Research on Fake News: An Empirical Analysis of Selected Library and Information Science Journals

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ABSTRACT

The purpose of the work is to make a quantitative and qualitative assessment of published research on fake news in light of the Library and Information Science (LIS) perspective and show the research trends. Essential metadata elements were collected from the SCOPUS bibliographic database pertaining to fake news with specific reference to the LIS domain from 2017 to 2020 for the research work and analysed as per the research objectives. While the bibliometric indicators and R package has been used to study the various quantitative dimensions of publication patterns of the research papers, qualitative content analysis has been used to determine the emerging areas of research on fake news within the discipline. The quantitative analysis reveals that a good number of research works (N=133) have been published in as many as 52 academic journals of LIS that received 628 citations. "Proceedings of the Association for Information Science and Technology" is the most productive journal that published the highest numbers of articles on fake news, and the USA is the dominant country of publications. In the LIS field, "fake news" is an emerging study topic that is gaining momentum. The research works covered a wide range of topics, including social media and fake news, information literacy and fake news, the role of libraries and librarians in fake news, detecting and combating fake news, theories, models, and frameworks, as well as archiving, preservation of fake news.

Keywords: Productive journals on fake news; Highly cited articles on fake news; Content analysis; Social media and fake news

1. INTRODUCTION

The notion of fake news is not a new concept. The concept has been in existence even before the emergence of the Internet. "Fake News" is a term used to denote fabricated news that has been manufactured and disseminated through traditional media such as print, radio, and television, as well as non-traditional media such as "social media." The most widely accepted definition of fake news available on the Internet is "fictitious articles deliberately fabricated to deceive readers" (Monther and Ali, 2018)[1]. Wikipedia states that "fake news is a type of yellow journalism or propaganda that consists of deliberate misinformation or hoaxes spread via traditional print and broadcast news media or online social media" (www.wikipedia.org)[2]. The general reason to spread false or fake news is to mislead the readers, damage any entity's reputation, or gain sensationalism. Fake news is increasingly being shared via social media platforms like Twitter and Facebook (Allcott and Gentzkow, 2017)[3]. These platforms provide a venue for the general public to express their thoughts and ideas in an unfiltered and uncensored manner. Therefore, fake news, which is a pertinent issue and popularised along with the Internet,

has become a booming topic of research. In this context, the present paper is an endeavour to map the publication pattern of fake news research and make the qualitative content analysis of research areas from the library and information science (LIS) perspective.

2. BACKGROUND

Fake news, as it sounds, is news that is misleading, that is false, fabricated and not based on facts. The idea of fake news is not entirely new. The idea has been in existence even before the advent of the Internet. However, the advancement and popularity of the Internet have enabled people to quickly and easily distribute news messages the world over. The spread of "fake news" especially through online platforms, has become a pressing concern for the civic society around the world in recent times. Social media platforms have become fertile grounds for the rapid spread of such misinformation and have made it more challenging to evaluate the credibility of such information. A look at contemporary scholarly publications shows that the issues of fake news have been a major concern amongst researchers from various backgrounds. Computer professionals have carried out research on detection methods and automatic fake news classification through natural language processing tools. Similarly, linguistic scholars have tried fake news

classification by morphological group analysis. The scholars from Library and Information Science (LIS) disciplines have also contributed to counteract the phenomenon of fake news. Nevertheless, no such studies have been conducted to assess the research areas of fake news in LIS. So the present study was conceptualised to draw attention towards trends and directions of research on fake news from the LIS perspective.

