Research Trend Analysis of Information Science in France based on Total, Cited and Uncited Publications: A Scientometric and Altmetric Analysis

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Article Info	ABSTRACT

Objective: The purpose of this study was to measure the number of contributions and highlight quantitatively the contributions made by French researchers in the field of Information Science indexed in the Web of Science Core Collection (WoS CC) during 1990-2021 from altmetric and bibliometric perspectives.

Materials and Methods: The bibliometric data were collected from WoS and three indexes of *SCI-Expanded*, *SSCI*, and *A&HCI* in the period 1990-2021. Scientometric data analysis was done using the HistCite, VOSviewer, CiteSpace softwares, and altmetric data analysis was performed using the Altmetrics.com and social sites such as ResearchGate, Academia, and Mendeley.

Results: The analysis showed that 1959 documents were published by French researchers in the field of Information Science. The highest number of publications was 114 documents contributed in 2020. The number of cited publications of French researchers in this field was more than the number of uncited publications, and this trend in cited publications was an upward trend. Michel Zitt and the Center National de la Recherche Scientifique (CNRS) were the most prolific researcher and institute in the field of Information Science in France. The two journals, *Social Science Information* (*Information sur les sciences sociales*) and *Scientometrics,* published the most publications in this field. Moreover, the findings showed that topics such as information retrieval, and information systems were hotspots for research, as well as issues such as social media and big data, emerging topics in the field of Information Science in France.

Conclusion: The publishing trend in the field of Information Science in France is an upward trend, and the United States and the UK were the main French collaborators in this field. The results of this study can serve as a roadmap for French researchers and research institutes to understand the current and future research trends in the field of Information Science in France.

Introduction

The foundations of information science in Western Europe were developed by Paul Otlet and Henri Lafontaine in the late 19th century and later by Suzanne Briet, a French librarian, documentalist, historian, organizer, and a pioneer in information science in the mid 20th century. Paul Otlet was one of several people who have been considered the father of information science, a field he called "*documentation*", the study of the recording and retrieval of information. Paul Otlet had coined the term *Documentation* as early as 1903 to describe a new field of study (Ibekwe-Sanjuan, 2012). Furthermore, Suzanne Briet known as "*Madame Documentation*" (Buckland, 1995), was a librarian, author, historian, poet, and visionary best known for her treatise *Qu'est-ce que la documentation?* (What is Documentation?), a foundational text in the modern study of information science.

In modern terms, "*Documentation is any communicable material that is used to describe, explain or instruct regarding some attributes of an object, system or procedure, such as its parts, assembly, installation, maintenance and use.*" (The Linux Information Project, 2005). It is in accordance with what has been indicated in Williams (1997, p.776), "*Otlet believed that documentation should be concerned with any records and objects that had the potential of providing useful information, and that offices of documentation should be created to carry out this work.*"

Ibekwe-Sanjuan (2012) stated that the emergence of information science as a scientific field in the French higher education system only came about in the mid-seventies. It was precisely in 1974 that a composite field named Information and Communication Sciences (in French: sciences de l'information et de la communication) was born out of existing university disciplines in France. However, the current study does not contribute in any way to the debate on the concepts and history of documentation, archives and information sciences in France.

The present research aimed to analyze the research trends of library and information science in France based on total publications, and cited and uncited publications from a bibliometric and altmetric point of view. Research publications in the field of library and information science in France need to be periodically evaluated to highlight the various attributes of scientific publications. Bibliometric techniques, methods and indicators are used to identify prolific authors, institutions, and subject trends to make subsequent decisions for allocation of research grants and on other types of funding (Hirsch, 2005; Shehatta & Mahmood, 2016).

There are numerous studies examining uncited publications, and cited publications from bibliometric and scientometric point of view. Some examples of these studies are tabulated in Table 1.

Table 1. Literature summarizing uncited publications, cited publications, and bibliometric

Study	Literature
Uncited publications	Yamashita & Yoshinaga, (2014); Liang, et al. (2015); Gopalakrishnan, et al. (2015); Hu, et al. (2019)
Cited publications	Levitt & Thelwall, (2009); Ivanović & Ho, (2016); Hu, et al. (2019); Gholampour, et al. (2022)
Bibliometric studies on subject areas, journal, etc.	Lin, (2012); Jabeen, et al. (2015); Okeji (2018); Siddique, et al. (2021); Siddique, et al. (2021); Noruzi, et al. (2022); Gholampour, et al. (2022)

Materials and Methods

This study analyzed the total publications and cited publications contributed by French researchers in the field of Information Science during 1990-2021 and uncited publications during 1990-2015 indexed in the Web of Science (WoS) citation databases. WoS is the most well-known and reliable citation index due to its strict criteria for the evaluation and selection of journals, as well as providing valid and reliable information. Therefore, it was used as the basis for the current bibliometric study.

It is worth noting that Garfield (1994, 1999; 2006) calculated the *Journal Impact Factor* (JIF) for a time period of two years. The *Journal Impact Factor* (JIF) is broadly defined as the ratio of a numerator -the citations made to a journal, to the denominator -the number of articles (or citable items) published in that journal (Garfield, 1994). Therefore, according to Garfield, the minimum time required for the citation fertility of scientific publications is two years, and an article needs at least two years to be read and show its citation impact. In addition, with the use of a 5-year Impact Factor by Web of Science (WoS), it can be assumed that it takes at least 5 years for an article to be read and cited. Therefore, in confirmation of Garfield's statement and in confirmation of the 5-year Impact Index for reviewing uncited publications in France, documents published from 1990-2015 were considered and documents published after 2015 were not included in the analysis of uncited publications. Data collection was carried out through several stages. First, bibliometric techniques were applied in this study to gather the total publications and cited publications. Second, the uncited publications in the subject area of Information Science was examined. An advanced search was conducted on May 2, 2021, in the Web of Science Core Collection (WoS CC); *Science Citation Index Expanded (SCI-Expanded), Social Science Citation Index (SSCI), and Art & Humanities Citation Index (A&HCI)* in the "Subject Area" of "*All Document Types*", in "*All Languages*" for Information Science, as follows:

CU=France AND SU="Information Science"

Timespan Total and Cited Publications: 1990-2021.

Timespan Uncited Publications: 1990-2015.

