA	66	2013	Pillai, R
6	SOUTH KOREA	66	2015	Sohn, K
7	SPAIN	62	2009	Currás-Pérez, R
8	ITALY	58	2013	Pesapane, F
9	GERMANY	58	2009	Du, S
10	FRANCE	52	2008	Parguel, B

Source: Author's work

CiteSpace employs several centrality metrics to assess the importance of documents or authors, with one of the most common being "Betweenness Centrality." The betweenness centrality is defined for each node in a network. It measures how likely an arbitrary shortest path in the network will go through the node. The calculation of Betweenness Centrality is to divide the sum for each node by the total number of possible node pairs (excluding the node itself) to obtain its Betweenness Centrality value. If a node has a high mediation centrality in the network, it means that it plays a key mediating role in information dissemination and cooperation (Chen, 2000).

In addition to numerical advantages, Lithuania (0.73), Romania (0.57), Pakistan (0.45), France (0.44), and Germany (0.38) have the highest centrality among countries (Table 3), this shows that the above-mentioned countries have had a certain influence and made outstanding contributions in this field. It is worth noting that conducting scientific and technological cooperation in different regions and backgrounds will better promote global technological innovation and progress.

Table 3
Analysis of national contribution centrality

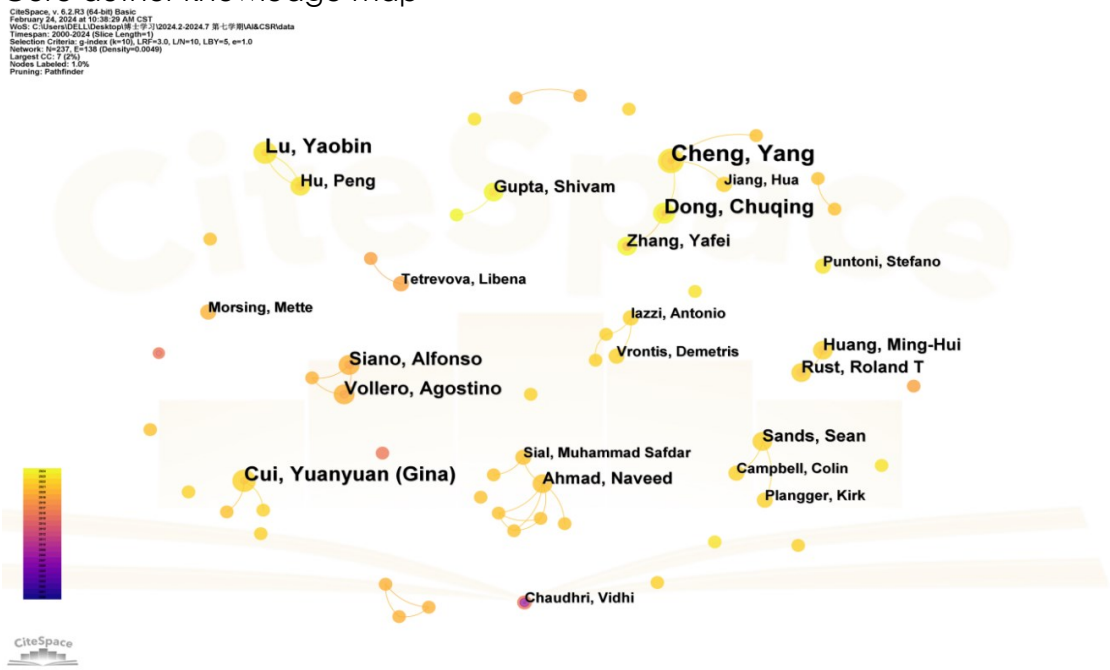
Ranking	Country	Centrality	Most cited authors
1	LITHUANIA	.73	Czinkota, M
2	ROMANIA	.57	Pelau, C
3	PAKISTAN	.45	Nawaz, Nishad
4	FRANCE	.44	Parguel, B
5	GERMANY	.38	Du, S
6	CHINA	.30	Kim, S
7	GREECE	.27	Alsalemi, A
8	CYPRUS	.27	Czinkota, M
9	SAUDI ARABIA	.26	Kumari, A
10	SWEDEN	.26	Toorajipour, R

Source: Author's work

Core author analysis

CiteSpace software created the author collaboration network diagram, shown in Figure 3, which contains 237 nodes and 138 lines. Each circular node represents an author, and the size of the shape indicates the author's contribution. The larger the shape, the more the author's contribution, and the smaller the shape, the less the author's contribution. The lines connecting the nodes show the collaboration relationship between authors.

Figure 3
Core author knowledge map



Source: Author's work

Table 4 presents an overview of the top ten authors based on post volume. Cheng Yang, whose inaugural study was published in 2021, stands as the most prolific author in the field with a total of eight posts. Lu Yaobin follows him with six articles, and Dong Chuqing, Cui Yuanyuan (Gina), Siano Alfonso, and Vollero Agostino occupy the third

to sixth positions, respectively. Furthermore, Zhang Yafei, Sands Sean, Rust Roland, and Huang Ming-Hui have made significant contributions to this domain. Overall, the centrality within this network remains low; cooperation primarily revolves around high-output authors. This has fostered strong collaborative relationships and created a positive atmosphere for academic engagement.

