Advances in Consumer Research
ISSN (Print): 0098-9258
ISSN(Online): 3079-1766

Vol. 2, Issue 4 (2025) https://acr-journal.com/

Demystifying Sentiment Analysis into Customer Relationship Management Systems: A Bibliometric Approach Utilizing Scopus Database

Sampada Mashirkar[1], Rahul Sharma[2], Amit Kumar[3], Ritika Mohta[4], Ashima Varghese[*5]

[1] Ramdeobaba University Nagpur, India
[2] Ramdeobaba University Nagpur, India
[3] Ramdeobaba University Nagpur, India
[4] Ramdeobaba University Nagpur, India
[*5]National Academy of Defence Production, Nagpur, India

***Corresponding Author:**
Ashima Varghese
Email ID: ashimavarghese8@gmail.com

Cite this paper as: Sampada Mashirkar, Rahul Sharma, Amit Kumar, Ritika Mohta, Ashima Varghese, (2025) Demystifying Sentiment Analysis into Customer Relationship Management Systems: A Bibliometric Approach Utilizing Scopus Database. *Advances in Consumer Research*, 2 (4), 2071-2088

KEYWORDS

Sentiment Analysis, Customer Relationship Management, CRM Systems, Artificial Intelligence, Bibliometric Analysis, Scopus Database

ABSTRACT

Using the Scopus database as the main source of scholarly literature, the present study performed a thorough bibliometric analysis looking at how sentiment analysis might be included into Customer Relationship Management (CRM) systems. From 2008 to 2025 the study examined publishing trends, citation networks, and research clusters.

The researchers searched two significant phrases "Sentiment Analysis" AND "Customer Relationship Management" that were employed in 'all fields' and whittled down to 989 relevant publications. Through systematic evaluation of bibliometric performance indicators, including co-citation analysis, author collaboration networks, and keyword co-occurrence mapping, this study identifies emerging research themes and recent developments in this domain. Five performance analysis indicators—publications by prolific writers, cumulative publications, affiliations by prestigious universities, contributions from leading publishing companies, and top nations were investigated by the researchers. 201 of the publications came from 2024 most of them. 989 papers in all were added to cumulative publications with great acceleration.

Out of 159 authors, most prolific authors were Chiu, D.K.W. with 18 documents published in this domain. The University of Hong Kong led with 18 publications. Among various subject areas, Computer Science lead with 599 articles. IEEE Access topped among the different journal sources. Out of 741 cited documents, there were 32,339 citations received with h-index 74. India led with 193 documents among 90 countries. National Natural Science Foundation of China leads with 33, top funding agencies. In scientific mapping, the minimum values for each indicator in the VOSviewer software were determined. Scientific mapping was conducted on author citation, co-citation analysis, bibliographic linking, and most occurring keywords. In co-authorship of 65 countries, India leads in collaboration with other countries. In bibliographic coupling of 2802 organisations, the university of Hongkong led with 11 documents,105 citations. In co-occurrence of author keywords, "sentiment analysis", "machine learning", "artificial intelligence", "customer relationship management" were among the top key terms displayed through network visualization. The analysis demonstrates a significant increase in research output since 2008, with particular acceleration in studies focusing on social customer relationship management applications and real-time sentiment analysis integration. Emphasizing the development of sentiment analysis in CRM

systems and identifying future study paths, this bibliometric review offers insightful analysis for scholars and practitioners. The findings indicate an increasing focus on deep learning methods and more empirical research confirming the success of sentiment-enhanced CRM systems in several sector environments. The study identifies research gaps, in areas of multilingual sentiment analysis and cross-cultural CRM applications.

1. INTRODUCTION

Overview of Sentiment Analysis and Customer Relationship Management

Sentiment Analysis (SA) is the classification of consumer emotions expressed in direct requests or responses directed at the business (Capuano et al., 2021). SA also known as opinion mining, is the computational process of recognizing and classifying opinions expressed in a piece of text. Customer Relationship Management (CRM) depends critically on SA since it helps companies to monitor consumer opinions, measure customer happiness, and improve customer contacts (Kalusivalingam et al., n.d.).

Both businesses and potential consumers can benefit much from online product reviews. They impact buying decisions and help evaluate consumer happiness. From CRM, structured data from which unstructured data like customer comments can be separated. Integration suffers from the unstructured nature of over eighty percent of enterprise data. SA is the classification of consumer emotions expressed in direct requests or responses directed at the business (Yaakub et al., 2013).

The transforming possibilities of including sentiment analysis features into conventional CRM systems are investigated in this study article, therefore producing a more complex and emotionally intelligent method of customer relationship management. The research study looks at how companies might use machine learning and natural language processing to better comprehend and react to consumer emotions, therefore enhancing the interactions and business outcomes.

Consequences on loyalty and customer satisfaction

Statistical investigation uncovered that companies utilizing sentiment-integrated CRM systems had notably higher customer satisfaction scores and loyalty indices. Businesses showing emotional awareness in their interactions helped customers to feel more valuable and understood, therefore building, more long-lasting relationships. Enhancing satisfaction through customer loyalty programs and incentives loyalty programs, big data enables enterprises to assess client preferences for the formulation of effective loyalty programs. Customizing rewards according to consumer data can markedly enhance satisfaction and retention (Tochukwu Ignatius Ijomah et al., 2024).

According to (Khan et al., 2024), integrating big data solutions like as Hadoop and Spark enable CRM systems to manage extensive activities more effectively. These systems provide advanced analytics, crucial for managing the intricacies of data produced by digital interactions.

Significance of SA in CRM

Assessing Customer Relations: Over several channels including social media, email, chat support, and voice conversations the modern companies create enormous volumes of consumer contact data. Conventional CRM solutions often overlook the emotional context even if they excel in data organization. Businesses may now automatically identify and classify consumer emotions by way of sentiment analysis integration, therefore transcending simple words to grasp not only what consumers say but also how they feel about their experiences “Enhancing Social Customer Relationship Management by Using Sentiment Analysis, 2017”. As per (Sandar Kyaw et al., n.d.), e-commerce customer data encompass personal information, reviews, ratings, and website traffic metrics. Sentiment analysis processes textual data to derive significant insights that can guide marketing tactics and improve cross-cultural CRM systems.

Emotional Intelligence in the Business Sector: The report presents vital evidence that awareness of consumer emotions significantly affects the performance of companies. Sentiment pattern analysis allows businesses to identify emotional triggers generating both positive and negative experiences. This information enables companies to fix problems before they become more critical by means of proactive solutions generating positive emotional reactions. Companies should carefully identify, monitor, and manage a subset of really unhappy customers who have had a high emotional experience (Griesser & Gupta, 2019). Firms may detect digital marketing tendencies by analyzing customer sentiments. This involves understanding customer satisfaction and identifying areas for improvement to be competitive in E-commerce (Sandar Kyaw et al., n.d.).

Enhanced customer interaction: Companies using sentiment-enhanced CRM systems increased consumer engagement, according to research. Companies might customize their communications to identified emotional states, fostering more meaningful partnerships. Technology that tracks emotional shifts lets organizations adapt policy ahead of time instead of reacting (Capuano et al., 2021) investigated the complex endeavour of aspect-based sentiment analysis, involved discerning customer opinions regarding various elements.

Techniques used in Sentiment Analysis

Natural Language Processing (NLP) with online product evaluations is a vital resource for customers seeking full information and making educated judgments. The automated extraction of sentiment or views from these assessments relies heavily on sentiment analysis, a part of NLP (Bharadwaj, 2023).

Data mining enables enterprises to categorize clients into discrete categories according to their purchase behaviours and preferences (Rygielski et al., 2002).

The Bharadwaj (2023) architecture used two methods to accurately classify sentiment. Lexical, syntactic, and semantic characteristics were extracted from review articles for feature engineering. Word embeddings, part-of-speech tags, sentiment lexicons, and n-grams were incorporated. N-grams helped detect tone-affecting word combinations and phrases. Sentiment lexicons helped explain sentiment by revealing phrase polarity. Part-of-speech tags reveal sentence grammar and emotion. Deep learning and feature engineering improve the system's capacity to distinguish complex sentiment patterns and construct robust representations. Recurrent and convolutional neural networks are used for sentiment analysis. Recurrent and convolutional neural networks are used to analyze emotions. CNNs are good in extracting regional traits from text by filtering small portions of review texts. This skill is important for distinguishing emotion indicators in small pieces like words or phrases. However, RNNs excel at contextual information and sequential links, which are essential for sentiment analysis in long, context-dependent evaluations. Integrating CNN and RNN strengths improves sentiment analysis accuracy (Bharadwaj, 2023).