Indexes: *SCI-Expanded, SSCI, A&HCI*

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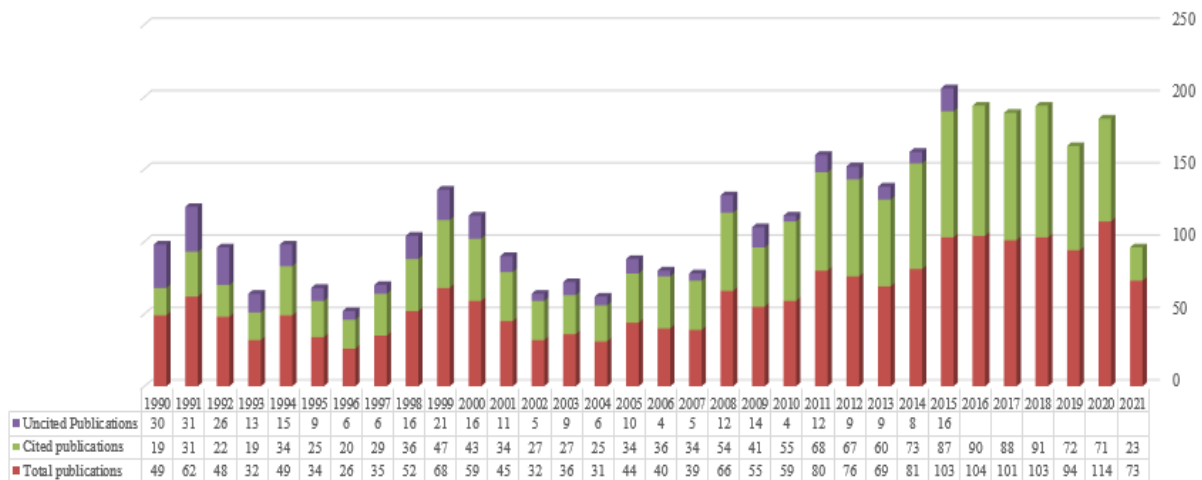
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The search strategy retrieved 1959 documents. To analyze the bibliographic information of the publications, the data were extracted in "plain text" format and were analyzed by the HistCite, VOSviewer, and CiteSpace software in three stages. In the first stage, the HistCite software was used to identify the distribution of authors, countries, institutions, journals, document types, publication year, and citations. In the second stage, the VOSviewer software was used to determine the scientific collaboration network, total publications, cited publications and uncited publications in the field of information science in France. In the third stage, the CiteSpace software was used to identify the hot and emerging topics.

Moreover, Altmetric (www.altmetric.com), ResearchGate, Academia, and Mendeley websites were also used to conduct an altmetric analysis of highly cited papers of French researchers in the field of information science. Academic social media such as *ResearchGate*, *Academia*, and *Mendeley* are the most important academic social networks. Thus, the data of these networks were used to check the viewing and reading status of these articles. Altmetric.com is one of the most important sites that studies the status of scientific activities of researchers in any of the social media such as Twitter, Facebook, Mendeley, CiteULike, blog, News Outlets, F1000, Google+, policy document, Dimensions, Wikipedia, Sina Weibo, Reddit, Pinterest, Patents, Post-publication Peer-reviews, etc. and gives a special score to the presence of each article in these networks. The sum of their points is the altmetric score of an article.

Results

Analysis of trend total publication cited and uncited publication

Figure 1 depicts the trend of publications contributed by French researchers in the field of Information Science.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Uncited Publications	30	31	26	13	15	9	6	6	16	21	16	11	5	9	6	10	4	5	12	14	4	12	9	9	8	16						
Cited publications	19	31	22	19	34	25	20	29	36	47	43	34	27	27	25	34	36	34	54	41	55	68	67	60	73	87	90	88	91	72	71	23
Total publications	49	62	48	32	49	34	26	35	52	68	59	45	32	36	31	44	40	39	66	55	59	80	76	69	81	103	104	101	103	94	114	73

Figure 1. Research trends of cited, uncited and all publications French information science

As can be seen in the Figure 1, the trend of publications is an upward trend, so that this trend increased from 49 publications in 1990 to 114 publications in 2020. This trend in the field of cited publications indicates that a large number of these publications have also been cited, and in a way, the trend of citations of the publications is also a growing trend. In general, the most cited publications of French researchers in the field of Information Science are related to 2018 with 91 cited publications. The trend of uncited publications of French researchers in the field of Information Science indicates that, with the exclusion of the publications of 1990-1992, the uncited publications were not very significant and were accompanied by a declining trend, which is very important.

Analysis of authors' total publications, cited and uncited publications

The VOSviewer software was used to analyze the collaboration network of authors with the uncited publications and cited publications as well as the most prolific authors in the field of Information Science in France. Figure 2 shows the authors' collaboration network with the most uncited publications, cited publications, and the authors' collaboration network in the production of publications in the field of Information Science in France. The authors' collaboration network with at least two uncited publications consists of 497 nodes and 449 links.

Figure 2(A) shows collaboration network of authors with the most uncited publications. Based on this figure, it can be confirmed that H. Eisele, M. J. Menou, and P. Zweigenbaum have the most uncited publications in this field. More complete information on these authors and other prolific authors with the most uncited publications is given in Table 2.

In addition, Figure 2(B) shows authors' collaboration network with at least two publications. This network consists of 583 nodes and 824 links. In this network, Michel Zitt, Cherifa Boukacem-Zeghmouri and Joachim Schopfel, as the most prolific authors, have the most cited publications in the field of Information Science in France. More complete information about these authors is also presented in Table 1. According to Figure 2(C) and Table 2, Michel Zitt with 31 publications, Cherifa Boukacem-Zeghmouri with 24, Joachim Schopfel with 24, Frantz Rowe with 22, Guillaume Cabanac with 21, and Thierry Lafouge with 21 were the authors who had the most publications in the field of Information Science in France. This is the network that is well visible in Figure 2(C) and Table 2.