3. LITERATURE REVIEW

As fake news has emerged as an important topic of research across disciplines, a substantial amount of literature has been published. However, the current literature review scope is confined to the field of library and information science. De Paor and Heravi[4] studied how the field of librarianship can help to counteract the phenomenon of fake news. Through a review of the literature, the authors identified the current themes, patterns and gaps within the existing literature on fake news and outlined the initiatives developed by those within the LIS profession. They also made recommendations on how librarians can continue enhancing their role in the digital age, fighting against fake news, and making successful contributions to the professional field. Bangani[5] pointed out the contribution of academic libraries to the fight against fake news in South Africa. The study brought the perspective of South Africa to the discourse about fake news. The results of this study affirmed the role played by libraries in the fight against fake news. Anderson[6] has discussed the role and responsibility of librarians in combating fake news. The author opined that the librarians had been engaged in fighting against bad sources and false authorities for a very long time. Since social media apps contribute to the spread of disinformation, it is important that the librarians become aware of apps like Facebook, Twitter, Snapchat, Pinterest, Tumblr, Instagram, YouTube, and adopt how fake news can be combatted. Batchelor[7] discussed about the role of libraries in the fight against fake news. He suggested that in an environment filled with inaccurate information, the importance of critical thinking skills is more apparent. Both public and academic librarians have a professional and civic obligation to promote critical thinking skills among the users. Durodolu and Ibenne[8] put forth a significant discussion of fake news infodemic vs information literacy. They opined that fake news had become an existential challenge and a threat to almost every aspect of life, for which detecting prejudice, misconception and bias from online information should form an important aspect. Library efforts must be geared toward discerning authentic and information literacy as a significant tool to fight fake news infodemics. In his study, Lim[9] examined how librarians understand fake news and the specific strategies for detecting fake news. The author conducted a content analysis of 21 academic institutional library guides and highlighted the findings. Suggested that librarians must pay attention to psychological factors when interpreting facts in their strategies about news sources and fake news. Doing a thorough reading of the Association of College and Research Libraries (ACRL) Framework for Information Literacy for Higher Education, Faix and Fyn[10] proposed that librarians should take an all-inclusive approach to the misinformation problem and promote critical thinking by incorporating concepts from ACRL

Framework. Leeder[11] surveyed 63 undergraduate students at a public university in the northeast USA, where the students evaluated examples of both fake and real news stories and stated their associated information-seeking behaviours. The author reported the students' specific information-seeking behaviours and critical evaluation strategies, their ability to accurately evaluate the trustworthiness of online news stories. The results identified effective verification strategies such as: searching for other sources to verify a story, using Google to find information about a news story and using Snopes or fact-checking sites. Sullivan[12] provided an overview of the library and information science approach to misinformation in the United States, discussed the shortcomings of that approach, and pointed out possible steps for remedying the problem. Rubin[13,] through her study, proposed a conceptual model known as the "disinformation and misinformation triangle". This disease triangle shows interactions between the environment, the host and an infectious pathogen. The conceptual model of the disinformation and misinformation triangle demonstrates an appropriate fit of computational solutions within the greater understanding of the socio-cultural "fake news" phenomenon.

All the above literature discussed about fake news infodemic and suggested a possible solution to fight against fake news. While some authors proposed to develop information literacy skills, some suggested paying attention to psychological factors, and others recommended enhancing critical evaluation strategies. In addition, authors have designed conceptual models and frameworks to counteract fake news.

4. OBJECTIVES OF THE STUDY

The study has been carried out with the following objectives
- To find out the growth pattern and average citations of research publications on fake news
- To point out the most productive journals of LIS on fake news
- To show the most productive countries on fake news research
- To make a qualitative content analysis of areas of research on fake news
- To map the Keywords on the basis of frequency of occurrences
- To determine the top-cited and referred articles on fake news within the corpus.

5. METHODOLOGY

A search through the Scopus multidisciplinary citation database with the keyword "Fake news research" in the discipline of Library and Information Science for the period from 2017-2020 in November 2020 resulted in 163 publications. After conducting a meticulous examination of the titles and abstracts, finally, 133 documents are included that best suited the objectives of the present study. While the bibliometrics and R package has been used to study the various dimensions of publication patterns of the research papers, qualitative content analysis has been used to determine the areas of research on fake news.