Churn Prediction and Mitigation

Predictive Modeling: Businesses may use transaction histories and customer interactions to anticipate which customers will depart. Machine learning can identify churn trends. After identifying at-risk consumers, targeted retention initiatives like personalized offers and proactive service may address their concerns (Tochukwu Ignatius Ijomah et al., 2024).

History is examined to find patterns that predict future outcomes in predictive model creation. This strategy is crucial for companies trying to forecast customer behavior based on past interactions. Enterprises may use predictive algorithms to determine whether customers will repeat purchases or disconnect (Rygielski et al., 2002).

Predictive Analytics in CRM systems may identify at-risk consumers, allowing companies to retain them more cheaply than acquire new ones (Chinekwu Somtochukwu Odionu et al., 2024).

Data Mining: According to (Rygielski et al., 2002), data mining may also anticipate customer behavior for lifecycle events like retirement or marriage. By identifying clients in similar life phases, companies may tailor their marketing to specific needs.

Customer Segmentation and Targeting

Clustering algorithms simplify segmentation, enabling more targeted marketing strategies. Basket analysis may help retailers locate commonly purchased items to optimize marketing and inventory management (Rygielski et al., 2002).

Big Data allows more exact customer segmentation than demographic data. By examining behavioral, transactional, and social media data, companies may discover customer groupings like repeat buyers and discount hunters (Tochukwu Ignatius Ijomah et al., 2024).

Special deals for regular clients or targeted promotions for bargain-hunters may be utilized for each category (Tochukwu Ignatius Ijomah et al., 2024).

Unfilled Constraints in Sentiment Analysis Cross-Domain Generalizability: The datasets used to train many current models may limit their application to other businesses or sectors. This weakness underscores the need for better models that can adapt to varied circumstances and linguistic peculiarities.

Research Questions: This research study focuses on the following “Sentiment Analysis” and “Customer Relationship Management” RQs:

RQ1: Which author is more productive and effective?

RQ2: Which year had the most papers?

RQ3: Top universities' affiliations?

RQ4: Which major publishers publish most articles?

RQ5: Which nations have published the most articles?

RQ6: Which writers are most cited?

RQ7: Most referenced journals?

RQ8: Which writers are co-cited most?

RQ9: Which nations have the greatest interbibliographical links?

RQ10: Which author keywords are more common in articles?

2. LITERATURE REVIEW

Sentiment Analysis in Natural Language Processing (NLP) seeks views on goods, services, businesses, people, problems, events, themes, and qualities. Polarity detection—determining whether a text is neutral, positive, or negative—is the primary sentiment analysis difficulty. Polarity detection helps prioritize client requests and streamline CRM system workflow (Capuano et al., 2021).

Ishtiaq et al. (2025) state that sentiment analysis includes aspect-, sentence-, and document-level studies. Part-of-speech tagging and TF-IDF are used to evaluate customer feedback sentiment.

Text data from many sources, including social media, online reviews, and consumer feedback, is analyzed using NLP and ML techniques (Kalusivalingam et al., n.d.).

As per (Rygielski et al., 2002), businesses may uncover customer behavior patterns by analyzing transaction data. This research may inform product positioning and marketing. Understanding seasonal purchase patterns helps organizations optimize inventories during peak seasons.

Sentiment research assessed positive and negative customer attitudes about NLP-enabled CRM. This research revealed that NLP approaches may boost customer interaction since customers absorb it more effectively than traditional information presentations. The framework combined behavior, trust, reputation, honesty, and accuracy into CRM methods (Lawson-Body et al., 2022).

The automated technique adjusts customer satisfaction levels based on loyalty and interaction frequency. This elasticity ensures ratings reflect real-time client feelings and actions. “8th International AI&DPS Symposium, 2024”. In the 2017 research “Enhancing Social Customer Relationship Management by Using Sentiment Analysis,” the banking industry found that active interaction does not necessarily indicate favorable sentiment. Sentiment research helped hospitality decision-makers increase client service and engagement. The architecture allows real-time customer satisfaction changes, reflecting consumer opinion. This capability lets companies monitor user experiences and alter their strategy.

Product reviews need feature ontology and synonyms to accurately capture and measure customer sentiment. They help better understand customer viewpoints, which may impact product development and marketing. (Yaakub et al., 2013).

An extensible framework with sentiment analysis can handle several languages and data types, making it easier to gather and analyze customer feedback from multiple E-commerce platforms. This design allows chatbots and other dynamic interactions, increasing customer engagement (Sandar Kyaw et al., n.d.). (Al-Rubaiee et al., 2018) offered a framework that connected CRM with consumer Experience Management using SA to enhance CRM by integrating it with social media consumer views.

Social media advancements include consumer mood detection. Most computer scientists led consumer language sentiment analysis, which is now widely used in industry. Sentiment summarizes an idea's valence. Today's always-on, always-connected environment allows anybody to communicate their ideas on social media instantly (Griesser & Gupta, 2019).

The findings of (Gupta & Agarwal, 2024) shown that social media may help students comprehend their viewpoints. The validation findings show that students' perspectives differ from institutional standards, indicating that adjusting remote education criteria based on student input might improve education.

Sentiment analysis may evaluate emails and social media reviews. SA filters and prioritizes input to increase customer commitment and satisfaction in the face of the expansion of social media, emails, and instant messaging (Capuano et al., 2021).

According to (Kalusivalingam et al., n.d.) an issue with pre-trained models is that they frequently retain biases from the data used to train them. This is particularly true with BERT and LSTM. To get more equitable results in sentiment classification, future studies should concentrate on finding ways to reduce these biases.

The system evaluates client sentiment using BERT and RoBERTa transformer models. The algorithm uses ensemble learning to enhance sentiment categorization and dynamically adjusts customer satisfaction ratings depending on loyalty and interaction frequency.

Transitioning from static data storage to dynamic, predictive systems lets organizations make educated choices based on actionable insights from complex datasets. This progression advances loyalty schemes and targeted marketing (Khan et al., 2024).

(Chinekwu Somtochukwu Odionu et al., 2024) analyzed big data-driven decision-making. Effective CRM tactics boost sales and profitability using data analytics insights Multilingual sentiment analysis is a developing domain that encounters numerous research deficiencies, especially for under-resourced languages and the intricacies of code-mixed and code-

switched texts. (Ho et al., 2024), investigated code-mixing, the practice of alternating between languages in conversation or text, poses distinct obstacles for sentiment analysis. Contemporary techniques struggle to accurately evaluate sentiments in these situations, especially among multilingual populations. Despite advances in code-mixed text analysis, research shows that viable frameworks for disaggregating these texts into their component languages are still lacking. Most sentiment analysis systems are designed for single-language environments, making them ineffective in multilingual settings. Machine Translation's use to standardize language in code-mixed texts shows promise, but more research is needed to find ways to enhance sentiment analysis in several languages. Thus, large datasets for many underexplored languages are urgently needed.

Research on cross-cultural CRM applications revealed significant gaps that must be addressed to increase understanding and implementation. Cultural preparation, organizational architecture, investment rationale, motivational analysis, communication issues, HR procedures, and segmentation tactics were highlighted as weaknesses. Enhancing these factors will improve foreign firms' CRM strategy and cultural fit.

According to the "8th International Artificial Intelligence And Data Processing Symposium, 2024", sentiment analysis in customer relationship management systems improves understanding of consumer needs and activities and customer satisfaction evaluation. By customizing client engagement and retention, this development helps organizations succeed.

3. RESEARCH METHODOLOGY

A well-structured and exacting technique for examining vast scientific data, bibliometrics enables researchers to unravel the subtleties of a particular field's evolution while illuminating its new frontiers (Donthu et al., 2021). Considering its primary advantage is the intricate scientific mapping over a certain time period that identifies novel trends that practitioners or decision-makers in a variety of domains may employ, bibliometric analysis has gathered momentum and is being utilized extensively in all sectors. VOSviewer uses the acronym VOS, which stands for Visualizing Similarity, to create the map. Microsoft Excel was used to calculate performance indicators, and VoSviewer software was used to undertake science mapping.