Table 4
Result analysis of the core author

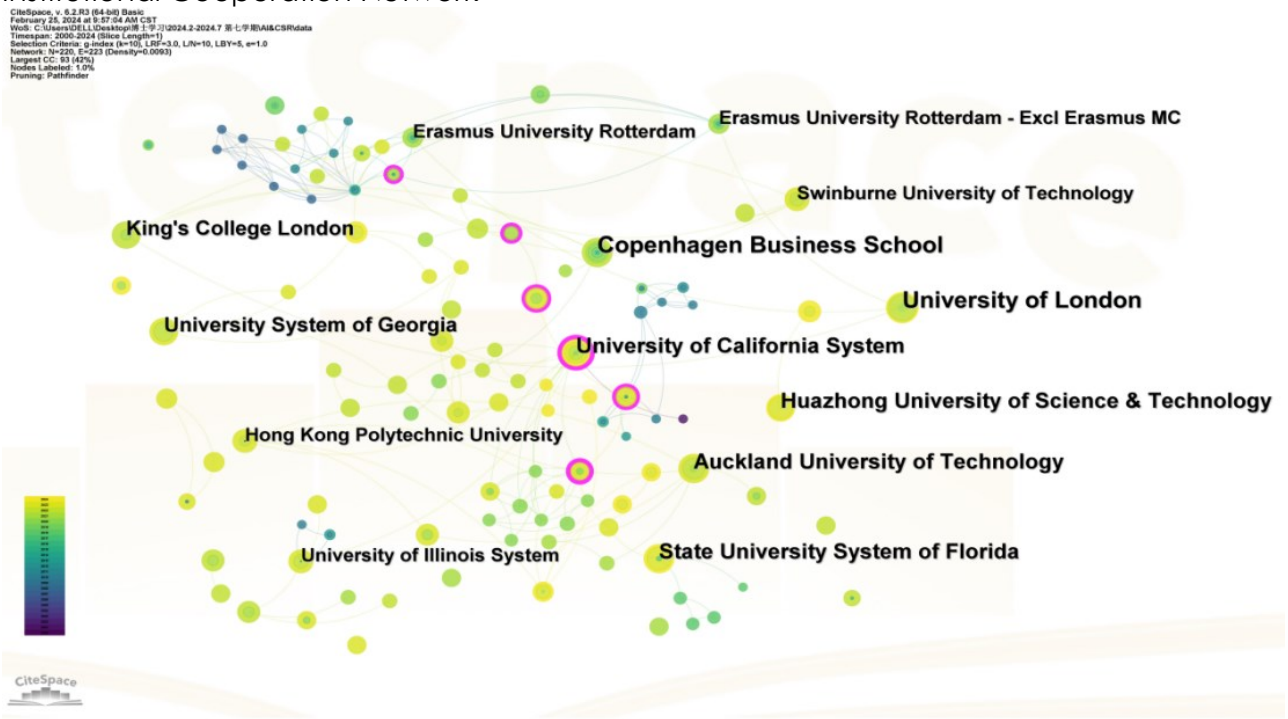
Ranking	Author	Frequency	Year
1	Cheng Yang	8	2021
2	Lu Yaobin	6	2022
3	Dong Chuqing	6	2021
4	Cui Yuanyuan (Gina)	6	2021
5	Vollero Agostino	5	2019
6	Siano Alfonso	5	2019
7	Zhang Yafei	4	2021
8	Sands Sean	4	2022
9	Rust Roland	4	2021
10	Huang Ming-Hui	4	2021

Source: Author's work

Core research institutions analysis

According to the data displayed in the knowledge graph (Figure 4), institutions such as the University of London, Copenhagen Business School, and Auckland University of Technology have outstanding performance in terms of literature output in the field of CSR communication and AI research (Table 5).

Figure 4
Institutional Cooperation Network



Source: Author's work

Table 5
Result analysis of core research institution

Number	Count	Year	Institution
1	14	2021	University of London
2	14	2013	Copenhagen Business School
3	12	2021	Auckland University of Technology
4	12	2021	Huazhong University of Science & Technology
5	11	2001	University of California System
6	11	2018	State University System of Florida
7	10	2021	King's College London
8	10	2022	University System of Georgia
9	8	2010	University of Illinois System
10	8	2009	Erasmus University Rotterdam

Source: Author's work

The contributions of these institutions have played an important role in promoting the development of this field. At the same time, there is also a very close cooperation relationship, with a total of 220 institutions participating and 223 cooperative relationships existing. Of note is the international attention to artificial intelligence in consumer social responsibility communication. Major institutions such as the University of California system and Cornell University have formed a stable and extensive cooperation network, playing an active role in promoting international academic exchanges (Table 6).

Table 6
Centrality analysis of core research

Ranking	Institution	Centrality
1	University of California System	.20
2	Cornell University	.20
3	Harvard University	.19
4	University of Pennsylvania	.16
5	National University of Singapore	.15
6	IESEG School of Management	.15
7	Kennesaw State University	.08
8	University of London	.07
9	Centre National de la Recherche Scientifique (CNRS)	.07
10	King's College London	.06

Source: Author's work

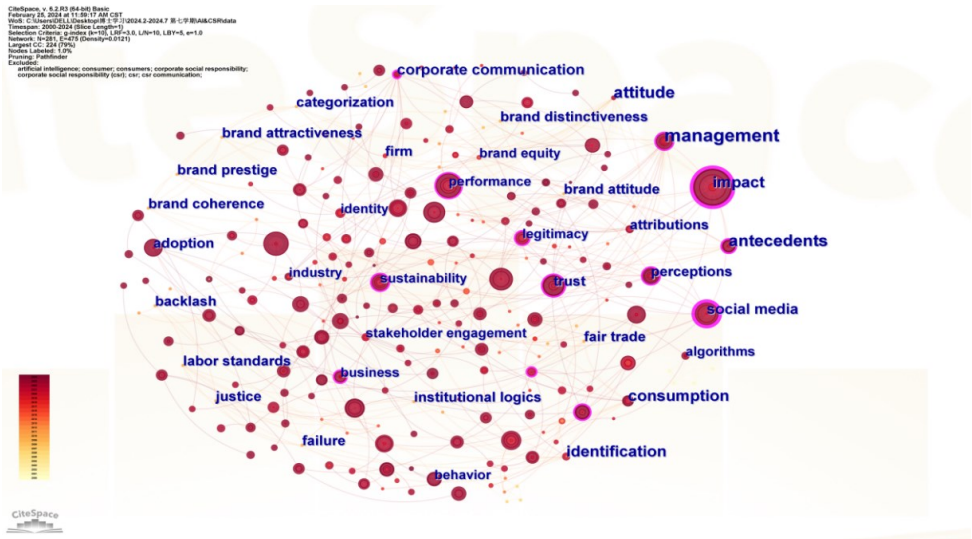
Overall, knowledge graph analysis clearly shows the contributions made by various core research institutions in consumer corporate social responsibility communication and artificial intelligence research and their close cooperation relationships with each other.