Table 1. Annual production of papers on fake news in LIS journals

YEAR	NP	CT	ACPP	Per cent
2017	16	163	10.19	12.03
2018	34	148	4.35	25.56
2019	41	200	4.88	30.83
2020	42	117	2.79	31.58
Total	133	628	4.72	100.00

NP= Number of Publications CT=Citations ACPP= Average Citations Per Paper P=Percentage
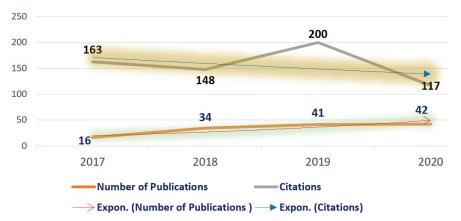

Figure 1. Number of publications on fake news versus citations.

Table 2. Top ten sources/journals on fake news

Rank	Sources	Np	Quartile	SJR
1	Proceedings Of The Association For Information Science And Technology	12	Q2	0.27
2	Information Communication And Society	10	Q1	2.58
3	Informing Science	8	Q2	0.3
4	Online Information Review	7	Q1	0.67
5	Journal Of Documentation	6	Q1	0.89
6	Reference Librarian	6	Q1	0.8
7	Journal Of Academic Librarianship	5	Q1	1.17
8	Profesional De La Informacion	5	Q1	0.48
9	Reference Services Review	5	Q1	0.81
10	Library Hi-Tech News	4	Q3	0.25

6. DATA ANALYSIS AND DISCUSSION

It is observed that all these papers are published in 52 Library and Information Science (LIS) journals. Based on the types of publications, the published literature is divided into seven types: article, review, editorial, note, erratum, letter, and short survey. Out of 133 publications, the highest (117, 88 %) are the articles, and the rest are short communications (16, 12 %). The study comprises 246 authors, 36 countries, and 164 affiliations/institutions as a whole.

6.1 Scientific Production

Table 1 shows the chronological distribution of publications with the keywords "Fake News" in Library and Information Science Journals/Sources from 2017 to 2020. It is observed that out of the total number of publications (n=133), the highest number of publications (31.6 %) was in the year 2020 (NP = 42, Citations = 117), followed by the year 2019 (NP = 41, 30.8 %), and the details are depicted in Table 1.

It was further observed that despite the minimum number of publications, the ACPP (Average Citations Per Paper) is highest (10.19) in the year 2017. This is due to the reasons that older articles get more time to accumulate more citations. The year-wise publications on fake news versus Citations are plotted in Fig. 1 and their respective trend lines to show the observed trends.

6.2 Most Productive Journals

The total 133 research papers on "Fake News" from the domain of the LIS field are distributed over 52 journals. Table 2 provides the top ten most influential journals with the corresponding quartile and Scimago Journal Rank. The results demonstrate that the most influential and productive journal is the "Proceedings of the association for information science and technology" (Q2) with NP 12, followed by the "Information communication and society" (Q2) with an NP 10. Figure 2 reflects the publication source with the numbers of papers published in these top-ranked journals. Further, it is observed that the SJR of the journals in Rank 2 (SJR = 2.58), and 5 (SJR = 1.17) are higher than the other journals (SJR < 1). So it can be interpreted that the reasons for citation are not always the quality of the journal or the number of publications, instead, it is the quality of research and relevance of the work that fetches more citations.

6.3 Most Productive Countries Produced Papers on Fake News

When only the first authors were examined, a total of 133 authors were found, spread over 34 nations. The geographical distribution of the most productive countries that have produced research on 'fake news' is also presented in Fig. 3. It is observed that the USA dominates other countries with the highest share of 59.4 per cent (79) and tops the list among the most prolific countries. This is followed by Spain (15), Canada (14), and the UK (14), having a share of above 10 per cent each.