Bibliometric Analysis: According to (Donthu et al., 2021), bibliometric analysis has surged in popularity within business research recently, attributable to the advancement of bibliometric software VOSviewer, Bibliometrix (an R package), CiteSpace, Biblioshiny etc. alongside scientific databases like Scopus, Web of Science, and the interdisciplinary transfer of bibliometric methodology from information science to business research. Bibliometric analysis primarily focuses on extensive and objective data, such as citation counts, publication numbers, and keyword occurrences.

Search Strategy

The researchers performed bibliometric analysis on studies published on "Sentiment Analysis" AND "Customer Relationship Management" that were employed in 'all fields. The primary data source for the VOSviewer software (version 1.6.20) was the Scopus. The initial search yielded over 1000 articles. The "All fields" search criterion and time period filter were applied, and the total number of documents was whittled down to 991. Subject categories helped further refine the papers. Consequently, bibliometric analysis was performed on 989 documents spanning the years 2008 through 2025. The search was conducted on 10th Feb 2025.

According to (Donthu et al., 2021), there are two main types of bibliometric methods: performance analysis and science mapping. Performance analysis basically takes into consideration the inputs from research components, whereas science mapping is more concerned with the connections between such components.

An overview of performance assessments and science mapping indicators is provided below:

I) Performance Assessments: Analysis of performance metrics includes the number of publications by prolific authors, cumulative publications, affiliations by top universities, contributions from top publishing houses, and countries using MS-excel.

II) Science Mapping: Scientific indicator mapping includes analysis of authors citations, co-citation analysis, bibliographic coupling, and co-occurrence of keywords utilising VOSviewer software.

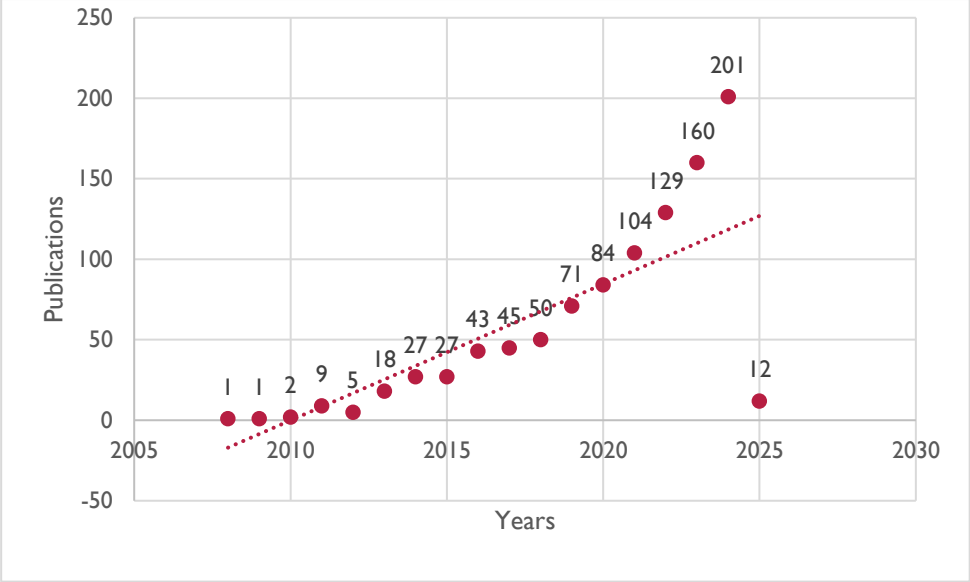
Data Extraction

The Scopus database was utilized to extract information. The process was sequential and involved the following phases. To begin, the researchers accessed the Scopus database and filled out the keyword fields in the first row. "All fields" was chosen for "Sentiment Analysis" AND "Customer Relationship Management". After applying time and subject area filters, 989 study results continued to persist. The file was downloaded in tab-delimited format. Performance metrics were calculated using the Scopus database. Scientific assessments were conducted using VoSviewer software.

4. RESULTS & DISCUSSION

I) Performance Analysis

1. Top Publications by year

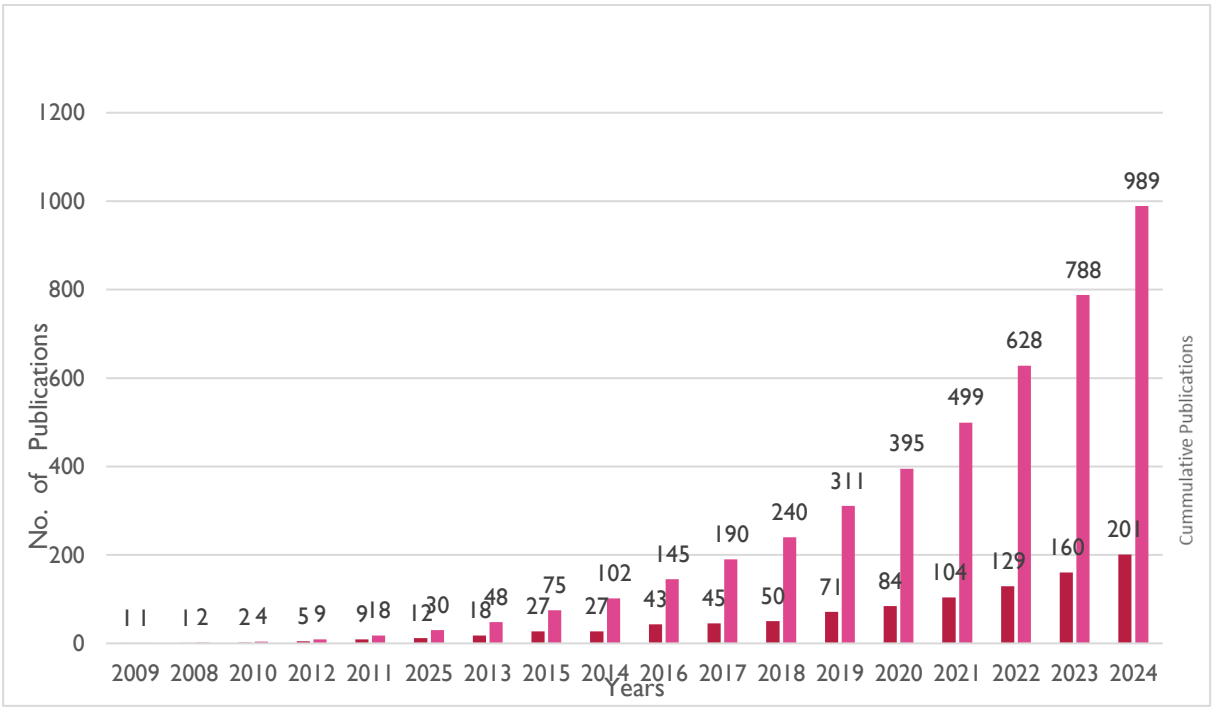


Source: Scopus database

Figure 1. Top publications by year

Figure 1. displayed top 201 documents, were most publications, in the year 2024. Between 2008 and 2024, there was a significant rise of publications, particularly from 2020 to 2024, culminating in a peak of 201 publications in 2024. This growth signifies increased interest in this domain.

2. Cummulative Publications by Year

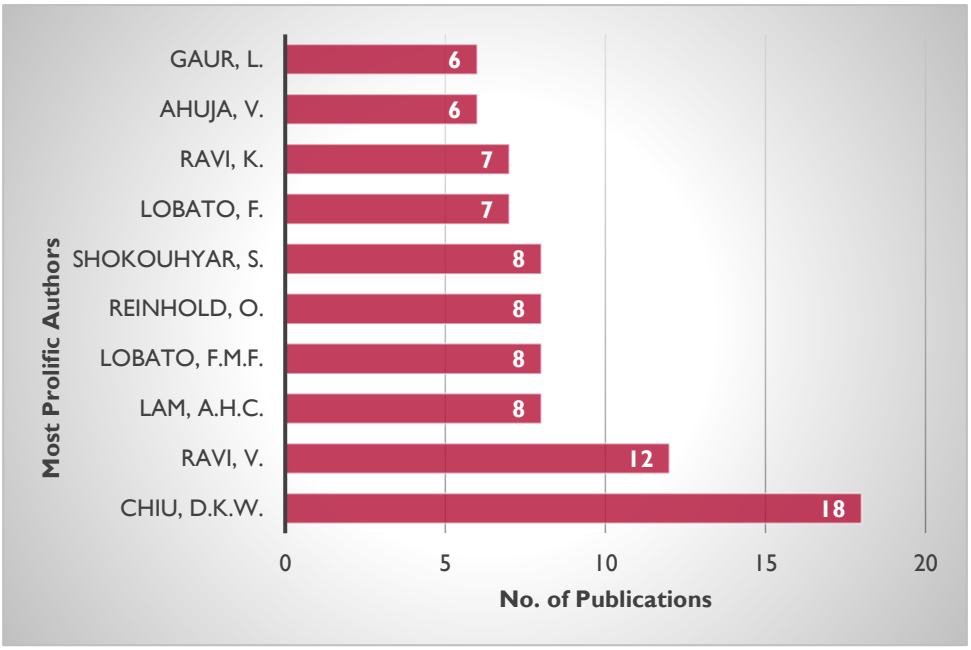


Source: Scopus database

Figure 2: Cumulative publications by year

A combo chart from 2008 until 2024, the total number of publications that climbed gradually from 11 to 989 had been analysed in Figure 2. Most of the publications climbed up after Covid, i.e. 395 in the year 2020, 499 in 2021, 628 in 2022, 788 in 2023. Figure 2. exhibited the cumulative publications by year on secondary axis with sharp increase to 989 documents in 2024.