Research hotspots and evolution trends

Keywords/research hotspot analysis

According to the keyword analysis knowledge graph shown in Figure 5, we can observe the hotspots and focuses of CSR communication and artificial intelligence (AI) research in the consumer field.

Figure 5
Keyword knowledge map



Source: Author's work

Through the analysis of keyword frequency, we found that "impact," "performance," "information," "social media," "technology," "strategy," "engagement," "model," "management" and "communication" have the highest frequency of appearance (Table 7). Particularly noteworthy is that "social media", "impact", and "management" have higher centrality throughout the entire knowledge graph, indicating widespread attention in CSR communication, AI, and consumer research.

Furthermore, Figure 5 elucidates that there exists a total of 281 keywords (N=281), accompanied by 475 interconnections (E=475), and portrays a network density of 0.0121 within the realms of CSR communication, artificial intelligence, and consumer behaviour. This intricate web encompasses various disciplines, including finance, economics, management, environmental studies, communication, and beyond. Such findings underscore an interdisciplinary and diversified developmental trajectory, which further accentuates the notion that CSR communication channels that integrate AI are progressively steering towards holistic and high-calibre sustainable development.

Table 7
Keyword knowledge map

Keywords	Count	Centrality	Year
impact	166	0.24	2008
performance	90	0.12	2014
information	80	0.04	2017
social media	75	0.32	2016
technology	75	0.06	2020
strategy	69	0.09	2009
engagement	67	0.10	2018
model	65	0.05	2017
management	65	0.19	2009
communication	57	0.04	2013

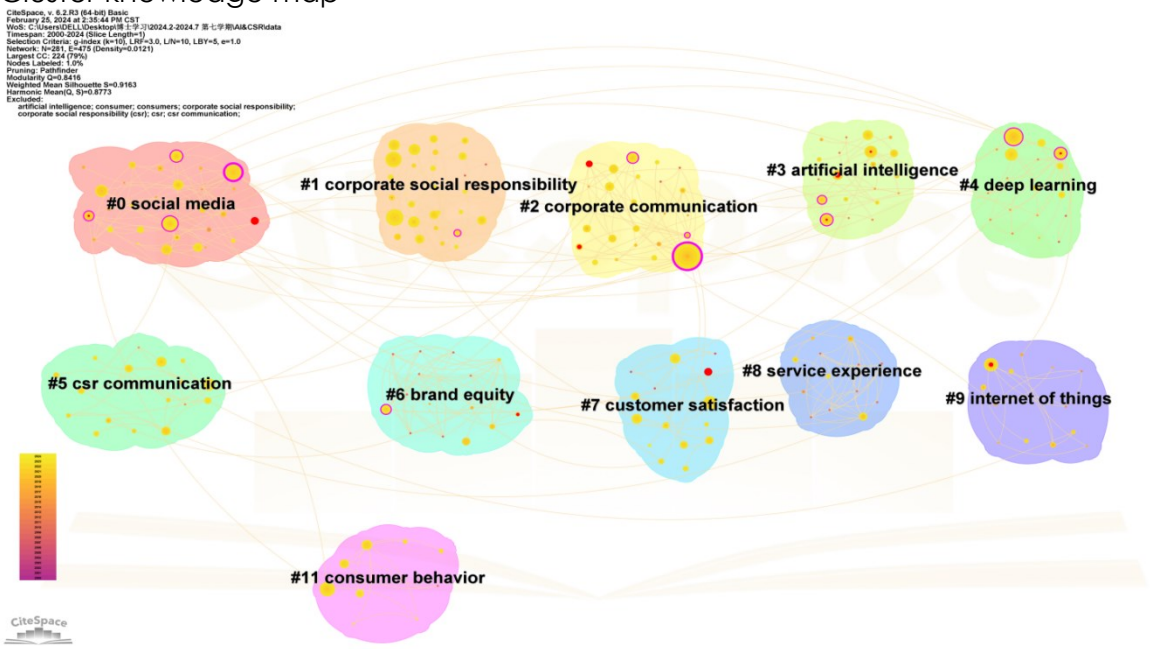
Source: Author's work

Research frontier analysis

This study utilised the knowledge clustering analysis feature of CiteSpace software, combined with the Log Likelihood Ratio (LLR) algorithm, to categorise and summarise the keywords in the field of CSR communication. This process provided a more comprehensive display of the frontier achievements in this field. Following the clustering analysis, we obtained 11 keyword clusters, with a modularisation index Q of 0.8416 exceeding 0.3, indicating the rationality of the network structure concerning AI in corporate social responsibility communication and consumer domains (Figure 6).

Figure 6

Cluster knowledge map



Source: Author's work

Furthermore, the network's Mean homogeneity (Mean Silhouette) of 0.9163 indicates the rational effectiveness of the clustering results, with well-defined keyword sub-clusters and high internal coherence within cluster nodes. These findings contribute to a deeper understanding of the connections and differences between various topics in the field of corporate social responsibility communication, providing important reference points for related research (Table 8).

Cluster 1 mainly studies CSR, including corporate social responsibility, artificial intelligence, CSR communication, CSR, and social media. Cluster 2 mainly studies corporate communication, including corporate communication, utilitarian products, donations, employees, and hedonic products. Cluster 3 mainly studies artificial intelligence, including artificial intelligence, governance, CSR communication, the Czech Republic, and sensemaking. Cluster 4 mainly studies deep learning, which mainly includes deep learning, sentiment analysis, supply chain management, supply chain, and CSR. Cluster 5 mainly studies CSR communication, including CSR communication, artificial intelligence (AI), finance, fintech, and social media. Cluster 6 mainly studies the annual reports, including brand equity, annual reports, attribution theory, corporate culture fit, and visual message. Cluster 7 mainly studies customer satisfaction, including customer satisfaction, information quality, voice assistants,

satisfaction, and linguistic feature analysis. Cluster 8 examines the service experience, mainly including service experience, augmented reality, virtual reality, virtual assistants, and customer experience. Cluster 9 impact studies on the Internet of Things, including the Internet of Things, congruence, employer attractiveness, edge computing, and turnover intention. Cluster 11 studies consumer behaviour, mainly including consumer behaviour, PLS-SEM, empirical research, AI-enabled products, and self-endorsement.