6.4 Content Analysis

One of the objectives of this paper is to identify the research areas on fake news and to provide a description of those areas as communicated through the research publications
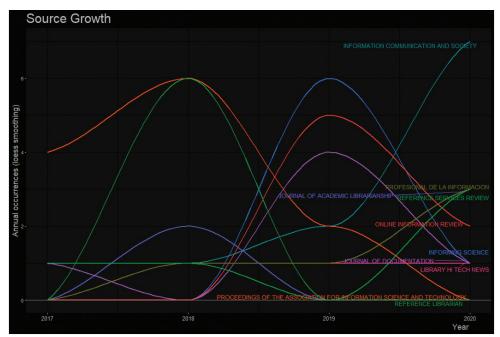
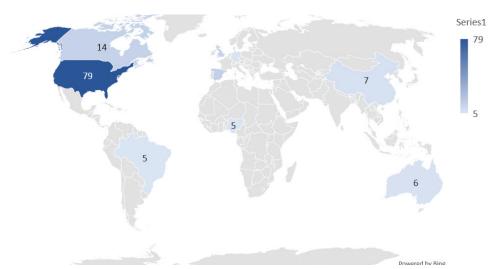**Figure 2. Top ten LIS Journals with an annual occurrence.**

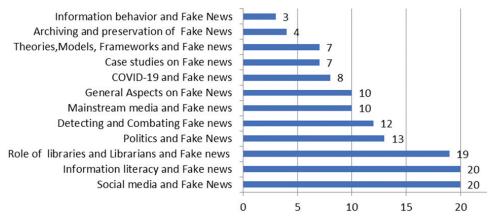**Figure 3. Geographical distribution of countries on fake news research.**

Figure 4. Distribution of various research areas on fake news.

categorisation, and compilation, has been adopted. For this, the titles and the abstracts were analysed to study both manifest and latent content categories. Accordingly, all the research areas were identified and categories based on the thematic approach in each article. It is observed that research on fake news in LIS has been done from various dimensions starting from theories, models, and frameworks on fame news to different case studies, archiving, preservation, Covid-19 pandemic, information literacy, the role of libraries, social media, and fake news, etc. All these research areas were classified into 12 categories (Fig. 4 and Table 3). Of all the categories, "Social media and fake news" and "Information Literacy and fake news" are the dominant areas of research where maximum numbers of works (20 each) have been published. This is followed by the "Role of Libraries and librarians and fake news". Finally, a detailed description of the areas and sub-areas of research is given in Table 3 on 'fake news' in the domain of LIS.

6.5 Mapping of the Keywords on the Basis of Frequency of Occurrences

Keywords play a significant role in the retrieval of documents from the vast ocean of literature. Keywords assist in indexing the documents at their appropriate locations in various indexing databases such that users can browse their needed documents quickly and efficiently. The use of acceptable keywords by the authors places the documents in the correct context, leading to greater recognition and accessibility of important works and thereby attracting more citations.

Keywords that have been featured in the fake news articles are presented in Fig. 5. It is found that 'Fake News' as a keyword, has become the first and foremost choice by the authors and placed at the first rank followed by 'Information literacy', 'Social media', 'Disinformation', "Misinformation' etc. The other

of the LIS discipline. For this purpose, qualitative content analysis with a three-stage approach, namely latent analysis,

popular keywords are 'Media-literacy', 'Covid-19', 'Post-truth', 'Information behaviour', 'Twitter', "Credibility', 'News