3. Top Prolific Authors

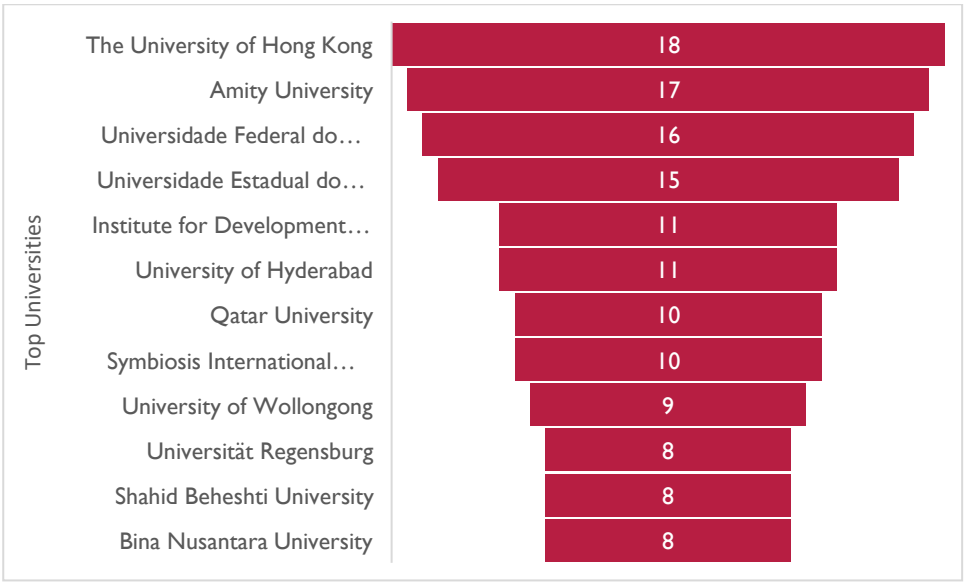


Source: Scopus database

Figure 3. Top prolific authors

In Figure 3., out of 159, authors who have published at least 1 paper, the top three prominent authors were Chiu, D.K.W. (18), followed by Ravi, V. (12), Lam, A.H.C. (8) and so on.

4. Top Ten Universities

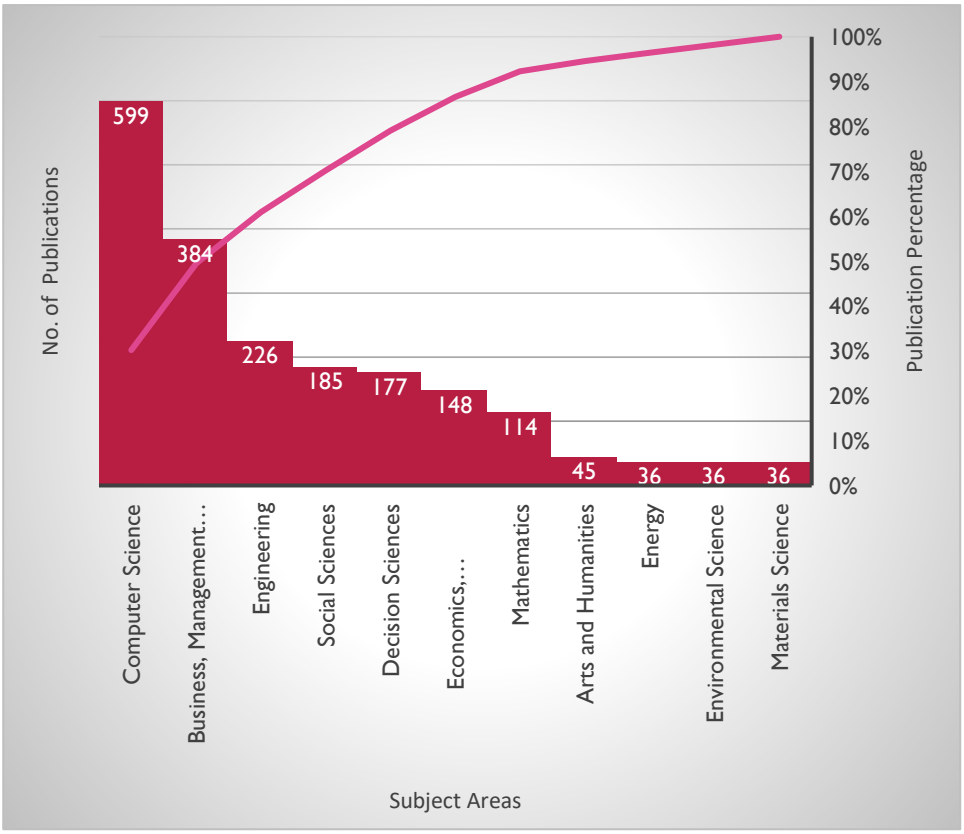


Source: Scopus database

Figure 4. Top ten universities

Figure 4. showed that out of 160 affiliations, Universities which have published at least 2 papers, the top three universities were The University of Hong Kong led with (18) publications, Amity University (17) and Universidade Federal do Oeste do Pará (16) publications.

5. Top Subject Areas

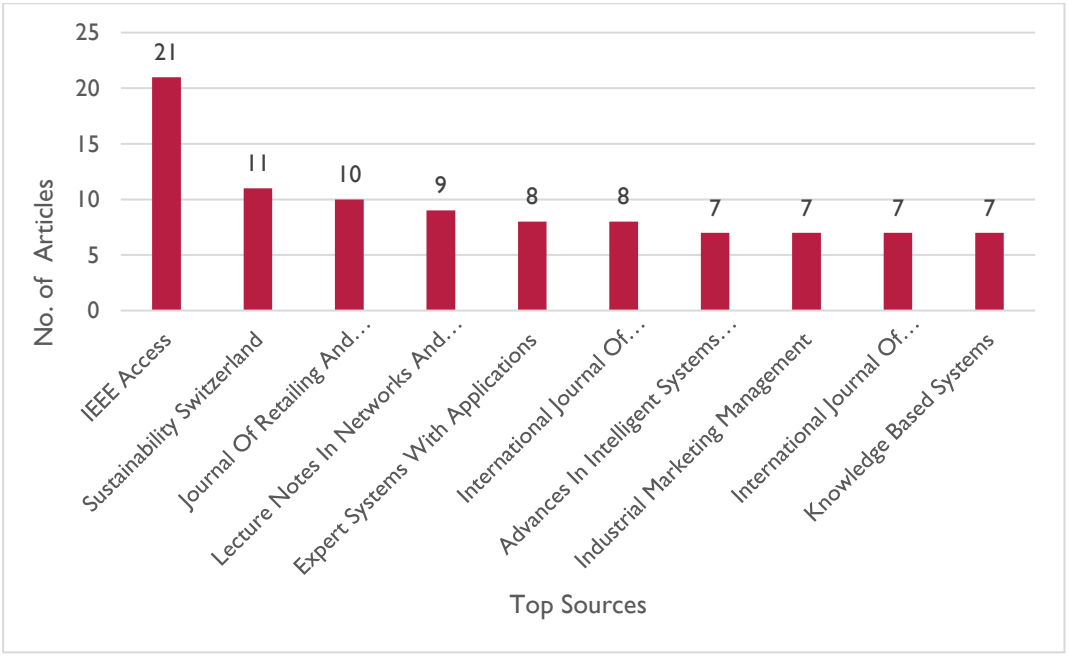


Source: Scopus database

Figure 5. Top Subject areas

Out of 23 subject areas in Figure 5., top three where most papers were published in this domain were Computer Science lead with (599) followed by Business, Management and Accounting (384) and Engineering with (226) documents.

