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Map-based communication: a pivotal function of knowledge information in sports

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ABSTRACT

Previous studies vividly indicate that understanding sports communication in competitive and non-competitive contexts could benefit athletes, coaches, officials, businesses, governing bodies, and spectators. This study aimed to inspect publication trends relevant to the global evolution of sports communication based on two high-impact and predominant databases, Scopus and Web of Science. The study analyzed selected top publications (peer-reviewed articles, books, and reports), keywords, and institutional data via ScientoPy on map-based communication. Our results depicted that the Scopus and WoS databases reveal growing trends in sports communication. The study's primary contribution is that it identified: the primary map-based communication research, essential keywords, connected studies, and leading universities within the sport management and sports scholarly fields. Keywords like (but not limited to) "public relations" and "organizational communication" has become prevalent in sport mapping communication between 2018 and 2019. The five most popular keywords concerning sports communication in include (but are not limited to) "Sports," "Communication," "Social media," "Sports communication," and "Media." the findings of our paper will be helpful (but not limited to): scholars interested in sports communication, athletes (professional, non-professional, and students), stakeholders, and researchers. Similarly, the study provides future readers and scholars with a global perspective on the current hot topics in sports communication to help them disseminate their ideas, as well as a variety of analyses to assist in the organization of data and the development of theory and practice in sports communication research.

Keywords: Sports management; map-based communication; sports communication; information mapping; scientometrics

Komunikasi berbasis map: fungsi penting informasi pengetahuan dalam olahraga

ABSTRAK

***Studi** sebelumnya dengan jelas menunjukkan bahwa memahami komunikasi olahraga dalam konteks kompetitif dan non-kompetitif dapat bermanfaat bagi atlet, pelatih, ofisial, bisnis, badan pengatur, dan penonton. Penelitian ini bertujuan untuk melihat tren publikasi yang relevan dengan evolusi global komunikasi olahraga berdasarkan dua basis data berdampak tinggi dan dominan, Scopus dan Web of Science. Studi ini menganalisis publikasi teratas yang dipilih (artikel, buku, dan laporan yang ditinjau sejawat), kata kunci, dan data institusional melalui ScientoPy pada komunikasi berbasis peta. Hasil kami menggambarkan bahwa database Scopus dan WoS mengungkapkan tren yang berkembang dalam komunikasi olahraga. Kata kunci seperti (namun tidak terbatas pada) "hubungan masyarakat" dan "komunikasi organisasi" telah menjadi lazim dalam komunikasi pemetaan olahraga antara 2018 dan 2019. Lima kata kunci paling populer lainnya mengenai komunikasi olahraga termasuk (tetapi tidak terbatas pada) adalah "Olahraga, " "Komunikasi", "Media sosial", "Komunikasi olahraga", dan "Media". Kontribusi utama penelitian ini adalah diidentifikasi: penelitian komunikasi berbasis peta utama, kata kunci penting, studi terkait, dan universitas terkemuka dalam manajemen olahraga dan bidang ilmiah olahraga. Temuan makalah kami akan berguna untuk (tetapi tidak terbatas pada): sarjana yang tertarik pada komunikasi olahraga, atlet (profesional, non-profesional, dan mahasiswa), pemangku kepentingan, dan peneliti. Demikian pula, studi ini memberikan pembaca masa depan dan sarjana dengan perspektif global tentang topik hangat saat ini dalam komunikasi olahraga untuk membantu mereka menyebarkan ide-ide mereka, serta berbagai analisis untuk membantu dalam organisasi data dan pengembangan teori dan praktek dalam penelitian komunikasi olahraga.*

***Kata-kata Kunci**: Manajemen olahraga; komunikasi berbasis peta; komunikasi olahraga; pemetaan informasi; scientometrics*

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INTRODUCTION

There are various reasons why research on and attention to team communication in sports is needed (Ishak, 2017). Remarkably, the development of sporting events has been inextricably linked to the role of technology in the sports industry, not only because of the potential of event communication to increase the number of spectators and viewers but also because of the potential to increase revenue through a variety of sponsorships, advertising, and other forms of innovations (Petrović et al., 2015). For instance, while understanding the complexity of appropriate coaching is crucial, the problem cannot be solved by changing how the message is conveyed (Ishak, 2017). The topic of what businesses honestly communicate using sports themes emerges given the significance of sport to its audience, its multidimensionality, and how eagerly it is to be used as a communication platform (Kończak, 2021).

Without effective strategic communication during the response phase, a crisis will immediately and seriously harm the reputation and image of the people and organizations involved, according to an assumption made in the study of crisis communication in general and crisis communication in sports in particular. The relationship between sports teams and their followers could suffer long-term consequences (Koerber & Zabara, 2017). By segmenting the sports market, it is possible to anticipate trends in sports' growth and development and improve communication between sports product manufacturers and consumers (Dadelo, 2020). The role of coaches in sports is changing from only imparting carefully thought-out methods and plans for improved performance to fostering excellent relationships with the players (Bum & Lee, 2016).