Table 8
Result analysis of cluster knowledge

ID	Size	Silhouette	Top Terms（LLR log—likelihood ratio）
#0 social media	28	0.829	social media; stakeholder engagement; sustainable development; artificial intelligence; legitimacy
#1 corporate social responsibility	28	0.883	corporate social responsibility; artificial intelligence; CSR communication; CSR; social media
#2 corporate communication	25	0.862	corporate communication; utilitarian product; donation; employees; hedonic product
#3 artificial intelligence	20	0.979	artificial intelligence; governance; CSR communication; Czech republic; sensemaking
#4 deep learning	18	0.914	deep learning; sentiment analysis; supply chain management; supply chain; CSR
#5 CSR communication	18	0.832	CSR communication; artificial intelligence (AI); finance; fintech; social media
#6 annual reports	16	0.986	brand equity; annual reports; attribution theory; corporate culture fit; visual message
#7 customer satisfaction	14	0.962	customer satisfaction; information quality; voice assistants; satisfaction; linguistic feature analysis
#8 service experience	13	1	service experience; augmented reality; virtual reality; virtual assistants; customer experience
#9 internet of things	13	0.902	internet of things; congruence; employer attractiveness; edge computing; turnover intention
#11 consumer behaviour	10	1	consumer behaviour; pls-sem; empirical research; AI-enabled products; self-endorsement

Source: Author's work

Based on the analysis of research hotspots, the research areas of corporate social responsibility communication, artificial intelligence, and consumer behaviour from 2000 to 2024 mainly include three directions: 1. CSR communication-related research. 2. AI and its applications and learning research. 3. consumer behaviour research. In CSR communication-related research, scholars focus on corporate communication strategies, influence, and the public's reception and feedback on corporate social responsibility practices. In AI and its applications and learning research, the emphasis is on the utilisation of AI technology in business environments and its impact on consumer behaviour and market trends. Additionally, in the field of consumer behaviour research, scholars explore the psychological factors behind consumer purchase decisions, brand loyalty, and the impact of marketing strategies on

consumer behaviour. These three directions are currently hot topics in this field and are of significant practical importance.

Firstly, research related to CSR communication primarily focuses on clusters 0, 1, 2, 5, and 6. The form of CSR communication is profoundly influenced by industry and institutional pressures and organisational characteristics, challenging the universality of CSR initiatives (O'Connor & Gronewold, 2013). Regarding the application and performance of AI in CSR communication, research is mostly conducted on social media platforms. The dissemination and methods of CSR on social media are concerns for researchers and businesses.

Abitbol and Lee (2017) explored how companies strategically use dedicated pages on Facebook to engage stakeholders and found that alignment with core business themes can effectively attract stakeholders. Meanwhile, an analysis of the communication strategies of Chinese and Japanese companies on Facebook and Twitter revealed that Chinese companies prefer a diversion strategy and demonstrate faster and stronger handling capabilities of online complaints (Yuan, 2018). A survey found that consumers' overall response to AI influencers on Instagram is less trustworthy than traditional influencers (Sands et al., 2022), leading researchers to caution brands against hastily replacing human influencers with AI counterparts. Text-based chatbots are considered innovative but perform poorly on social media platforms; frequent failures lead to consumer resistance (Cheng et al., 2022).

Second, research on artificial intelligence (AI) and its applications and learning primarily focuses on clusters #3, #4, #8, and #9. Intelligent AI devices have become a common presence in the commercial sector, providing a wide range of services from the medical industry to the hospitality sector. From an organisational perspective, AI devices offer several advantages over humans, enabling faster and more accurate execution of certain tasks while also being more cost-effective (Pelau et al., 2021). Consequently, the application and study of AI have become the focal point of researchers and businesses in recent years. Chhetri (2024) proposes that the integration of AI and machine learning technologies in the food industry, particularly in food quality control and safety, not only enhances efficiency and minimises risks but also ensures regulatory compliance, heralding a new era of personalised nutrition, autonomous monitoring, and global collaboration, marking a paradigm shift in the field of food quality control and safety (Chhetri, 2024).

However, the greatest challenge facing the investment and proliferation of AI in enterprises and markets is how to gain better acceptance from stakeholders, with many scholars offering constructive suggestions. Currently, the impact of AI on stakeholders, especially consumers, is not very pronounced, and there are even cases of consumer resistance to AI. Consumer engagement through AI (such as voice assistants) does not directly influence future purchasing intentions (McLean et al., 2021). However, it has been found that when humanoid AI devices can demonstrate empathy and interaction similar to human consumers, they are more likely to be accepted (Pelau et al., 2021). The anthropomorphised attributes of perceived warmth and perceived capability positively affect consumers' perceived trust in chatbots, while communication delay has a negative impact (Cheng et al., 2022).

Furthermore, researchers have found that consumers' acceptance of highly innovative products with very low practical value (such as AI-based smart products) is more influenced by technological interest than utilitarian aspects. Therefore, when facing highly innovative products, consumers are not inclined to "pay the bill" solely for the sake of pursuing "low prices" (Sohn & Kwon, 2020). Yen and Chiang (2020) found that chatbots in AI enable businesses to enhance customer experiences and meet expectations through real-time interactions in e-commerce environments. Thus,

factors influencing consumers' trust in chatbots are crucial. Credibility, capability, anthropomorphism, social presence, and informativeness affect consumers' trust in chatbots, thereby influencing purchase intentions.