6. Top Journal Sources

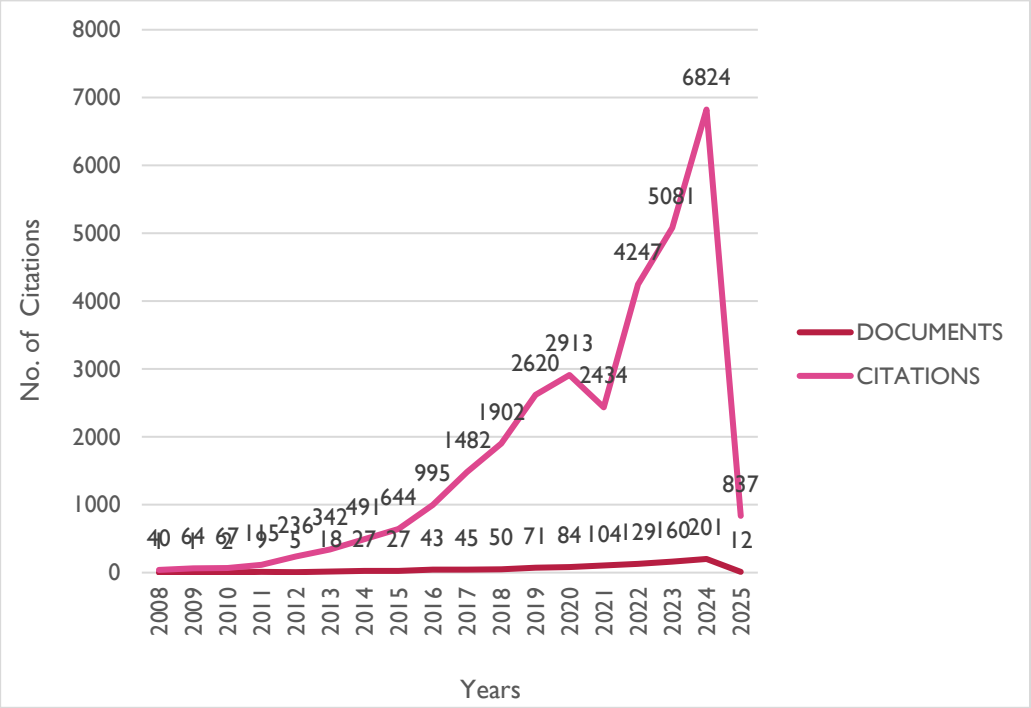


Source: Scopus database

Figure 6. Top journal sources

Out of 129 Journal sources which have published at least 2 articles in this domain, the top three were IEEE Access with (21) publications, followed by Sustainability Switzerland (11) and Journal of Retailing and Consumer Services (10) publications as displayed in Figure 6.

7. Citations Overview of Documents

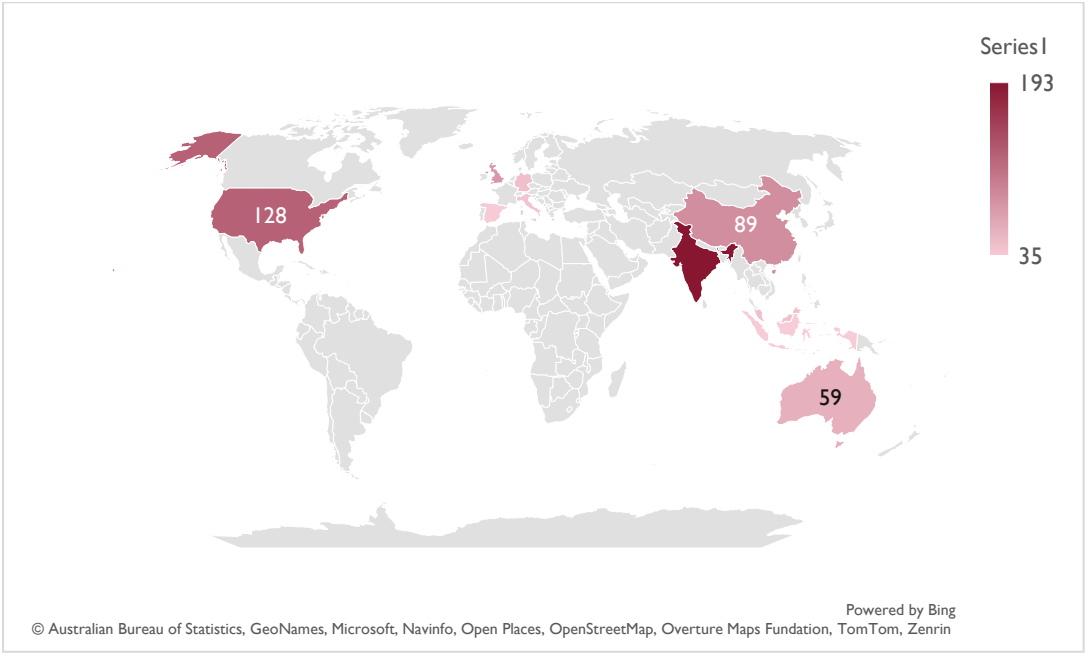


Source: Scopus database

Figure 7. Citations overview of documents

Figure 7. exhibited the citation overview on the said domain among 989 documents. Out of 741 cited documents, there were 32,339 Citations received with h-index 74. The number of Citations increased in the year 2024 with 201 and citations received were 6824.

8. Top Ten Countries

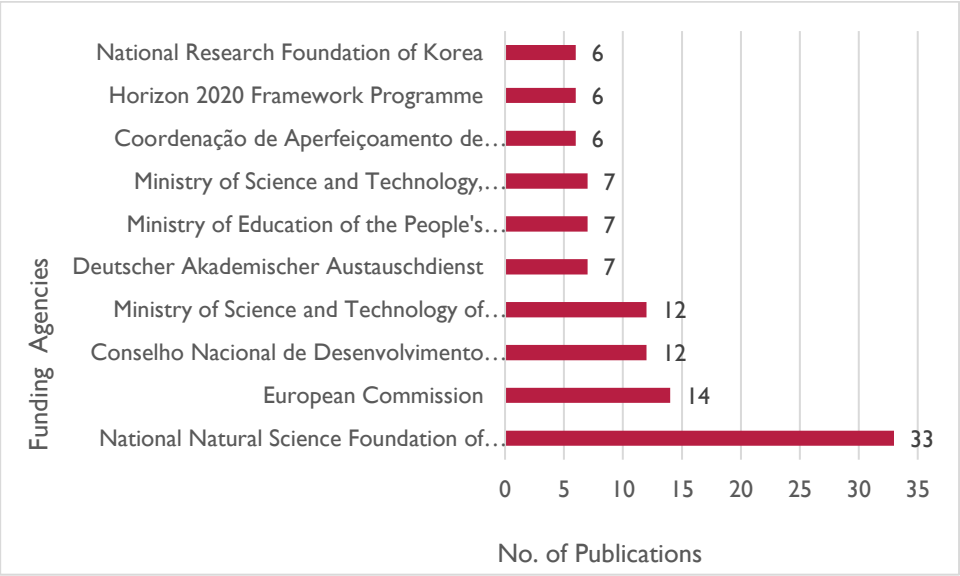


Source: Scopus database

Figure 8. Top ten countries

Out of 90 countries, India led with (193) documents followed by United States (128) and China with (89) and so on as displayed in world map in Figure 8.