The integration of virtual platforms and web-based applications into traditional public relations and corporate communication methods by sports clubs competing in the globalized sports industry, particularly in the football branch with millions of fans, can give them a competitive edge in business models, products and services (Göksel & Serarslan, 2015).

Sports organizations are forced to compete with one another on various levels. Marketing is one of the most well-liked sports in which to compete. In this situation, sports teams must employ innovative and successful communication techniques (Siguencia et al., 2016). One of the most crucial elements for business efficiency in sports organizations or institutions is efficient communication between management and staff (Terzić, 2018). Social media is crucial for sports communication (Nölleke et al., 2017). The actors with the highest Facebook likes, Twitter followers, and Instagram followers are well-known athletes.

Scholars in sports media and public relations have become interested in sports organizations' usage of social media (Litchfield & Kavanagh, 2019). For each connected component, sports organizations can choose the best communication means (Wang, 2021). However, there are various difficulties with communicating about disabilities in sports (Kolotouchkina et al., 2021).

Our knowledge of the value of sports and sports clubs has grown due to how social distance measures have affected sporting events and activities (Schallhorn et al., 2022). Along with improved psychological health, stress reduction, and physical fitness (Judge, 2018), sports, particularly team sports and social gatherings -encourage face-to-face interaction and conversation while boosting social connectedness (Hoye et al., 2015).

Colleges, schools, and departments of mass communication and journalism have been slow to offer their courses, programs, or faculty scholarships in sports communication, sports media, and sports journalism — even though the majority of sports media industry professionals have long had education in journalism and media programs (Hull et al., 2019). Sports communication majors, minors, cognates, specialties, emphases, or certifications, did not begin to appear until the 21st century, with most of them being created over the previous ten years (Hull et al., 2019). The Olympics have sparked a sports media frenzy that has resulted in the growth of sports publications, magazines, and obstacles (Shi, 2015).

According to earlier studies on the state of sports communication, traditional sports communication methods can no longer keep up with the rapid advancement of artificial intelligence technology (Peng, 2020). An association, club, league, event planner, or regional sports organization must collaborate to reach the best level of efficiency and address

any issues that may occur (Daniel, 2019). The goal of strengthening cross-cultural sports communication is for each country to advance in confidence (Gao, 2021). Sports organizations' social media usage is expected to change, necessitating ongoing academic research as teams manage organizational goals and sports communication professionals learn more about social media as a medium for fan involvement (Walden & Waters, 2015).

The recent advancement of science and technology has significantly altered civilization (Sajana & Krishnamurthy, 2017). Science can be characterized as a social activity focused on defining a field of knowledge through measurement and observation (Moral-muñoz et al., 2020). The benefits of research collaboration have been amply demonstrated through scientometrics and social network analysis (Ceballos et al., 2017).

Scientometrics is the development of quantitative research techniques to investigate how science develops as a process of information (Mingers & Leydesdorff, 2015). The quantitative study of science from a database system, structured data, storage, retrieval, scientific communication, and science policy is known as scientometrics (Mohan & Kumbar, 2021; Sofik & Rahman, 2022). Scientometrics has significantly advanced, moving toward Library and Information Science (Leydesdorff & Milojević, 2015). A scientometric analysis is required to gain more profound knowledge (Lai et al., 2017). Scientometrics frequently employs statistical and mathematical techniques to quantitatively and qualitatively examine scientific literature (Nath & Jana, 2021)

Scientometrics is a potent tool for analyzing patterns and the slow evolution of scientific findings (Nyika et al., 2021). Scientometrics provides an in-depth analysis of the field's research activity and can offer current trends backed by quantitative data (Ramy et al., 2018). A researcher must analyze every scientific subject before proposing any idea (Orlova & Titova, 2021). An unbiased viewpoint on the dissemination and development of scientific information at various levels is offered by Tang et al. (2021).

To better understand how scientific research functions as a social activity, scientometrics examines the quantitative elements of creating, sharing, and utilizing scientific information (Gonzales et al., 2021). Scientometric and bibliometric analysis have various uses in the library and information science field, including creating new subscription policies in the future by observing research trends in topics, core journals, author productivity, and authorship patterns (Velmurugan & Radhakrishnan, 2015). In addition, scientometric data is a tool for analyzing the quality and productivity of scientific research and the breadth and advancement of scientific research (Wani & Zainab, 2017). The systematic analysis of scientific publications, including their significance and content, is known as scientometrics (Young et al., 2015). Computing technology, mathematical statistics, and other mathematical techniques, scientometrics is the quantitative examination of the input, output, and processes of scientific activity (Zhou et al., 2019).

The objectives of this scientometric study are to 1) determine the growth pattern of sports communication publications in the Scopus and WoS databases, 2) analyze the author's keywords and research on the function of communication in influential sports, and 3) pinpoint the top sources and essential organizations in the sports communication industry. Furthermore, by giving readers and potential researchers a summary of the study on the essential elements of communication in this sport, the authors hope to increase readers' understanding of current trends in communication research in sports.