Finally, research on consumer behaviour has long been favoured by researchers because consumer behaviour determines a company's profits and reputation. Through the organisation and summarisation of a large body of relevant studies, it has been found that consumer behaviour is influenced by CSR communication and technological applications. Consumer behaviour is the study of how individuals, groups, and organisations choose, acquire, use, and provide ideas, goods, and services to meet their requirements and needs. It refers to the behaviour of customers in the market and its underlying reasons. Customer Behaviour Modelling (CBM) in the field of AI is a frequently mentioned technical concept by researchers. It is constructing a mathematical structure to capture typical behaviours observed in certain customer groups so that similar behaviours can be predicted under comparable conditions.

Meanwhile, scholars have explicitly stated a positive correlation between CSR communication and consumer behaviour. In the banking sector, the use of technology has a positive and direct impact on service quality, customer satisfaction, and consumer purchasing behaviour (Omoge et al., 2022). Corporate social responsibility communication contributes to increasing consumers' likelihood of purchase and admiration for banks (Gupta et al., 2021). Including Generation Y, corporate social responsibility support plays a central role in regulating purchase intentions (Luger et al., 2022).

In addition to research on traditional CSR communication and consumer behaviour, scholars have studied the impact of new technologies appearing in social media on consumer behaviour. Laszkiewicz and & Kalinska-Kula (2023) conducted research on the influence of computer-generated avatars and virtual influencers (VIs), including those using artificial intelligence (AI) and machine learning, on consumer attitudes and behaviour in social media, revealing the mechanisms of VI attractiveness and their role in shaping consumer attitudes and behaviour.

Research trend analysis

Time zone analysis

As a visual representation of data, a time zone map not only clearly depicts the distribution and changes of keywords in different periods within specific topics or fields but also aids in better understanding the evolving hot topics in the field of CSR communication. Through in-depth analysis of time zone maps, rich information can be extracted, such as the frequency of use of specific keywords or phrases during certain periods, the relationships between related topics, and trend changes. Regarding the impact of AI on consumer satisfaction in CSR communication, the time zone view can clearly display the usage of popular phrases and keywords from 2000 to 2024, spanning approximately 24 years (Figure 7). These data reflect the challenges, opportunities, and evolving trends related to the application of AI technology in CSR communication. By delving into and analysing these data, we can more accurately grasp the challenges faced by AI technology in different stages of CSR communication and provide a reference for future development of rational and effective communication strategies. Therefore, the time zone map has become an important tool for understanding the dynamics of the research field.

Figure 7
Time zone knowledge map

Source: Author's work

Although data collection results show that research on the application of AI in CSR communication and its impact on consumers emerged as early as 2000, analysis reveals that it was not primarily within the disciplines of marketing, economics, and management but rather concentrated in medical and biological-related disciplines. Furthermore, research in this field has not been extensive, with scholars only beginning to study and organise it in 2017 systematically. Over these 7 years, the research can be categorised into three distinct phases: 2017-2019, 2020-2022, and 2023. However, these phases cannot be accurately classified according to the conventional stages of "initiation," "development," and "maturity" because AI in CSR communication and consumer domains is a relatively novel concept. Instead, over these 7 years, the field more closely resembles an initiation phase. As researchers delve deeper, as businesses apply AI in practice and as consumers and markets react, various challenges and issues arise alongside the convenience of AI in CSR communication with consumers. Therefore, the author primarily divides these three periods based on the differing focal points of research questions during each period.

Between 2017 and 2019, research in this field primarily focused on the impact of corporate social responsibility communication on consumers, who often utilised social media platforms for application. However, researchers began to shift away from traditional questionnaire analysis methods towards using media data or more specific analytical approaches, laying a solid foundation for subsequent AI learning and improvement. Etter et al. (2018) suggested using social media data and sentiment analysis to study citizens' emotionally based responses to organisational behaviour. Some scholars provided practical recommendations for companies engaging in CSR communication through social media. They suggested that companies could use hashtags to make thematic information clear and leverage discussions within existing social movements to resonate with consumers, thereby conveying the theme of corporate social responsibility (Saxton et al., 2019). Additionally, frequent tweeting

about corporate social responsibility on social media platforms was found to garner higher user approval (Araujo & Kollat, 2018).

From 2020 to 2022, research in this field primarily focused on two aspects: exploring AI technology and discussing consumer trust in AI. Regarding the exploration of AI technology, this included machine learning, voice assistants, text recognition, and more. Huang and Rust (2020) found a three-stage framework for strategic marketing planning, integrating various AI advantages: mechanical AI for automating repetitive marketing functions and activities, thinking AI for processing data to make decisions, and emotional AI for analysing interactions and human perceptions. Buhalis and Moldavska (2022) found through research on interactions supported by Voice Assistants (VAs) between hotels and guests in the hotel industry that although VA technology is still in its infancy, virtual assistants are increasingly becoming digital assistants, helping hotels improve customer service, expand operational capabilities, and reduce costs.

As for the issue of consumer trust in the application of AI technology in CSR communication, it appears to be one of the concerns and focuses for researchers and businesses. Artificial Intelligence (AI) voice assistants (VAs) continue to be popular among consumers, and while technological means do influence consumers' brand engagement, concerns about trust issues that may arise after AI usage can negatively impact brand engagement behaviour (McLean et al., 2021). Uysal's interviews and on-site research with Artificial Intelligence Assistants (AIAs) users indicated that the anthropomorphism of AIAs may threaten users' identity, thereby depriving them of their power, triggering data privacy issues, and ultimately harming their well-being. These harmful effects are particularly evident in intimate, long-term relationships (Uysal et al., 2022).