9. Top Funding Agencies



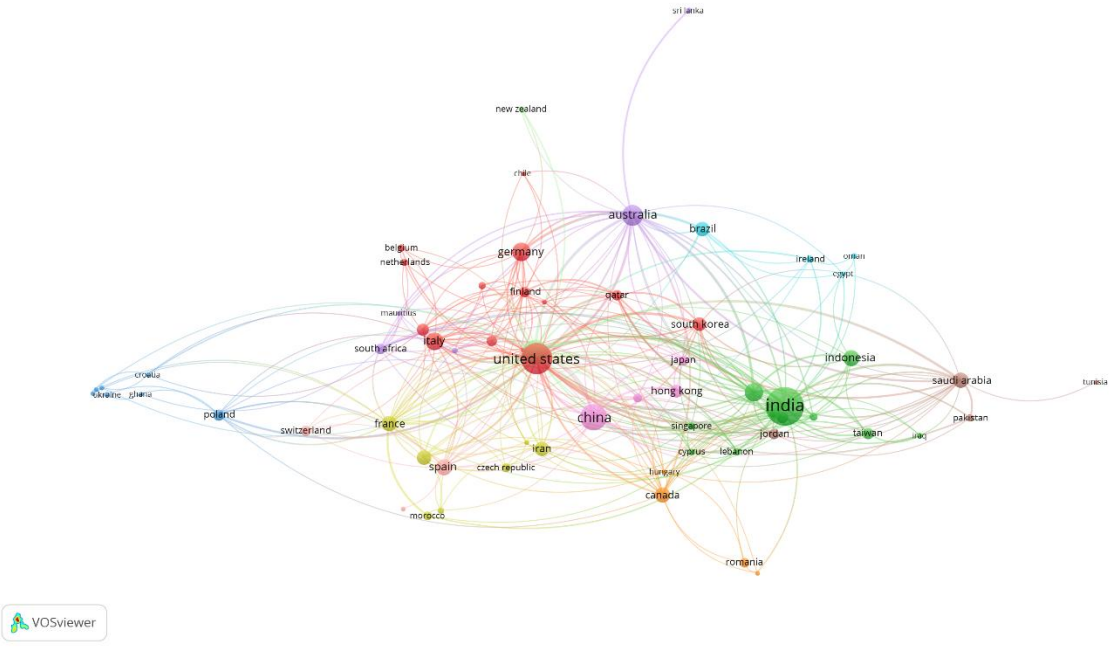
Source: Scopus database

Figure 9. Top funding agencies

In Figure 9. Top funding agencies are displayed with maximum funding. National Natural Science Foundation of China topped with (33), followed by European Commission (14), Conselho Nacional de Desenvolvimento Científico e Tecnológico (12) and so on.

II) Scientific Mapping

10. Co-authorship of top nations



Source: Scopus database

Figure 10. Co-authorship of top nations

In Figure 10. among co-authorship of 65 countries, minimum threshold was 3, India leads in collaboration with other countries. After running the layout algorithm, Figure 10. exhibited network visualisation with coloured circles and curving lines for better comprehension of all countries using VOSviewer software.

11. Co-authorship of Top 20 Nations

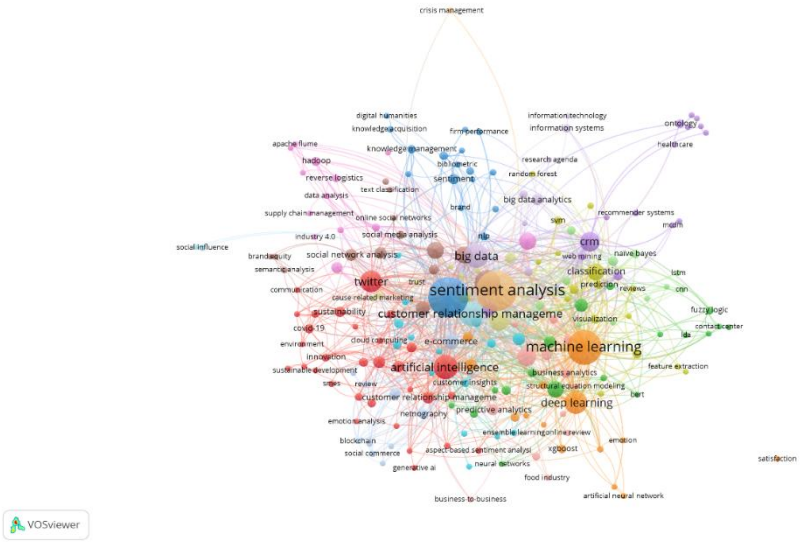
#	country	documents	citations	total link strength	#	country	documents	citations	total link strength
1	India	193	4353	87	11	Saudi Arabia	32	1249	44
2	United States	129	14091	97	12	Canada	31	11991	32
3	China	91	2196	61	13	France	31	1199	47
4	United Kingdom	82	4533	118	14	Brazil	29	767	17
5	Australia	59	3445	77	15	Iran	28	315	17
6	Germany	46	1035	31	16	Turkey	28	255	19
7	Malaysia	45	840	57	17	South Korea	25	343	25
8	Italy	42	2438	30	18	Hong Kong	23	605	13
9	Spain	36	1293	26	19	Portugal	20	954	14
10	Indonesia	35	207	12	20	Thailand	18	390	14

Source: Scopus database

Table 1. Co-authorship of top 20 nations

Table 1. displayed the co-authorship of top 20 nations among 104, with of documents, citations and link strength.

12. Co-occurrence of Author Keywords



Source: Scopus database

Figure 11. Most occurring keywords

In Figure 11. Most occurring keywords by author with least occurrence determined was 3. Among 2562 keywords, 210 achieved the threshold. The co-occurrence of author keywords, “sentiment analysis", “machine learning”, “artificial intelligence”, “deep learning”, “twitter”, “big data”, “customer relationship management” were among the top key terms displayed through network visualization.

13. Most Occurring and Popular Keywords

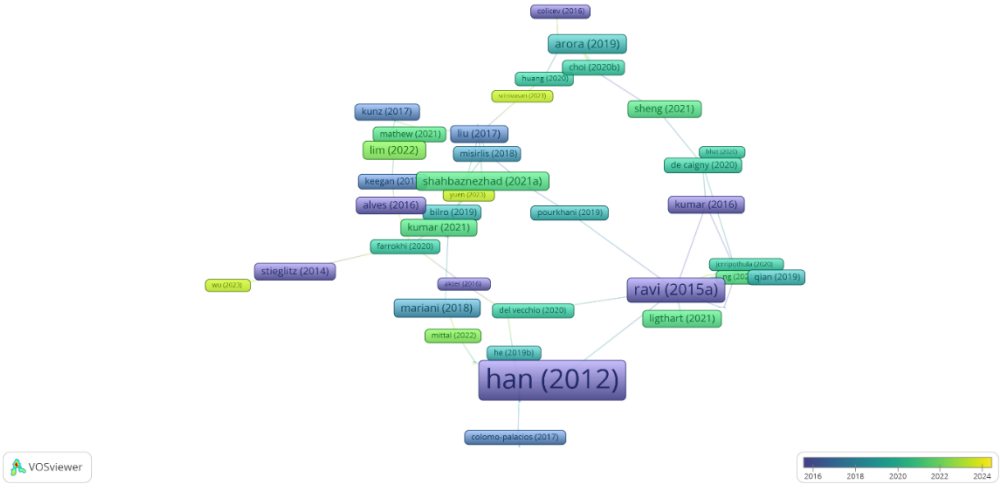
#	keyword	occurrences	total link strength	#	keyword	occurrences	total link strength
1	sentiment analysis	130	341	11	natural language processing	31	79
2	social media	127	239	12	data mining	30	70
3	machine learning	94	243	13	opinion mining	24	70
4	text mining	53	116	14	social crm	24	74
5	customer relationship management	50	117	15	classification	23	58
6	big data	48	137	16	social media analytics	23	45
7	artificial intelligence	46	124	17	customer satisfaction	22	50
8	deep learning	43	90	18	e-commerce	19	45
9	twitter	38	100	19	business intelligence	17	42
10	crm	32	73	20	customer engagement	15	29

Source: Scopus database

Table 2. Most occurring and popular keywords

Table 2. displayed the frequent occurrence of top 20 keyterms among 210, with number of occurrences and link strength. Topping keyword is sentiment analysis 130 occurrences and link strength 341, followed by social media 127, 239, machine learning 94, 243, text mining 53, 116, customer relationship management 50, 117 followed by others.

14. Document-wise Citation Analysis



Source: Scopus database

Figure 12. Document wise citation analysis

In Figure 12. Document wise citation analysis, 570 documents were depicted using overlay visualization of coloured frames from 2016 to 2024.