Table 3. Main areas and sub-areas of research on fake news

Main areas of research	No. of papers	% of papers	Sub-areas of Research
Social media and Fake News	20	15.0	The network of Twitterbots, compiling lists of fake news sites, fake news stories on social media, overview of NodeXL tool, social media in the dissemination of fake news, social bots, and fake news.
Information literacy and Fake news	20	15.0	Information literacy instruction for checking fake news, challenges of post-truth politics in information literacy, fake news issues in the context of information literacy instruction, incorporating news literacy into the learning management system, Immersive Virtual Reality program to teach Information Literacy skills.
Role of libraries and Librarians and Fake news	19	14.3	Libraries to combat a rising tide of fake news, Role of libraries to understand the post-truth phenomenon, public libraries responses to fake news, LIS response to the problems of fake news, how librarians understand fake news, library science students' method in countering hoax, Changing library environment and Fake news.
Politics and Fake News	13	9.8	Networked political spamming, qualitative analysis of viral tweets on politics, etc.
Detecting and Combating Fake news	12	9.0	The perspective of natural language processing to automatically detect misinformation, Automatic clickbait detection, filtering, vetting, and verifying fake news, Artificial Intelligence (AI), Deep Learning (DL) and fake news, five-factor model (FFM) on an individual's ability to detect fake news.
Mainstream media and Fake news	10	7.5	Investigative journalism and fake news, public distrust in the mainstream media and fake news, mainstream media (MSM) coverage of fake news discourse, Media social responsibility and disinformation, information patterns and journalistic practices, ethical journalism, scholarly writing, and fake news, specialized journalism and fake news.
General Aspects on Fake News	10	7.5	Flourishing of fake news, types, principles, and tactics of fake news, classification of fake news, connotations of fake news.
COVID-19 and Fake news	8	6.0	Covid-19 infodemic, Understanding fake news during the Covid-19, fake news sharing during the COVID-19 pandemic, Impact of covid-19 on the media system, types and sources of COVID-19 misinformation.
Case studies on Fake news	7	5.3	Insights into students' fake news judgment, undergraduate students - how to avoid falling victim to fake news, college students and spreading of fake news, whether schoolchildren were able to identify the spoof website as fake, Effect of online fake news on the middle-aged and elderly populace.
Theories, models, frameworks and fake news	7	5.3	Development of Agent-based model, A conceptual model for "fake news", ACRL Framework for fake news, actor-network theory, and fake news.
Archiving and preservation of Fake News	4	3.0	Post-Truth Archive, Digital Archive, Preserving Fake news, Archival Integrity.
Information behaviour and fake news	3	2.3	Information behaviour and critical information consumption, fake news phenomenon, and exploration of information behaviour.
Total	133	100	

literacy', 'Digital literacy', 'Journalism', 'Higher education', 'Trust', 'Democracy', 'Content analysis' etc. There are 20 per cent of keywords that have five or above occurrences only indicate that there are as many as 80 per cent of keywords that are not so popular or common keywords with the most conservative hurdle of 5 or more occurrences.

6.6 Top Cited Articles on Fake News Within the Corpus

Listing references in publications is a convention for the acknowledgement of the importance of previous work by scholars, and citation analysis is an existing method used to calculate the influence of particular papers, authors, periodicals, mapping a correlation between two quoted and
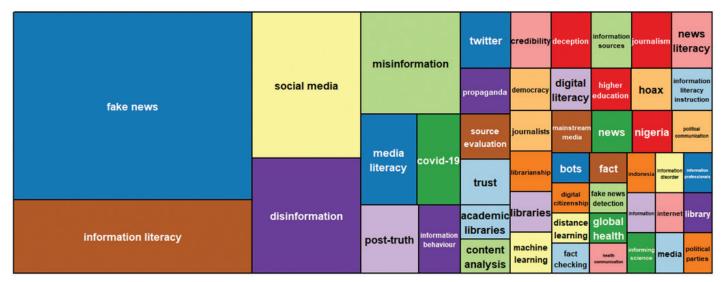
Figure 5. Keywords on the basis of frequency of occurrences.