A

B

C
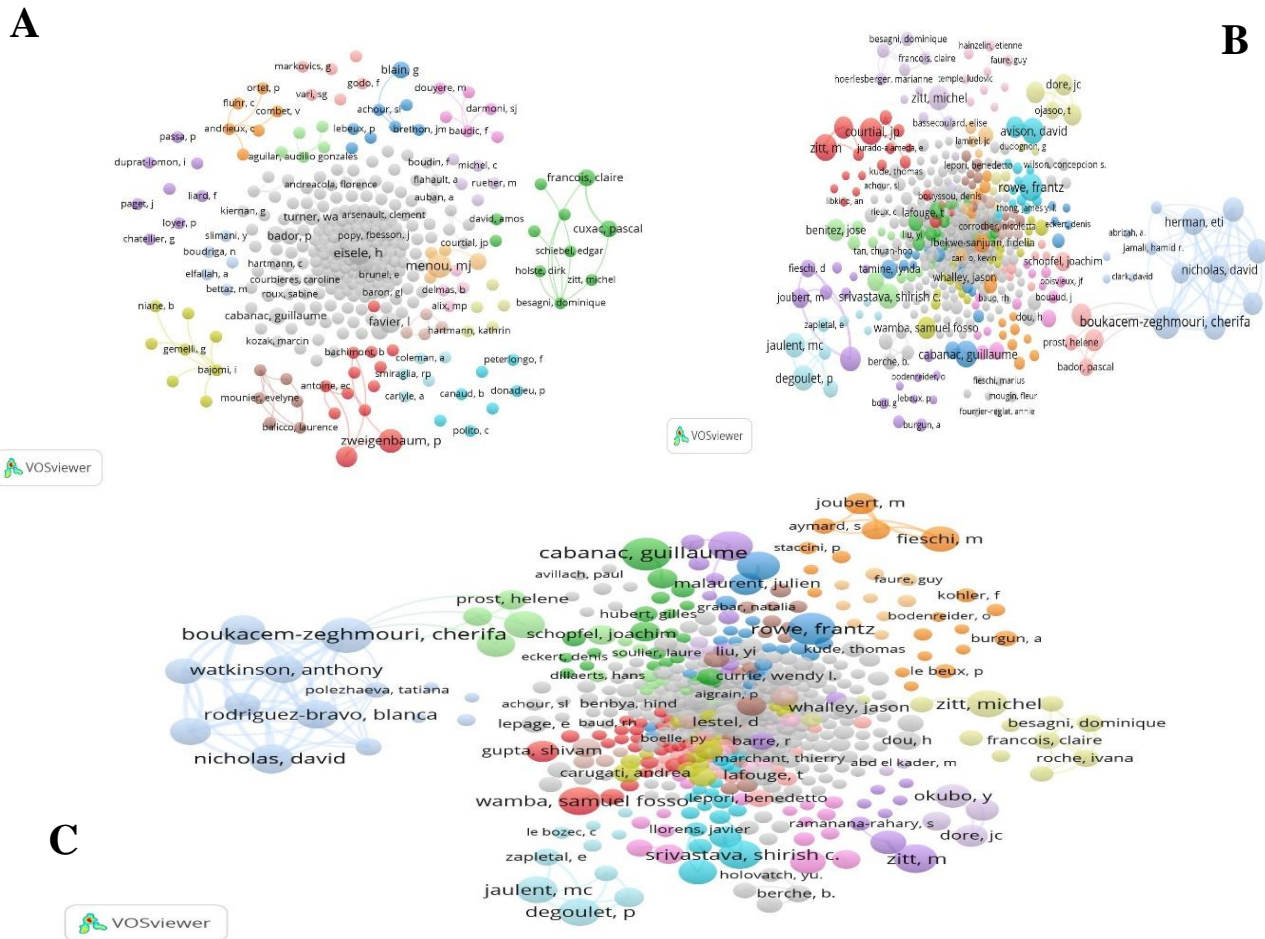
Figure 2. Co-authorship analysis of French authors in Information Science.
Uncited Publications (A), Cited Publications (B), Total Publications (C).
The node size shows the number of authors' publications and the thickness of the lines indicates the strength of the relationship.

Table 2. Prolific researchers in the production of cited and uncited publications, and total publications in Information Science in France

Total Publications		Cited Publications		Uncited Publications	
Authors	NP	Authors	NP	Authors	NP
Zitt M	31	Zitt M	30	Eisele H	4
Boukacem-Zeghmouri C	24	Boukacem-Zeghmouri C	23	Menou MJ	4
Schopfel J	24	Schopfel J	22	Zweigenbaum P	4
Rowe F	22	Lafouge T	19	Bouaud J	3
Cabanac G	21	Rowe F	19	Courrier Y	3
Lafouge T	21	Avison D	17	Couzinet V	3
Avison D	18	Courtial JP	17	Favier L	3
Courtial JP	18	Bassecoulard E	16	Gautschi H	3
Herman E	17	Cabanac G	16	Le Boeuf P	3
Nicholas D	17	Herman E	16	Lecoadic YF	3
Bassecoulard E	16	Nicholas D	16	Ypsilanti D	3

NP = Number of Publications

Analysis of Institutions total publication cited and uncited publication

Figure 3 shows the collaboration network between institutions. This figure consists of three networks. In addition, the most prolific institutions with uncited publications, cited publications, and total publications are presented in Table 3. As shown in Table 3 and Figure 3(A), we see that the French National Centre for Scientific Research (French: Centre National de la Recherche Scientifique, CNRS)*,* the University of Vincennes in Saint-Denis*,* and Pierre and Marie Curie University were the most prolific institutions. Figure 3(A) consists of 247 nodes and 201 links. Further information related to other prolific and influential institutions is given in Table 3. Based on Table 3, the institute CNRS with 18 documents, and the University of Vincennes in Saint-Denis with 11 documents, had the most uncited publications in Information Science in France.
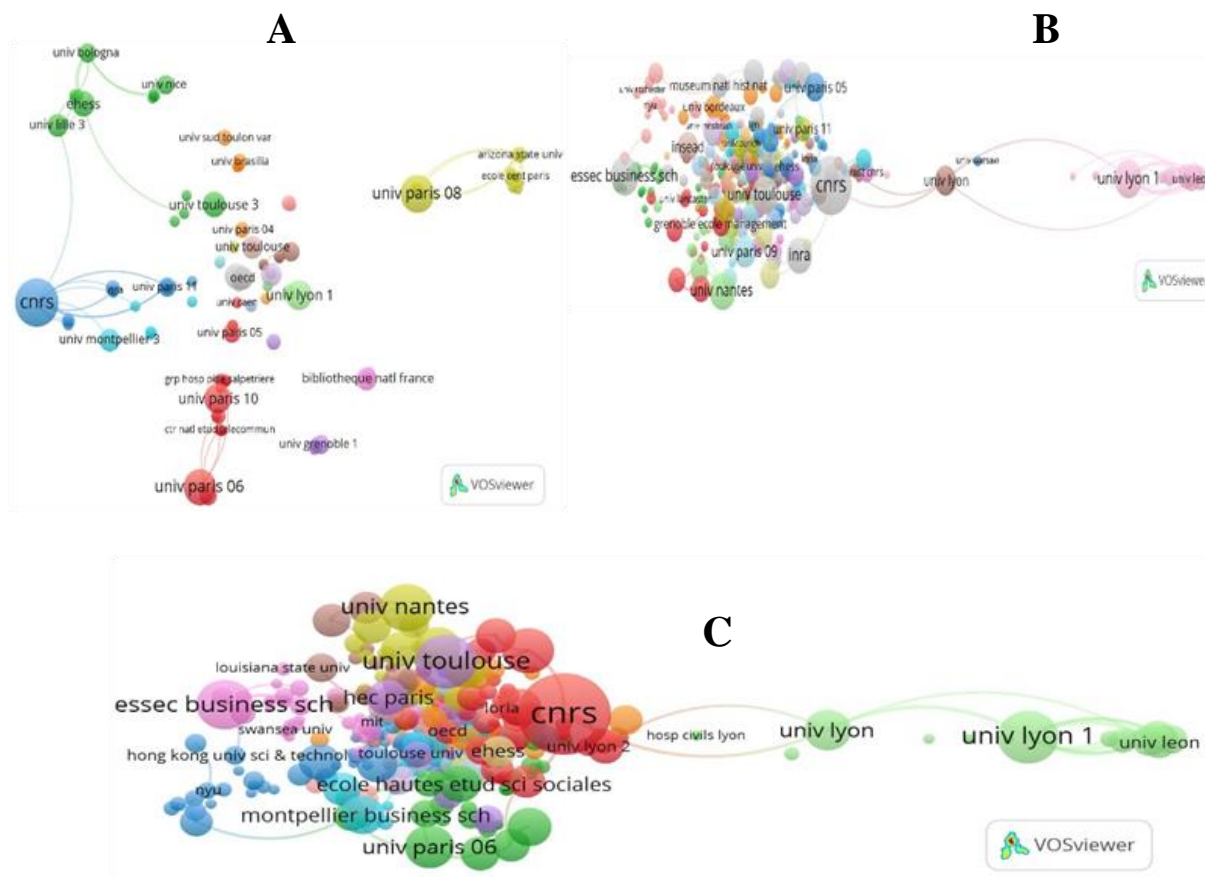
**Figure 3. Co-authorship analysis of French institutions contributing to Information Science.
Uncited Publications (A), Cited Publications (B), Total Publications (C).**

The node size presents the number of institutions' publications and the thickness of the lines indicates the strength of the relationship.