In the past year of 2023, researchers have focused more on addressing trust issues and improving how AI serves CSR communication with consumers. Particularly, addressing ethical issues mainly centred around trust problems has drawn attention from practitioners and scholars. Liu et al. (2021) highlighted the need for scrutiny of ethical issues associated with the use of artificial intelligence. This scrutiny can help organisations gain trust, minimise privacy infringements, and ultimately promote responsible success in operating AI on social media platforms. Meanwhile, an increasing number of scholars are utilising technology acceptance models (TAM) to explain the relationship between consumer perception and AI usage. Iancu and Iancu (2023) found in their study involving elderly consumers in the healthcare industry using AI-related systems that perceived ease of use was explained by effort, ability, and perceived external control when interacting with chatbots, while perceived usefulness was supported by perceived ease of use and subjective norms.

Additionally, if individuals perceive the interaction as useful and receive approval from others, they may further utilise chatbots (behavioural intention). This insight suggests that in the design of future AI products and systems, ease of use should be the primary consideration, following responsible AI principles, and effective promotion of AI products and systems should also be conducted to influence consumer perceptions positively. Previous research indicates that consumers perceive non-human (compared to human) agents differently in many aspects (e.g., lacking emotional capability), leading to various behavioural changes when interacting with them. Kim et al. (2022) found that users tend to engage in unethical consumer behaviour more when interacting with non-human (as opposed to human) agents (e.g., artificial intelligence and robots) because the anticipated guilt is reduced. Furthermore, he proposed the moderating effect of anthropomorphism, suggesting that imparting non-human agents with human-like characteristics can reduce

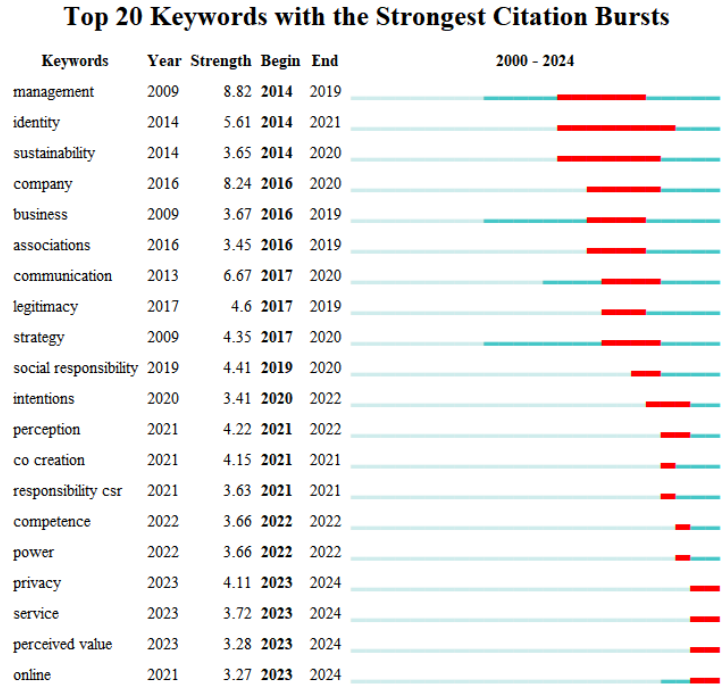
unethical behaviour. Therefore, anthropomorphism in AI regulation can not only increase user trust and experience but also effectively reduce user unethical behaviour.

Keywords' burst analysis

Keyword burst analysis is an important method based on big data, which helps the scientific community to understand hot issues in a timely manner by analysing the frequency changes of specific keywords in a particular field. This method not only reveals valuable information about research frontiers and trend predictions but also provides valuable data references for decision-makers. The intensity and duration of keyword bursts over the past 24 years, as shown in Figure 8, reflect the achievements of this method in practical applications. Through in-depth analysis of these data, we can better understand issues that suddenly attract attention in certain fields and provide guiding significance for future related research. Furthermore, with the continuous advancement of technologies such as artificial intelligence and machine learning, keyword burst analysis will also usher in new development opportunities.

Figure 8

Keywords' burst analysis



Source: Author's work

In CiteSpace operations, the period should be set to at least one year, and parameters such as gamma 1.0, f(x) = alpha * e - alpha x (where alpha 1 / alpha 0 = 2.0, alpha l/alpha l - 1 = 2.0) should be used for analysis. The red part indicates the period during the outbreak of the epidemic, during which the keyword "management" became a topic of continuous discussion and attention.

In addition, over the past 24 years, "business" and "social responsibility" have also been two keywords with long durations and high levels of attention. These data not only reflect the enduring high involvement of people in issues such as business economy and social responsibility but also help us better understand the changes and evolution of different thematic topics within various fields over time.

Analysis of cited reference burst

According to the data from Figure 9, citations related to artificial intelligence in the field of consumer social responsibility communication show a steady increase year by year, which indicates that research on artificial intelligence in consumer social responsibility has garnered widespread attention from both academia and industry. The primary period is set to at least 2 years in the Citespace. This decision was made because journals published within a one-year period are numerous and widely distributed, allowing for a better reflection of the development of artificial intelligence and consumer social responsibility communication. From the graph, it can be observed that articles such as Cho et al. (2017), Crane et al. (2016), and Etter et al. (2018) have experienced significant citation bursts, indicating that many scholars cited these journals during that period, and these articles hold significant importance in the field. This further confirms that the intersection of artificial intelligence and consumer social responsibility communication is becoming a focal point of attention for both academia and industry.