15. Documents with Highest Citations

#	document	citations	#	document	citations
1	ha (2011)	5829	11	mariani (2018)	291
2	han (2012)	5215	12	vecchio (2018)	283
3	ravi (2015a)	1064	13	lim (2022)	271
4	assunção (2015)	628	14	vlačić (2021)	264
5	andrejevic (2013)	472	15	ahmed (2023)	228
6	arora (2019)	373	16	amin (2016)	228
7	verma (2021)	359	17	sheng (2021)	223
8	abbas (2019)	334	18	kumar (2021)	220
9	shahbaznezhad (2021a)	302	19	stieglitz (2014)	218
10	kurani (2023)	299	20	camacho (2020)	216

Source: Scopus database

Table 3. Documents with highest citations

Top 20 documents with highest citations topping with ha (2011), 5829 citations, han (2012)5215, ravi (2015a) 1064 citations and so on was represented in Table 3.

16. Bibliographic Coupling of Top 20 Authors

#	author	documents	citations	total link strength
1	ravi, vadlamani	12	1408	1726
2	chiu, dickson k. w.	11	81	6954
3	lam, apple hiu ching	8	64	6443

4	reinhold, olaf	8	58	1791
5	shokouhyar, sajjad	8	121	786
6	chiu, dickson k.w.	7	54	5430
7	ravi, kumar	7	1149	1415
8	ahuja, vandana	6	50	152
9	gaur, loveleen	6	28	330
10	rotovei, doru	6	14	544
11	alt, rainer	5	46	1349
12	benslimane, djamal	5	17	1397
13	el fazziki, abdelaziz	5	17	1397
14	ennaji, fatima zohra	5	17	1397
15	kasemsap, kijpokin	5	45	882
16	leist, susanne	5	34	1455
17	lobato, fabio	5	65	936
18	nilashi, mehrbakhsh	5	252	1271
19	sadgal, mohamed	5	17	1397
20	afaq, anam	4	16	233

Source: Scopus database

Table 4. Bibliographic coupling of top 20 authors

Table 4. represented the bibliographic coupling of top 20 authors out of 71, with documents, citations and link strength.

17. Bibliographic Coupling of Premier Sources

Source: Scopus database

Figure 13. Bibliographic coupling of premier sources

The network visualization of bibliographic coupling of sources was displayed in Figure 13. Bibliographic coupling of 2802 organisations, the university of Hongkong led with 11 documents ,105 citations followed by others.

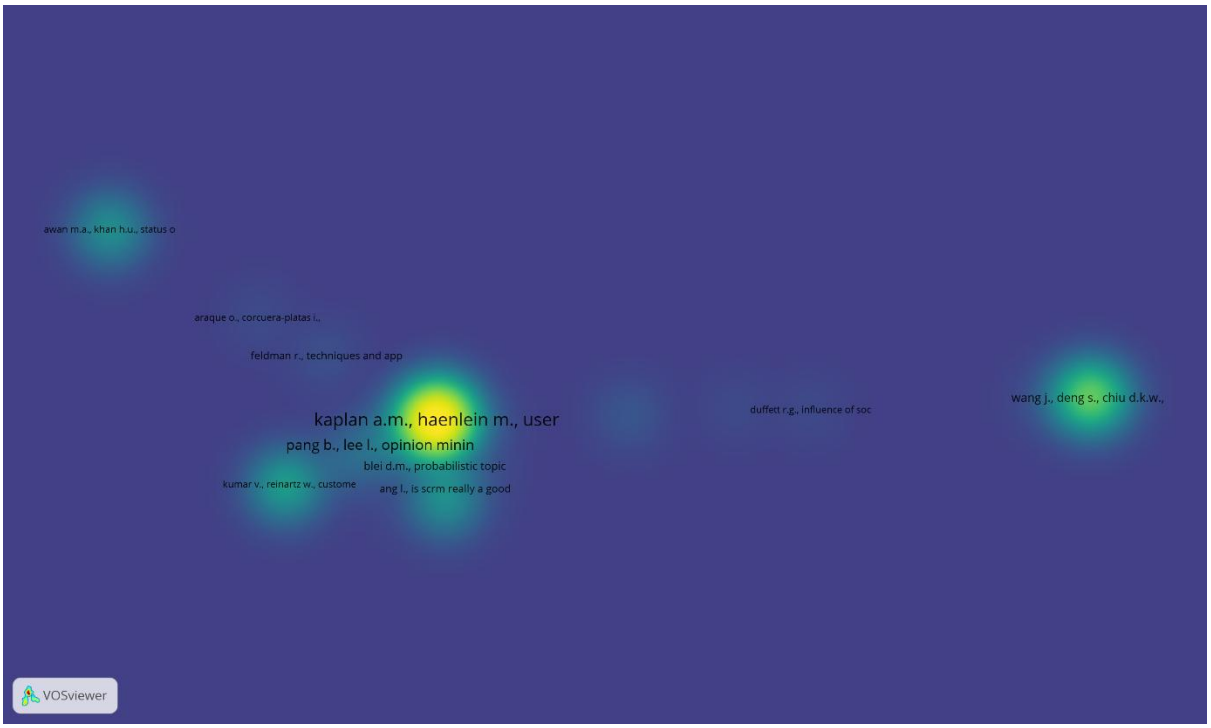
18. Bibliographic Coupling of Top Organisations

#	organization	documents	citations	total link strength
1	the university of hong kong, hong kong	11	105	2708
2	state university of maranhão, são luís, brazil	6	42	743
3	west university of timisoara, computer science department, timisoara, romania	5	14	146
4	engineering and geoscience institute, federal university of western pará (ufopa), santarém, brazil	4	7	301
5	social crm research center (scrc), leipzig, germany	4	6	262
6	computer systems engineering laboratory (lisi), faculty of sciences - ucam, marrakech, morocco	3	6	282
7	department of accounting and information systems, college of business and economics, qatar university, p.o. box 2713, doha, qatar	3	14	354
8	department of business administration, college of business and administration, princess nourah bint abdulrahman university, riyadh, saudi arabia	3	57	1150
9	department of computer science and engineering, qatar university, doha, 2713, qatar	3	35	936
10	department of industrial and information management, faculty of management and accounting, shahid beheshti university, tehran, iran	3	52	110
11	informatics laboratory in image and information systems, claude bernard university, lyon 1, france	3	6	282
12	instituto universitário de lisboa (iscte-iul), business research unit (bru-iul), lisboa, portugal	3	276	243
13	lovely professional university, india	3	0	225
14	school of computer & information sciences, university of hyderabad, hyderabad, 500046, india	3	300	222
15	school of computer and information sciences, university of hyderabad, hyderabad, 500046, india	3	6	54
16	suan sunandha rajabhat university, thailand	3	25	385
17	taylor's university, malaysia	3	2	310
18	the university of hong kong, hong kong, china	3	6	1667
19	university of central oklahoma, united states	3	2	326
20	university of regensburg, regensburg, germany	3	44	338

Source: Scopus database

Table 5. bibliographic coupling of top organisations

19. Co-citation Analysis of Most Cited References



Source: Scopus database

Figure 14. Co-citation analysis of most cited references

Co-citation analysis of most cited references among 69441 citations 1467 achieved the threshold. Density visualisation of co-citation analysis of most cited references was exhibited in Figure 14. Cluster density was indicated by the intensity of the yellow colour. Cited reference, citations and total link strength of top three displayed as kaplan a.m., haenlein m., (55 ,948), malthouse e.c., haenlein m., skiera b., wege e., zhang m., (44, 717), kietzmann j.h., hermkens k., mccarthy i.p., silvestre b.s.,(32, 884).