Figure 3(B) and Table 3 indicate that French institutions such as CNRS*,* ESSEC Business School of Paris*,* and Claude Bernard University Lyon 1 are the top institutions. Based on the number of cited publications, the CNRS with 92 documents and the ESSEC Business School with

41 documents are at the top compared to other institutions. CNRS with 115 documents, the University of Toulouse with 50 documents, Claude Bernard University Lyon 1 with 48 documents, and ESSEC Business School with 43 documents were the most prolific institutions with the highest number of publications in the field of Information Science in France. Moreover, among the institutions presented in Table 3, five of them were universities and three were institutions.

Table 3. Prolific institutes contributed to the production of cited and uncited publications, and total publications in the field of Information Science in France

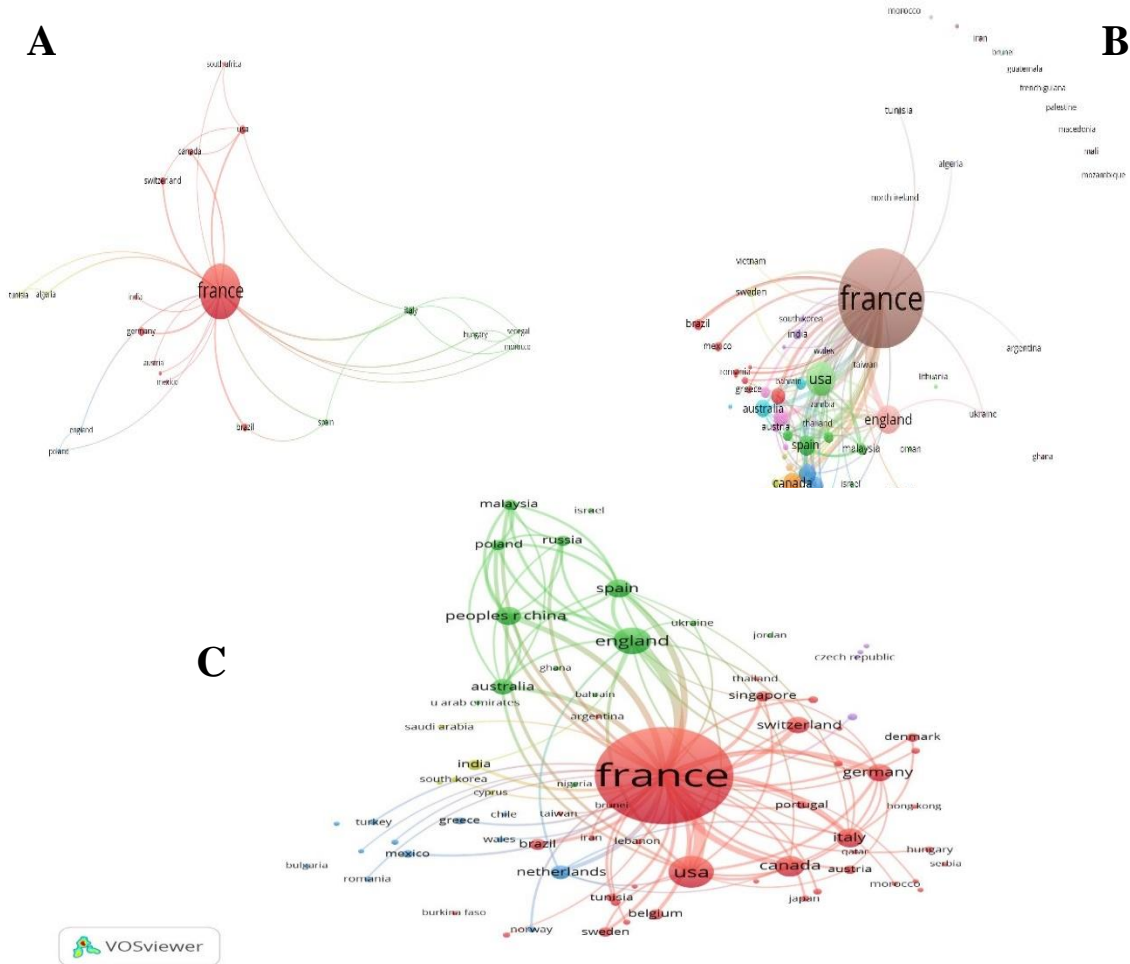| Total Publications		Cited Publications		Uncited Publications	
Institutes	NP	Institutes	NP	Institutes	NP
CNRS	115	CNRS	92	CNRS	18
University of Toulouse	50	ESSEC Business School	41	University of Vincennes in Saint-Denis	11
Claude Bernard University Lyon 1	48	Claude Bernard University Lyon 1	39	Pierre and Marie Curie University	10
ESSEC Business School	43	University of Toulouse	38	École des Hautes Etudes en Sciences Sociales (EHESS)	10
University of Nantes	39	University of Nantes	36	Paris Nanterre University	7
INRA	36	INRA	34	Claude Bernard University Lyon 1	7
Paris Dauphine University	32	Paris Dauphine University	26	University of Toulouse 3	5
University of Lyon	29	University of Lyon	24	Bibliothèque Nationale de France	4

NP = Number of Publications

Analysis of countries total publication cited and uncited publication

Figure 4 shows the status of scientific collaboration of French researchers with other countries in the field of Information Science. This figure consists of three networks of scientific collaborations, i.e., uncited publications (A), cited publications (B), total publications (C). The nodes in the figures represent countries and links represent scientific connections. Therefore, the scientific collaborations network of French researchers with other countries in uncited publications is composed of 20 nodes and 33 links, with Italy and Brazil each having six and five documents of the most scientific collaborations.

The countries' scientific collaboration network in cited publications in the field of Information Science in France is composed of 39 nodes and 266 links, in which the United States and the UK with 163 and 127 documents were the most scientific collaborators of France in the field of Information Science. Moreover, the total publication's network in the field of Information Science in France is composed of 86 nodes and 484 links, in which the United States with 185 documents and the UK with 145 documents were the most prolific scientific collaborators of French researchers in this field. Table 4 reports general information about uncited publications, cited publications, and total publications in the field of Information Science in France.

Figure 4. Co-authorship analysis of countries contributing to Information Science in France.
Uncited Publications (A), Cited Publications (B), Total Publications (C).

The node size specifies the number of countries' publications and the thickness of the lines indicates the strength of the relationship.