Figure 9

Cited references burst

Top 21 References with the Strongest Citation Bursts

References	Year	Strength	Begin	End	2000 - 2024
Porter ME, 2006, HARVARD BUS REV, V84, P78	2006	3.4	**2009**	2010	
Du SL, 2010, INT J MANAG REV, V12, P8, DOI 10.1111/j.1468-2370.2009.00276.x, DOI	2010	3.42	**2014**	2015	
Etter M, 2013, PUBLIC RELAT REV, V39, P606, DOI 10.1016/j.pubrev.2013.06.003, DOI	2013	6.33	**2016**	2018	
Golob U, 2013, CORP COMMUN, V18, P176, DOI 10.1108/13563281311319472, DOI	2013	5.06	**2016**	2018	
Lyon TP, 2013, J BUS ETHICS, V118, P747, DOI 10.1007/s10551-013-1958-x, DOI	2013	3.94	**2016**	2017	
Castelló I, 2013, J BUS ETHICS, V118, P683, DOI 10.1007/s10551-013-1954-1, DOI	2013	3.79	**2016**	2018	
Eberle D, 2013, J BUS ETHICS, V118, P731, DOI 10.1007/s10551-013-1957-y, DOI	2013	5.86	**2017**	2018	
Devin BL, 2014, J PUBLIC RELAT RES, V26, P436, DOI 10.1080/1062726X.2014.956104, DOI	2014	4.88	**2017**	2019	
Kent ML, 2016, PUBLIC RELAT REV, V42, P60, DOI 10.1016/j.pubrev.2015.11.003, DOI	2016	7	**2018**	2021	
Etter M, 2014, J COMMUN MANAG, V18, P322, DOI 10.1108/JCOM-01-2013-0007, DOI	2014	5.68	**2018**	2019	
Hayes Andrew F., 2017, INTRODUCTION TO MEDIATION, V0, P0	2017	4.22	**2018**	2019	
Cho M, 2017, BUS PROF COMMUN Q, V80, P52, DOI 10.1177/2329490616663708, DOI	2017	7.85	**2019**	2021	
Crane A, 2016, J MANAGE STUD, V53, P1223, DOI 10.1111/joms.12196, DOI	2016	6.88	**2019**	2021	
Kollat J, 2017, J CONSUM MARK, V34, P505, DOI 10.1108/JCM-03-2017-2127, DOI	2017	4.9	**2019**	2021	
Dutot V, 2016, MANAGE DECIS, V54, P363, DOI 10.1108/MD-01-2015-0015, DOI	2016	4.9	**2019**	2021	
Abitbol A, 2017, PUBLIC RELAT REV, V43, P796, DOI 10.1016/j.pubrev.2017.05.002, DOI	2017	4.41	**2019**	2021	
Lock I, 2016, J CLEAN PROD, V122, P186, DOI 10.1016/j.jclepro.2016.02.060, DOI	2016	3.69	**2019**	2020	
Cho CH, 2015, ACCOUNT ORG SOC, V40, P78, DOI 10.1016/j.aos.2014.12.003, DOI	2015	3.69	**2019**	2020	
Lemon KN, 2016, J MARKETING, V80, P69, DOI 10.1509/jm.15.0420, DOI	2016	4.78	**2020**	2021	
Kumar V, 2019, CALIF MANAGE REV, V61, P135, DOI 10.1177/0008125619859317, DOI	2019	4	**2020**	2021	
van Doorn J, 2017, J SERV RES-US, V20, P43, DOI 10.1177/1094670516679272, DOI	2017	8.17	**2021**	2022	

Source: Author's work

There is an increasing acknowledgement that the design, implementation, and effectiveness of CSR initiatives are not merely internal management concerns; rather, they necessitate robust communication and collaboration with stakeholders. These stakeholders include employees, customers, suppliers, investors, government agencies, and local communities, among others. They have direct or indirect impacts on the actions and decisions of the corporation. Therefore, establishing good communication channels with them and actively listening to their opinions and feedback are crucial for the success of CSR initiatives. Only through effective communication with stakeholders can their needs and expectations be better understood and considered in CSR planning, ensuring that the design, implementation, and success of CSR initiatives align with the principles of social responsibility and have a positive impact (Crane & Glozer, 2016). The communication between businesses and users regarding CSR has been a topic of discussion for nearly two decades. However, even among the 'World's Most Admired Companies' listed by

Fortune magazine, the frequency of non-CSR messages conveyed in social media posts by companies exceeds that of CSR messages. When conveying CSR activities, companies tend to use informative strategies rather than interactive strategies, and they include activities targeting internal audiences more frequently than those targeting external audiences (Cho et al., 2017). Effective CSR communication is not something that can be achieved overnight; it requires time and strategy, which is challenging for business managers.

For the application of new technologies such as AI, as early as 2016, Doorn emphasised in their research the ability of technology to attract customers at the societal level, introducing a new concept called Automated Social Presence (ASP), which refers to the extent to which technology makes customers feel the presence of another societal entity. Based on this concept, Doorn also suggested that in response to the impact of new technologies on consumers, companies should focus on the application of technology in relation to customer relationships, the tendency for technological anthropomorphism, and technological readiness (van Doorn et al., 2017), which aligns with the previous discussion on the timeline of keywords and reflects the focus and trends of research in recent years and the future.

Conclusions

Contributions

The purpose of this study is to provide an overview of the application of AI in the field of CSR communication and its relationship with consumers. Through bibliometric analysis of literature, we can identify patterns, and characteristics within relevant thematic research, highlighting current areas and potential future directions. CiteSpace (V6.2.R3) is a widely used tool for this purpose; therefore, we selected it for our analysis. We searched the WOSCC database using keywords "AI," "Corporate social responsibility communication," and "Consumer," applying specific criteria that resulted in 1094 articles published over a span of 24 years (from 2000 to February 2024). After categorising the 158 disciplines, we identified the top five key disciplines as business, management, environmental studies, engineering, electrical engineering, and environmental sciences.

Firstly, in terms of publication volume, before 2012, scholars showed limited interest in this field, with very few focusing on the application of AI in CSR communication and its impact on consumers. With the introduction of the AI concept, from 2013 to 2018, there was a noticeable increase in the number of articles published. In contrast, from 2019 to 2023, the research related to this topic saw a sharp increase, with not only theoretical studies but also more scholars analysing problems encountered by businesses in the market and providing relevant recommendations through experimental methods, which indicates that research in this field has received increasingly widespread attention in the academic community. At the same time, we expect the number of publications in 2024 to be approximately 378.