Table 4. Top 10 most-cited articles on fake news in LIS literature

Authors	Title	Year	Source title	CT
Bastos M.T., & Mercea D.	"The Brexit Botnet & User-Generated Hyperpartisan News"	2019	Social Sc. Computer Rev.	56
Cooke N.A.	"Posttruth, truthiness, & alternative facts: Information behaviour & critical information consumption for a new age"	2017	Lib. Quarterly	49
Rochlin N.	Fake news: belief in post-truth	2017	Lib. Hi-Tech	34
Zhang X., & Ghorbani A.A.	"An overview of online fake news: Characterization, detection, & discussion."	2020	Inf. Proc. & Management	30
Batchelor O.	"Getting out the truth: the role of libraries in the fight against fake news."	2017	Ref. Services Rev.	26
Casero-Ripollés A.	"Impact of covid-19 on the media system. Communicative and democratic consequences of news consumption during the outbreak."	2020	Professional de la Inf.	25
Laato S., *et al.*	"What drives unverified information sharing and cyberchondria during the COVID-19 pandemic?"	2020	European J. of Inf. Systems	19
Ross B., *et al.,*	"Are social bots a real threat? An agent-based model of the spiral of silence to analyse the impact of manipulative actors in social networks."	2019	European J. of Inf. Systems	18
Carlson M.	"Fake news as an informational moral panic: the symbolic deviancy of social media during the 2016 US presidential election."	2020	Inf. Comm. & Society	17
Boididou C., *et al.*	"Detection & Visualization of misleading content on Twitter."	2018	Inte. J. of Multimedia Inf. Retrieval	17

cited documents. It is observed that a total of 5,102 references are cited by 133 research papers, with an average of 38 research papers per article during the study period. This indicates that the contributors on "Fake News" literate refer to a good number of research papers before publishing their research paper. Table 4 depicts the rank list of most cited articles with their respective citations from the SCOPUS database in the literate of fake news. It is observed that the corpus received a total of 665 numbers of citations, with an average of 5 citations per article. The number of articles that have never been cited to date is 31, and the mean 'un-cited ratio' is 23.3 per cent. It is also observed

that around 14.3 per cent of articles having '10+ citations' and showing a declining trend during the study period. Citations per article, 10+ citations, and Cited-to-Citing ratio are higher for older articles than for recent articles, indicating that older articles get more time to accumulate more citations.

7. CONCLUSION

Periodic evaluation of the scholarly output of LIS is not only essential but also inevitable to map the extent of progression of the profession by revealing the publication pattern and emerging domains of research. Following this

practice, the present study on 'fake news' provided valuable insights into the ever-growing discipline. It is found that fake news is a booming research area in the LIS discipline that facilitated the production of a good number of research works (N=133) within the last four years which received 628 citations. The exponential trend lines on the publications and citations on fake news also show a steady growth trend during the study period. A number of academic journals (52) have featured the publications, among which 'Proceedings of the Association for Information Science and Technology' is the most productive journal that published the highest numbers of articles on fake news, followed by the 'Information communication and society'. USA tops the list among the most productive countries with the highest share (59 %), followed by Spain, Canada, and the UK. Out of 12 popular classified research areas, the top three are 'Social media and Fake News', 'Information literacy and Fake news', and 'Role of Libraries and Librarians and Fake news'. In regard to the top-cited and referred articles on fake news within the corpus, the article by Bastos and Mercea (2019) has received the highest number of citations (56), while the average number of citations is found to be 5 per article. Further, the 'keyword analysis' shows that around 80 per cent of keywords that are not so popular or common keywords with the most conservative hurdle of 5 or more occurrences. Since social media is the potential career of the spread of fake news, it has appeared as the leading area of research with an equal sharing of research on 'information literacy' and 'fake news'.

The primary value of this paper lies in extending the understanding of the evolution of fake news research, which is an emerging research area in the LIS domain. This study is important from the perspective of the growing research field of the LIS discipline to identify the innovative areas of research on fake news and know the direction of research. It is evident that the extensive spread of fake news can explore many emerging areas of research and the LIS domain is not an exception to this practice.

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His contribution to the present study is data validation, making inferences, and preparing the paper's final draft.