Table 4. Most prolific countries in the production of cited and uncited publications, and total publications in the field of Information Science in France

Total Publications		Cited Publications		Uncited Publications	
Countries	NP	Countries	NP	Countries	NP
France	1959	France	1482	France	323
USA	185	USA	163	Italy	6
England	145	England	127	Brazil	5
Canada	80	Canada	68	Canada	4
Italy	69	Spain	57	Germany	4
China	63	Italy	55	USA	4
Spain	62	China	54	Switzerland	3
Germany	52	Australia	44	Algeria	2
Switzerland	50	Germany	43	Hungary	2
Australia	49	Switzerland	42	Spain	2
Netherlands	36	Netherlands	35	England	2

NP = Number of Publications

Analysis of journals total publications, cited and uncited publications

Table 5 illustrates the three contextual perspectives of the journals that published the most publications, the most cited publications, and the most uncited publications in the field of Information Science in France. The total publications in the field of Information Science in France were published in 115 journals. The total number of cited publications were published in 98 journals and the total number of uncited publications were published in 58 journals. In terms of the total number of publications, the *Social Science Information* (*Information sur les sciences sociales*) and *Scientometrics* published the highest number of publications. On the one hand, the journals such as *Scientometrics* and *Social Science Information* (*Information sur les sciences sociales*) are leaders in publishing the most cited publications in the field of Information Science in France. On the other hand, the journals such as *Social Science Information* (*Information sur les sciences sociales*), *TSI-Technique et Science Informatiques*, *Scientist*, *Canadian Journal of Information and Library Science* (*Revue Canadienne des Sciences de l'Information et de Bibliotheconomie*) and *Knowledge Organization* published the highest number of uncited publications in the field of Information Science in France.

The results presented in Table 5 show that the majority of the most-cited publications were published in Q1 (Quartile 1) and influential journals in this field, while the uncited publications in this field were published mainly in Q3 and Q4 journals and did not have a significant Impact Factor (IF) and rank.

Table 5. Top journals with the most publications cited and uncited publication of French information science

	Journal	NP	IF	Q	Rank	Country
Total Publications	Social Science Information (Information sur les sciences sociales)	242	0.951	3	61	🇫🇷
	Scientometrics	227	2.867	1	21	🇳🇱
	Journal of the American Medical Informatics Association	109	4.112	1	12	🇺🇸
	Information Processing & Management	76	4.787	1	7	🇬🇧
	International Journal of Information Management	69	8.21	1	1	🇬🇧
Cited Publications	Scientometrics	198	2.867	1	21	🇳🇱
	Social Science Information (Information sur les sciences sociales)	151	0.951	3	61	🇫🇷
	Journal of the American Medical Informatics Association	92	4.112	1	12	🇺🇸
	Information Processing & Management	69	4.787	1	7	🇬🇧
	International Journal of Information Management	63	4.787	1	7	🇬🇧

		NP				
Uncited Publications	Social Science Information (Information sur les sciences sociales)	72	2.867	3	21	🇫🇷
	TSI-Technique et Science Informatiques	31	-	-	-	🇫🇷
	Scientist	26	0.939	3	62	🇺🇸
	Canadian Journal of Information and Library Science (La Revue canadienne des sciences de l'information et de bibliothéconomie)	22	0.179	4	81	🇨🇦
	Knowledge Organization	18	0.977	3	59	🇩🇪

NP = Number of Publications

Table 6 depicts the status of publications in the field of Information Science in France based on the quartile index of journals. A total of 1959 publications in the field of Information Science in France were published in 115 journals, including 23 publications in Q1 journals, 23 publications in Q2 journals, 20 publications in Q3 journals, 31 publications in Q4 journals, and 18 publications in journals without Q. In addition, a large number of uncited publications were published in Q4 journals and in journals without Q.

Table 6. The Q status of journals publishing publications in Information Science in France

	No. of Journals	Q1	Q2	Q3	Q4	Lack of Q
Total number of publications	115	23	23	20	31	18
No. of cited publications	98	23	23	18	23	11
No. of uncited publications	58	6	12	9	18	13

Analysis of Highly-Cited and Hot papers

Table 7 shows a list of highly-cited papers in the field of Information Science in France. In total, out of 1959 publications published in this field, 14 articles were highly-cited papers, and two of these articles were also recognized as hot papers. The title, author(s), number of citations, year of publication, and document type of each article are indicated in Table 7 below. An article written by Chaomei Chen, et al. (2010) entitled "*The structure and dynamics of cocitation clusters: A multiple-perspective cocitation analysis*" with 389 received the highest number of citations. Also, among the highly-cited papers, a paper entitled "*Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA*" contributed by Maciel M.Queiroz, et al. (2019), and a paper entitled "*The technostress trifecta - techno eustress, techno distress and design: Theoretical directions and an agenda for research*" conducted by Monideepa Tarafdar, et al. (2019), were recognized as highly-cited and hot papers.

It is worth noting that all of the eight highly-cited papers were published between 2019-2020. In addition, studying the type of papers indicates that 13 publications were research articles and

one was a review. Furthermore, the examination of these articles showed that all of them were the result of research collaboration and none of them were individually conducted. Moreover, in these 14 articles, French researchers collaborated with researchers from 14 countries especially with researchers from India, Spain, China, and the United States.

Table 7. Top 14 highly-cited papers and hot papers in the field of Information Science in France

Title	Author	Citation	Year	Document Type	
The structure and dynamics of cocitation clusters: A multiple-perspective cocitation analysis	Chaomei Chen, et al.	389	2010	Article	🏆
A Framework and Guidelines for Context-Specific Theorizing in Information Systems Research	Weiyin Hong, et al.	178	2014	Article	🏆
Examining branding co-creation in brand communities on social media: Applying the paradigm of Stimulus-Organism-Response	Shampy Kamboj, et al.	132	2018	Article	🏆
Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA	Maciel M. Queiroz, et al.	127	2019	Article	🔥 🏆
How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory IS research	Jose Benitez, et al.	63	2020	Article	🏆
Big data with cognitive computing: A review for the future	Shivam Gupta, et al.	62	2018	Review	🏆
IT-enabled knowledge ambidexterity and innovation performance in small US firms: The moderator role of social media capability	Jose Benitez, et al.	54	2018	Article	🏆
The technostress trifecta - techno eustress, techno distress and design: Theoretical directions and an agenda for research	Monideepa Tarafdar, et al.	47	2019	Article	🔥 🏆
Impact of information technology infrastructure flexibility on mergers and acquisitions	Jose Benitez, et al.	45	2018	Article	🏆
Dual relational embeddedness and knowledge transfer in European multinational corporations and subsidiaries	Alberto Ferraris, et al.	45	2020	Article	🏆
How do social commerce-IT capabilities influence firm performance? Theory and empirical evidence	Jessica Braojos, et al.	41	2019	Article	🏆
Mobile edge computing based QoS optimization in medical healthcare applications	Ali Hassan Sodhro, et al.	39	2019	Article	🏆
The role of brand community identification and reward on consumer brand engagement and brand loyalty in virtual brand communities	Harsandaldeep Kaur, et al.	18	2020	Article	🏆
Blockchain in the operations and supply chain management: Benefits, challenges and future research opportunities	Samuel Fosso Wamba, et al.	13	2020	Article	🏆

Altmetric Analysis of Highly-Cited and Hot Papers

Table 8 shows the specifications and altmetric information of the highly-cited papers in the field of Information Science in France. In total, 14 articles were recognized as highly-cited papers, and two articles were assigned as hot papers.