Secondly, the authors conducted an in-depth analysis and identification of key contributors and collaborators in the field. Cheng Yang as one of the most influential authors in the field, with the publication of 8 articles. Following closely are Lu Yaobin, Dong Tianqing, and Cui Yuanyuan (Gina), each with 6 articles published in the field. Moreover, besides individual contributions, prominent institutions such as the University of London, Copenhagen Business School, and Auckland University of Technology have also made significant literature contributions in this domain.

In country/region analysis, the United States leads in research publications, followed by China and the United Kingdom, respectively, reflects the strong research

capabilities of these countries in the field and their high level of attention and investment in related issues. It is worth noting that there are many other countries or regions globally that actively participate and make significant contributions, which may become even more active and prominent players in the future.

Thirdly, the analysis of keyword distribution in the field of AI application in CSR communication and relationship with consumers reveals that "social media," "impact," and "management" are the top three contributing keywords. In order to make the analysis clearer, the software generated 12 clusters with different names. For example: #0 social media, #1 corporate social responsibility, #2 corporate communication, #3 artificial intelligence, #4 deep learning, #5 CSR communication, #6 annual reports, #7 customer satisfaction, #8 service experience, #9 internet of things, #11 consumer behaviour. After clustering these 12 groups, the authors classified them into three research directions based on their content, namely research related to corporate CSR communication, research on AI and its applications and learning, and research on consumer behaviour.

Fourthly, when classified according to the timeline of keywords, it was found that the research in this field is relatively recent, with scholars only beginning to research and organise it from 2017 systematically. Over these 7 years, the research can be divided into three stages: 2017-2019, 2020-2022, and 2023. Overall, during these 7 years, this field remains in the developmental stage. Particularly, with the increasing adoption and popularisation of new technologies such as AI, more and more researchers are focusing on addressing trust issues and improving AI's service to CSR communication for consumers. Ethical issues, particularly those related to trust, have garnered attention from practitioners and scholars alike.

Finally, in burst word analysis, "management" has been the longest burst word in the past 24 years. Other keywords with lasting impact include "business" and "social responsibility". As CSR communication and consumer relations are inherently part of the disciplines of management and business, many scholars use disciplinary classification as a key criterion. 'Privacy', 'Service', 'Perceived value', and 'Online' are newly emergent keywords this year, indicating potential directions for future research. It also proves that issues of trust and ethics have always been issues that urgently need to be addressed and paid attention to in this field(Gonçalves et al., 2023; Du & Xie, 2021). At the same time, we found through research that some scholars have given relevant and effective suggestions (Buhalis & Moldavska, 2022; Etter et al., 2016). Researchers and businesses increasingly focus on the impact of businesses on consumers when utilising artificial intelligence for CSR communication. Particularly, there is a growing emphasis on using new technologies such as artificial intelligence to improve service, enhance consumer perceived value, better protect consumer privacy, and consequently alleviate consumer concerns about artificial intelligence.

Through visual analysis of knowledge graphs, we can gain insights into the application of artificial intelligence in corporate social responsibility communication and consumer relations, which helps to understand the knowledge structure of this field comprehensively and provides valuable references for related research. Firstly, we can summarise the trends and distribution of contributions in the articles to demonstrate that the application of artificial intelligence in corporate social responsibility communication is a continuous and highly valued research direction. This is significant as it impacts consumers. Secondly, we can delineate the foremost contributors–namely, the authors, institutions, and nations–that significantly impact this domain. Furthermore, we shall delve into an intricate analysis of keyword clusters and explore the most frequently cited articles. This information will help us better understand the current research status. Thirdly, during the visual analysis of knowledge

graphs, we can uncover the topics and themes of great interest, guiding future related research. Fourthly, after delving into the evolution of research on the impact of artificial intelligence on corporate social responsibility communication to consumers, it is necessary to classify and elaborate on it according to content. Additionally, analysing and summarising future research directions based on highly cited articles will assist future scholars in finding relevant statistical data and analytical materials, thus promoting further development in this field.

In practical terms, firstly, scholars provide more reflections on corporate social responsibility communication strategies, encouraging companies to leverage social media to increase the frequency and content of CSR communication. Simultaneously, regarding the development and application of technologies like AI, emphasis should be placed on AI's simulation of human emotions. Moreover, when companies utilise AI-related products and services targeting consumers, ensuring consumer convenience should be a priority. Additionally, adequate pre-promotion efforts are essential, potentially fostering greater consumer acceptance of AI-related services and products. Regarding ethical concerns and privacy issues, companies should adhere to responsible AI principles to better serve consumers and the market.

Limitations and future studies

Research on the impact of artificial intelligence on CSR communication with consumers still has certain limitations. Apart from the limitations of bibliometric analysis, there are other aspects to consider. Firstly, due to the continuous development and changes in artificial intelligence technology itself, research results may vary at different time points. Secondly, during the data collection process, factors such as sample selection bias and data quality may affect the accuracy and reliability of research conclusions. Additionally, relevant literature may be omitted when searching for keywords. For example, not all fields or specialised terms related to corporate social responsibility communication and artificial intelligence are covered. Therefore, in future research, it may be beneficial to use broader search strategies to obtain more relevant literature and consider introducing other databases for comparative analysis to improve data coverage. The application of AI in CSR communication involves multiple fields, such as ethics, law, and business, thus necessitating interdisciplinary research and collaboration. For instance, in the ethical domain, artificial intelligence may impact consumer privacy, while in the legal realm, it requires clarity on relevant responsibilities and regulations. Moreover, businesses need to enhance their communication skills and methods to convey their social responsibility better and enhance consumer awareness of their actions. Additionally, at the consumer level, there are divergent attitudes toward the use of artificial intelligence in CSR communication. Some consumers are concerned that artificial intelligence may lead to job losses or replace traditional service methods, while others value the convenience and efficiency it brings. Therefore, when engaging in CSR communication, it is crucial to consider the needs and concerns of different groups and seek more effective communication methods. Addressing these issues, academia and businesses can strengthen collaborative research efforts to explore how new technologies, such as artificial intelligence, can improve CSR communication and alleviate consumer concerns about ethical implications.

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