5. DISCUSSION

The researchers examined performance analysis indicators, including publications by prolific authors, cumulative publications, affiliations by top universities, contributions from top publishing houses, and countries. Most of the publications climbed up after Covid, i.e., 104, were in the year 2021, followed by 129 in 2022, 160 in 2023, 201 in 2024 as top publication, displayed in Figure 1. There was a sharp increase of 989 documents in cumulative publications exhibited in Figure 2. The top three prolific authors who published articles on this domain were Chiu, D.K.W. (18), followed by Ravi, V. (12), Lam, A.H.C. (8) and so on represented in Figure 3. Figure 4. displayed that affiliation by "The University of Hong Kong,18 was among top160 affiliations. The top subject area in Figure 5., where most papers are published in this domain were Computer Science lead with (599). IEEE Access journal topped with 21 publications was represented in Figure 6. A combo chart with number of citations displayed in Figure 7., which observed a steep increase after Covid-19. The year 2024 received highest 6824 citations on the articles of Sentiment Analysis and Customer Relationship Management. The maximum document types were Article 547, followed by Conference Paper 227, Book Chapter 107, Review 56, Book 43, Conference Review 7 and Editorial 3. Figure 8. represented the top countries with the most articles published were India, 193, followed by United States 128, China with 89 and so on. National Natural Science Foundation of China topped with 33, among the 159 funding sponsors was reflected in Figure 9. In scientific mapping using Vosviewer software, network visualisation in Figure 10., demonstrated co-authorship among 65 countries. India leads in collaboration with other countries, suggesting that developing countries show more research interest in this area than developed nations. Table 1. displayed country, documents, citations and total link strength of total 104 countries with India (193, 4353, 87), United States (129, 14091, 97), China (91, 2196, 61) followed by others. Figure 11., and Table 2. reflected the co-occurrence of top 20 keywords among 210, with total sum of keyword occurrences and link strength as 'sentiment analysis' (130, 341), 'social media' (127, 239), 'machine learning' (94, 243), 'text mining' (53, 116), 'customer relationship management' (50,117) and so on. In Table 3., documents with highest citations received, ha (2011), 5829 followed by han (2012), 5215 , ravi (2015a), 1064 and so on were displayed. Table 4. represented the bibliographic coupling of top 20 authors out of 71, with total sum of documents, citations and link strength as ravi, vadlamani (12, 140, 1726), chiu, dickson k. w. (11, 81, 6954), lam, apple hiu ching (8, 64, 6443) followed by others. Table 5. displayed bibliographic coupling of top 20 organisations among 78, with total sum of documents, citations and link strength as The university of hong kong,(11, 105, 2708) followed by state university of

maranhão, são luís, brazil (6, 42, 743), west university of timisoara, Romania (5, 14, 146) followed by others. Co-citation analysis of most cited references was exhibited in Figure 14. through density visualization.

Limitations:

The analysis was limited to articles that were indexed in the Scopus database only; consequently, it's possible that publications from unidentified databases like Web of Science, PubMed, and Dimensions etc. were undetected.

Ethical Considerations:

More research is needed to fully understand the ethical implications of sentiment analysis, especially with relation to data privacy and the possibility of its abuse in targeted advertising or manipulation. 17 Ethical Considerations: As data collecting increases, organizations must adhere to standards like the GDPR and establish security protocols to safeguard customer information. The ethical utilization of data is essential for preserving customer trust.

6. CONCLUSION

This study showed that bibliometrics helps seasoned and budding business researchers examine broad and varied subjects. The paper found that bibliometric methodology has grown in popularity due to the widespread availability and utility of bibliometric software and databases, which enable detailed scientific data acquisition and evaluation in business research, especially in lucrative fields like artificial intelligence and big data (Donthu et al., 2021). This bibliometric study covers sentiment analysis and CRM research extensively. It highlights important growth patterns, contributors, and emerging research clusters, suggesting theoretical and practical changes for companies and governments. The paper emphasizes the need for ongoing research owing to technological advances and environmental challenges, which determine optimization in this sector.

Customer relationship management has advanced with sentiment analysis in CRM systems. This data-centric emotional intelligence strategy helps companies make smarter choices while keeping true connections. The findings show a rising focus on deep learning and the need for further empirical research verifying sentiment-enhanced CRM solutions across industries. The research also finds knowledge gaps in multilingual sentiment analysis and cross-cultural CRM applications. The research found that organizations using sentiment analysis AI technologies may build lasting customer relationships by being more empathetic, intelligent, and rigorous. Advanced customer experience management using data analytics, emotional intelligence, and sentiment analysis builds stronger, more profitable client connections.

REFERENCES

[1] 2024 8th International Artificial Intelligence And Data Processing Symposium. (2024). IEEE.

[2] Al-Rubaiee, H., Alomar, K., Qiu, R., & Li, D. (2018). Tuning of Customer Relationship Management (CRM) via Customer Experience Management (CEM) using Sentiment Analysis on Aspects Level. In *IJACSA) International Journal of Advanced Computer Science and Applications* (Vol. 9, Issue 5). www.ijacsa.thesai.org

[3] Bharadwaj, L. (2023). Sentiment analysis in online product reviews: mining customer opinions for sentiment classification. *Int J Multidiscip Res*, *5*(5). https://doi.org/10.36948/ijfmr.2023.v05i05.6090

[4] Capuano, N., Greco, L., Ritrovato, P. *et al.* Sentiment analysis for customer relationship management: an incremental learning approach. *Appl Intell* **51**, 3339–3352 (2021). https://doi.org/10.1007/s10489-020-01984-x

[5] Chinekwu Somtochukwu Odionu, Bernadette Bristol-Alagbariya, & Richard Okon. (2024). Big data analytics for customer relationship management: Enhancing engagement and retention strategies. *International Journal of Scholarly Research in Science and Technology*, *5*(2), 050–067. https://doi.org/10.56781/ijsrst.2024.5.2.0039

[6] Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

[7] Enhancing Social Customer Relationship Management by Using Sentiment Analysis. (2017). *International Journal of Science and Research (IJSR)*, *6*(12), 803–807. https://doi.org/10.21275/art20178856

[8] Griesser, S. E., & Gupta, N. (2019). Triangulated Sentiment Analysis of Tweets for Social CRM. *Proceedings - 6th Swiss Conference on Data Science, SDS 2019*, 75–79. https://doi.org/10.1109/SDS.2019.000-4

[9] Gupta, A., & Agarwal, P. (2024). Integrating CRM and ERP Insights for Optimized Product Development Using CNN-LSTM Hybrid Models. *International Journal of Computer Trends and Technology*, *72*(8), 91–97. https://doi.org/10.14445/22312803/IJCTT-V72I8P113

[10] Ho, C. F., Chean, K. L., & Lim, T. M. (2024). Leveraging Machine Translation to Enhance Sentiment Analysis on Multilingual Text. *ACM International Conference Proceeding Series*, 242–248. https://doi.org/10.1145/3651781.3651819

[11] Ishtiaq, M., Tiwari, S., Nagamani, M., Kang, S.-G., & Reddy, N. G. S. (2025). Data-Driven ANN-Based Predictive Modeling of Mechanical Properties of 5Cr-0.5Mo Steel: Impact of Composition and Service Temperature. *Crystals*, *15*(3), 213. https://doi.org/10.3390/cryst15030213

[12] Kalusivalingam, K., Sharma, A., Patel, N., & Singh, V. (n.d.). *Enhancing Customer Relationship Management with Natural Language Processing: A Comparative Study of BERT and LSTM Algorithms Authors*.

[13] Khan, M. A. R., Akter, M. S., & Islam, R. (2024). Big Data Analytics And Predictive Analysis In Enhancing Customer Relationship Management (CRM): A Systematic Review Of Techniques And Tools. *Non Human Journal*, *1*(01), 83–99. https://doi.org/10.70008/jmldeds.v1i01.44

[14] Lawson-Body, A., Lawson-Body, L., Illia, A., & Willoughby, L. (2022). Impact of natural language processing on CRM and trust: An integrated framework. *Issues in Information Systems*, *23*(1), 306–315. https://doi.org/10.48009/1_iis_2022_124

[15] Rygielski, C., Wang, J.-C., & Yen, D. C. (2002). Data mining techniques for customer relationship management. In *Technology in Society* (Vol. 24). www.elsevier.com/locate/techsoc

[16] Sandar Kyaw, K., Tepsongkroh, P., Thongkamkaew, C., & Sasha, F. (n.d.). *Asia Social Issues Business Intelligent Framework Using Sentiment Analysis for Smart Digital Marketing in the E-Commerce Era*. https://so06.tci-thaijo.org/index.php/asi

[17] Tochukwu Ignatius Ijomah, Courage Idemudia, Nsisong Louis Eyo-Udo, & Kikelomo Fadilat Anjorin. (2024). The role of big data analytics in customer relationship management: Strategies for improving customer engagement and retention. *World Journal of Advanced Science and Technology*, *6*(1), 013–024. https://doi.org/10.53346/wjast.2024.6.1.0038

[18] Yaakub, M. R., Li, Y., & Zhang, J. (2013). Integration of Sentiment Analysis into Customer Relational Model: The Importance of Feature Ontology and Synonym. *Procedia Technology*, *11*, 495–501. https://doi.org/10.1016/j.protcy.2013.12.220

fffff