This section of the study reports the presence of highly-cited papers and hot papers in the field of Information Science in France in various social media. As can be seen in Table 8, these articles were mentioned in social media such as News Outlets, blogs, Facebook page, Twitter, Dimensions, Mendeley, and CiteULike. Table 8 reveals that a paper entitled "*The technostress trifecta - techno eustress, techno distress and design: Theoretical directions and an agenda for research*" contributed by Monideepa Tarafdar, et al. (2019), was obtained the highest altmetric score with a score of 76. This paper was mentioned 8 times on News Outlets, 2 times on blogs, and 5 times on Twitter. It is worth noting that this paper had 271 readers on Mendeley and also received 75 citations on Dimensions.

Table 8. Top eight highly-cited papers and hot papers with an Altmetric score

Rank	TITLE	Altmetric Score	News Outlets	Blog	Facebook Page	Twitter	Dimensions	Mendeley	CiteULike
1	The technostress trifecta - techno eustress, techno distress and design: Theoretical directions and an agenda for research (Monideepa Tarafdar, at al.)	76	8	2	0	5	75	271	0
2	Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA (Maciel M. Queiroz, et al.)	5	0	0	0	6	158	721	0
3	The structure and dynamics of cocitation clusters: A multiple-perspective cocitation analysis (Chaomei Chen, et al.)	2	0	0	1	2	476	463	2
4	Blockchain in the operations and supply chain management: Benefits, challenges and future research opportunities (Samuel Fosso Wamba, et al.)	2	0	0	0	2	25	271	0
5	Big data with cognitive computing: A review for the future (Shivam Gupta, et al.)	2	0	0	0	2	75	258	0
6	Dual relational embeddedness and knowledge transfer in European multinational corporations and subsidiaries (Alberto Ferraris, et al.)	2	0	0	0	2	61	48	0

7	How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory IS research (Jose Benitez, et al.)	1	0	0	0	1	92	571	0
8	Examining branding co-creation in brand communities on social media: Applying the paradigm of Stimulus-Organism-Response (Shampy Kamboj, et al.)	1	0	0	0	1	164	478	0

Table 9 shows the total Altmetric scores of these eight papers on social media. From the results of this table, it can be observed that these papers had 3081 readers on Mendeley and received 1126 citations on Dimensions. These papers have been tweeted 21 times on Twitter, shared two times on the Facebook pages, discussed eight times in the News Outlets, mentioned two times on blogs, and reads two times on the CiteULike by researchers. In addition, the total altmetric score of these articles is equal to 91.

Table 9. The contribution of various social media in sharing the highly-cited papers and hot papers in the field of Information Science in France

Social Media	Total Score
News Outlets	8
Blog	2
Facebook Page	2
Twitter	21
Dimensions	1126
Mendeley	3081
CiteULike	2
Total Altmetric Score	91

Table 10 examines the status of highly-cited papers and hot papers in the field of Information Science in France on the three academic social networks, i.e., ResearchGate, Academia, and Mendeley. The results showed that all 14 highly-cited papers in this field were shared on *ResearchGate* and *Mendeley*, and only two papers were shared on Academia. Sharing articles on these academic social networks creates a bridge between researchers and readers to share their research findings with readers and other researchers. The paper entitled "*How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory is research*" was reads 2901 times by researchers on ResearchGate and the paper entitled "*Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA*" was read 704 times by researchers on Mendeley compared to other papers. In addition, the paper entitled "*A framework and guidelines for context-specific theorizing in information systems research*" and the paper entitled "*The structure and dynamics of cocitation clusters: A multiple-perspective cocitation analysis*" were seen respectively 94 and 73 times on *Academia*.

Table 10. Checking the number of views, reads and readers status of highly-cited papers and hot papers on ResearchGate, Academia and Mendeley

| Title	Author	Research Gate	Reads	Academia	Views	Mendeley	Readers
Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA	Maciel Queiroz, et al.	✅	702	❌	-	✅	704
A framework and guidelines for context-specific theorizing in information systems research	Weiyin Hong, et al.	✅	2779	✅	94	✅	356
Examining branding co-creation in brand communities on social media: Applying the paradigm of stimulus-organism-response	Shampy Kamboj, et al.	✅	1464	❌	-	✅	466
How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory IS research	Jose Benitez, et al.	✅	2901	❌	-	✅	573
Big data with cognitive computing: A review for the future	Shivam Gupta, et al.	✅	539	❌	-	✅	254
IT-enabled knowledge ambidexterity and innovation performance in small US firms: The moderator role of social media capability	Jose Benitez, el al.	✅	69	❌	-	✅	252
The technostress trifecta - techno eustress, techno distress and design: Theoretical directions and an agenda for research	Monideepa Tarafdar, et al.	✅	1216	❌	-	✅	256
The structure and dynamics of cocitation clusters: A multiple-perspective cocitation analysis	Chaomei Chen, et al.	✅	2638	✅	73	✅	463
Impact of information technology infrastructure flexibility on mergers and acquisitions	Jose Benitez, et al.	✅	299	❌	-	✅	246
Dual relational embeddedness and knowledge transfer in European multinational corporations and subsidiaries	Alberto Ferraris, et al.	✅	142	❌	-	✅	45

How do social commerce-IT capabilities influence firm performance? Theory and empirical evidence	Jessica Braojos, et al.	✅	185	❌	-	✅	224
Mobile edge computing based QoS optimization in medical healthcare applications	Ali Hassan Sodhro, et al.	✅	1493	❌	-	✅	116
The role of brand community identification and reward on consumer brand engagement and brand loyalty in virtual brand communities	Harsandaldeep Kaur, et al.	✅	444	❌	-	✅	205
Blockchain in the operations and supply chain management: Benefits, challenges and future research opportunities	Samuel Fosso Wamba, et al.	✅	554	❌	-	✅	264

Analysis of Author Keywords, Total Publication, Cited and Uncited Publications

The analyses of co-occurrence networks of author keywords are presented in Figures 5(A, B, and C). Figure 5 consists of author keywords' co-occurrences analysis of uncited publications (A), cited publications (B), total publications (C) in the field of Information Science in France. The network of uncited publications with at least one co-occurrence consists of 228 nodes and 552 links, in which keywords such as information processing, scientific information, and information technology had the highest number of frequency.

Most of the uncited publications were in these subject areas Figure 5 (A). In addition, the network of cited publications with at least two co-occurrences includes 537 nodes and 1602 links Figure 5 (B). The network of total publications with at least two co-occurrences formed 692 nodes and 2226 links Figure 5 (C). For example, in Figures 5 (B and C), the connection of words is strong due to the closeness and overlap of the nodes related to them. Keywords such knowledge management, information retrieval, innovation, social media, knowledge transfer and knowledge sharing have had the highest frequency. The cited publications of French researchers in the field of Information Science were on these research fields.
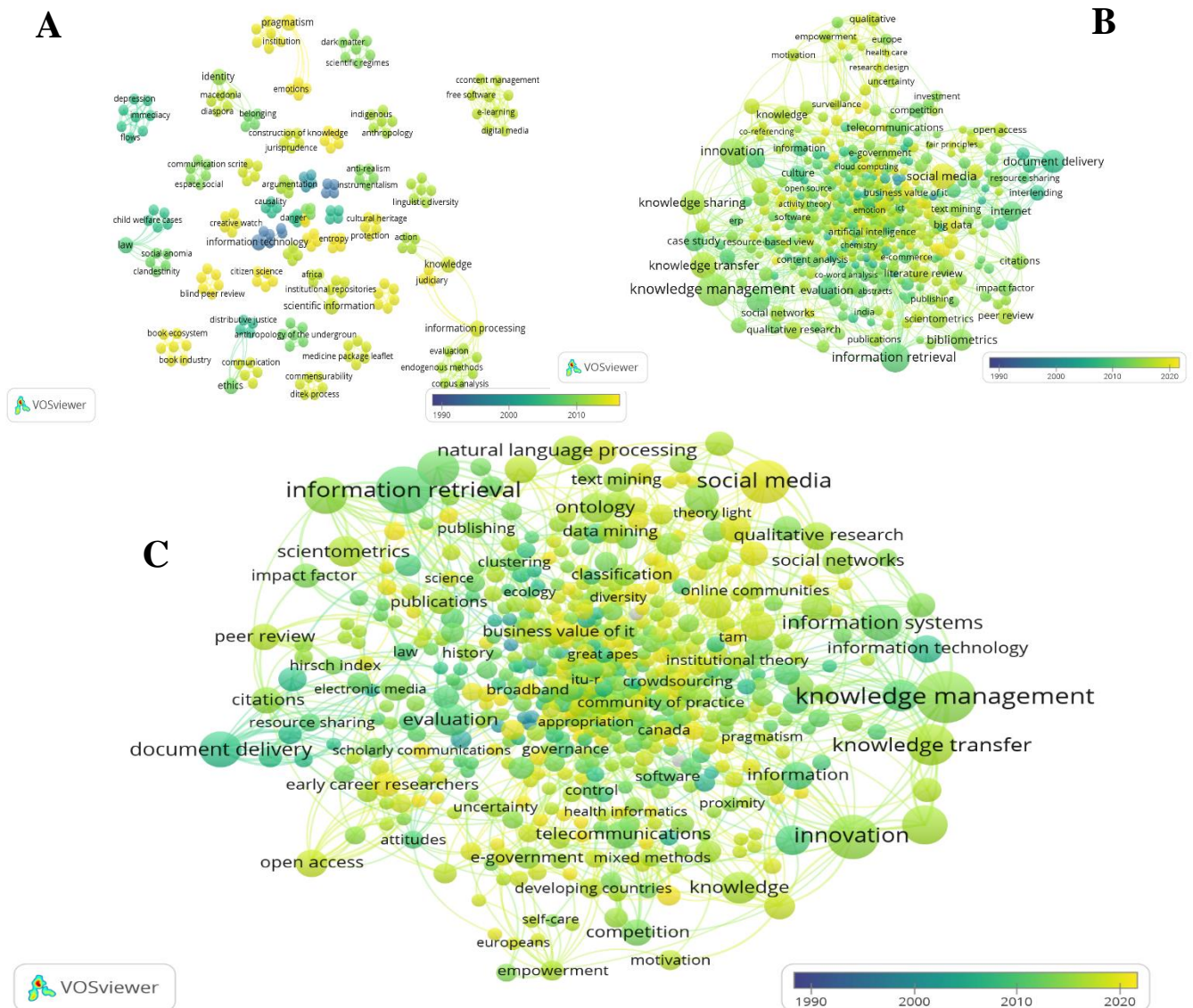
Figure 5. Author keywords' co-occurrences analysis of uncited publications (A), cited publications (B), total publications (C).

The node size shows the number of keywords publication and the thickness of the lines indicates the strength of the relationship.

Analysis of Hotspot and Emerging Topics

Figures 6 and 7 show the co-occurrence keywords based on the view of the time zone and the citation bursts. As shown in Figure 6, nodes represent research topics and connecting lines represent the relationships between topics over time and represent hotspots and emerging topics in the field of Information Science in France. The results related to the time zone view show that the

terms such as science, citation, information system, information retrieval, and Impact Factor, indicate hotspots in this field.
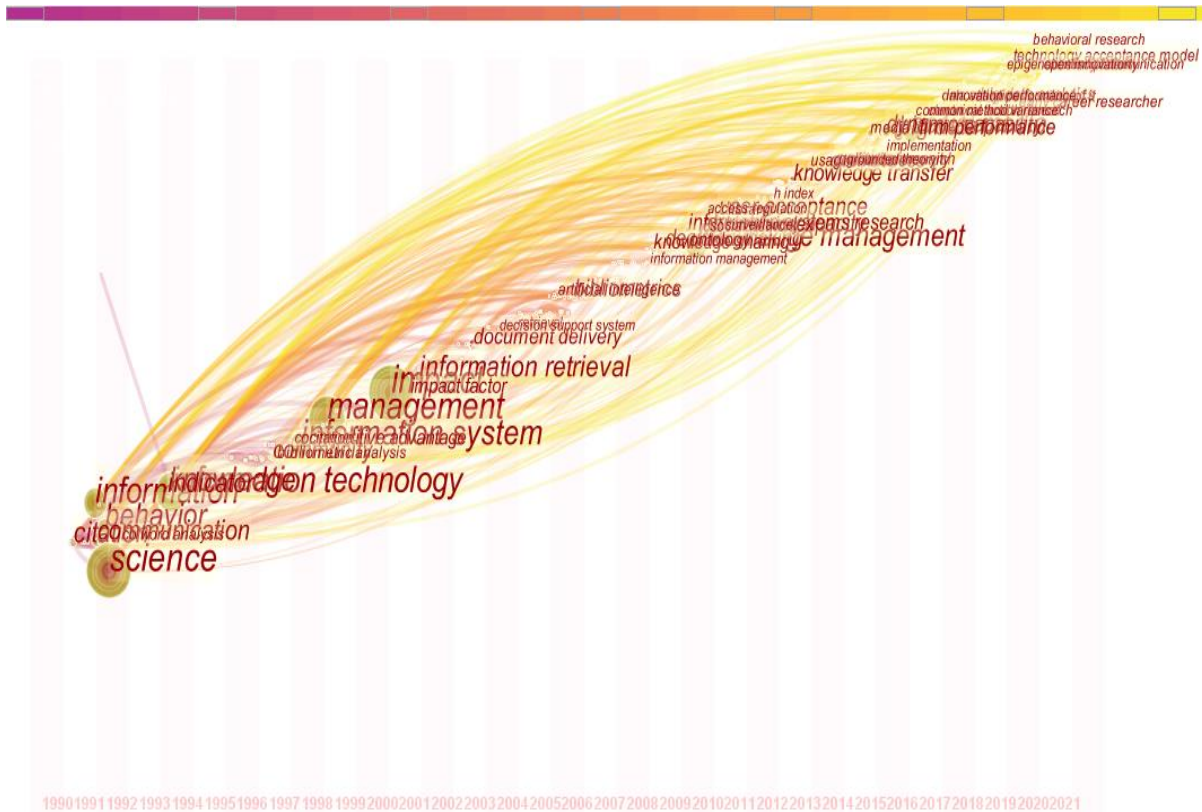
Figure 6. The time zone visualization map of co-occurrence keywords

In Figure 7, blue lines indicate the length of the study period (1990-2021) and red lines indicate the year of the beginning and end of citation bursts; and also indicate the level of researchers' attention to a subject. As can be seen in Figure 7, terms such as *science*, and *citation* had the longest citation bursts time, and research hotspots ranged from 1991 to 2010. This confirms that researchers in the field of Information Science in France during this period paid attention to analysis and measurement of scientific activities and science indicators based on citation analysis.

During the period 1997-2013, researchers focused on aspects related to information such as information systems, and information retrieval; and also conducted extensive studies in the field of scientometrics, especially studies related to scientometric indicators such as Impact Factor. In other words, the studies of French researchers in the field of Information Science and their attention in recent years have been directed to studies related to altmetrics, especially social media, as well as studies on big data; and these topics can be considered as emerging topics in the field of Information Science in France in the time period under review.
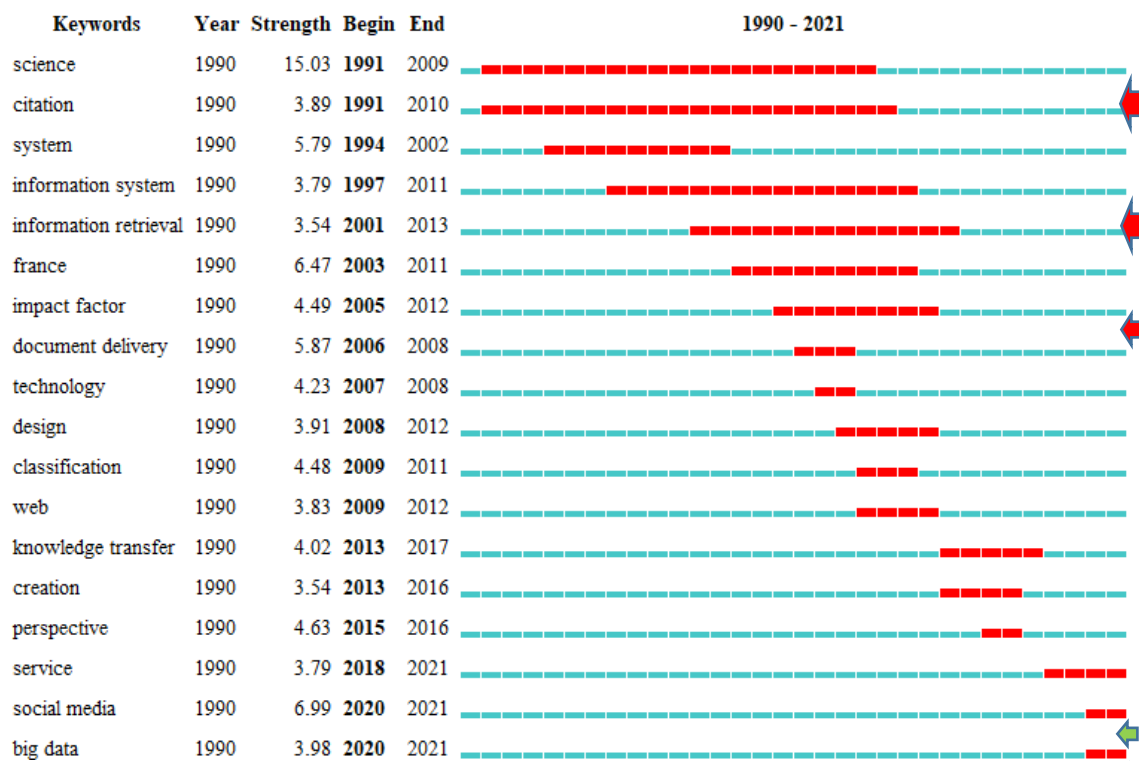
Figure 7. Top 18 keywords with the strongest citation bursts (red arrows mention hotspot and green arrows indicate emerging topics)

Discussion and Conclusion

This scientometric study is the first research that analyzes the process of indexed scientific publications in the field of Information Science in France from three aspects of uncited publications, cited publications, and the total publications by bibliometric and altmetric methods. This study is valuable because it highlights the publishing trend in this field in the last three decades (1990-2021) for researchers and research centers involved in research in the field of Information Science in France. The analysis of the findings showed that the trend of publications in the field of Information Science in France has been upward and the citations have been increasing during these three decades and in contrast, the trend of uncited publications in this field has been decreasing. This may be due to researchers paying attention to new topics and numerous collaborations with researchers, institutions, and countries at the international level, which can lead to an increase in the number of publications and citations in this field. In addition, based on the research findings, Michel Zitt, Cherifa Boukacem-Zeghmouri, and Joachim Schopfel were the most prolific French researchers who had the most cited publications and total publications in the field of Information Science in France during the period under review. They contributed to the development of the field of Information Science in France. Among the institutions, the Center National de la Recherche Scientifique (CNRS) is the most prolific research center contributed most to the field of Information Science in France between 1990 and 2021. The high number of CNRS publications

(including uncited publications, cited publications and total publications), maybe due to the center's involvement in all research areas in France. In general, the United States and the UK were the most active collaboration countries of France in total publications as well as cited publications. In addition, most of the uncited publications in France were published in cooperation with Italy and Brazil.

It is worth noting that the two journals *Social Science Information* (*Information sur les sciences sociales*) and *Scientometrics*, respectively, have published the majority of total publications of French researchers, leading in publishing the most cited publications in the field of Information Science in France. The journal *Social Science Information* (*Information sur les sciences sociales*) and the *TSI-Technique et Science Informatiques* have the most uncited publications in this field.

The findings showed that out of 1959 documents published in the field of Information Science in France, 14 articles were recognized as highly-cited papers, of which only eight articles received an altmetric score. In addition, these eight highly-cited papers attracted 3081 readers in Mendeley, 21 times tweeted in Twitter and received 1126 citations in Dimensions. But all 14 highly-cited papers were shared on ResearchGate and Mendeley. The findings also revealed that the trend of publications in the field of Information Science in France is growing. In other words, 82.11 percent of the publications in the field of Information Science in France were cited publications and only 17.89 percent were uncited publications.

Data Availability Statement

The raw data were collected from the WoS database. Data will be available upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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