RESEARCH METHOD

A scientometric review has grown in popularity due to the large number of studies being published in almost all fields of knowledge (Aziz et al., 2022). Despite the importance of sports, only a bit of scientometric analysis has been done to examine the dynamics of research and publication patterns on a global scale (Sofyan et al., 2022). To correctly comprehend the practice of sports communication research, this study adopts the information framework mapping approach to assess the research situation and set up the existing theoretical structure (Abdullah, 2021). It is crucial to establish the study goals early on in this review (Abdullah & Abd Aziz, 2021).

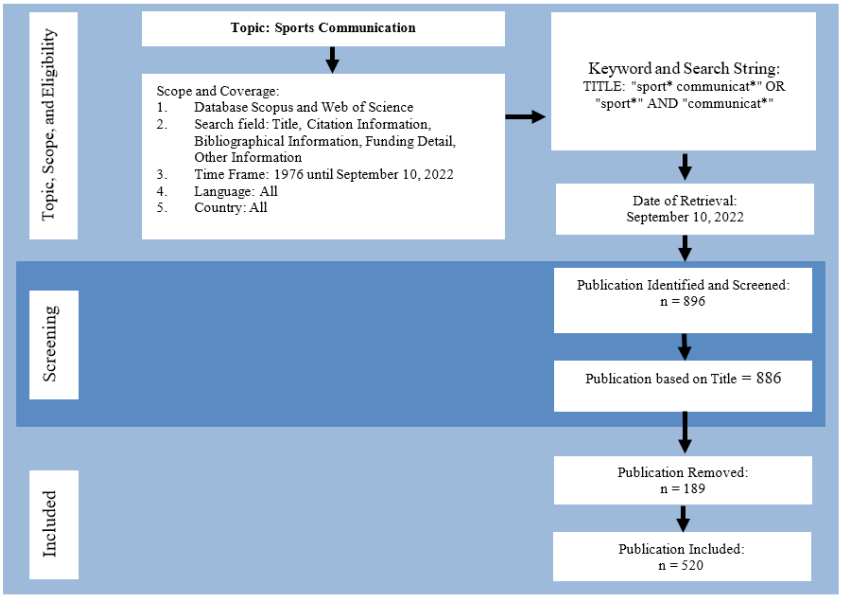
This Python script creates a list of the most

popular themes by author, author, and country, along with related papers (Pabon et al., 2020), and eliminates the possibility of bias in individual studies (Ruiz-Rosero et al., 2017). The evolution and trend of publications, subjects, source titles, and citations were studied using scientometric indicators throughout this study (Li et al., 2016). A significant amount of bibliographic data is analyzed using scientometric methods (Martynov et al., 2020). Finding and extracting papers on themes pertinent to the research is the first step in performing a scientometric study (Malakoutikhah et al., 2021). Analysis of author names, such as a list of primary authors, may add bias to the study due to the likelihood of name similarity (Sofyan & Abdullah, 2022).

The documents included in the Scopus database and the Web of Science served as the study's data sources (WoS). On September 10, 2022, a search strategy was created, and a thorough review of the literature on sports communication was done in Scopus and WoS. The Scopus and WoS databases are searched for sports communication documents using the keywords "sport* communicate*" OR "sport*" AND "communicate*." To increase the precision of the outcomes of the questions asked, authors looked for keywords in article titles. As a result, 896 documents were reviewed; 424 papers were identified and retrieved from Scopus, and 472 WoS documents related to sports communication were further analyzed using the scientometric analysis technique. The maximum and lowest metadata standards that can be assessed and the number of metadata numbers used for bibliometric analysis need to be specified (Sofyan, 2022).

This research used PRISMA flowcharts to identify, assess, and submit papers for our scientometric data evaluation. The method for collecting documents from Scopus and Web of Science (WOS) is depicted in Figure 1 and will be further examined. This scientometric review's primary goal is to investigate the patterns of publications in the Scopus and WoS databases related to the significance of communication in sports. Descriptive analysis was used to perform this study, and papers were checked using the Scopus and WoS databases.

It is a free and open-source scientometric analysis tool built on Python that may remove bias in specific articles (Ruiz-Rosero et al., 2017; Ruiz-Rosero et al., 2019). Scientology can perform the following tasks: gain access to the Clarivate Web of Science and Scopus databases; sort publications by document type; find and remove duplicate documents; construct graphs that depict the history of selected items in a topic; find popular topics by looking at the average growth rate (AGR), and calculate h-indices for authors and countries. This software may identify popular topics by



Source: Researcher's research flow, 2022; (Moher et al., 2009)

Figure 1 For our review of scientometric data, papers were found, assessed, and included using the PRISMA flow diagram

Table 1 Pre-processing brief

Info	Number	Percentage
Loaded papers	886	
Omitted papers by document type	177	20.0%
Total papers after omitted papers removed	709	
Loaded papers from WoS	391	55.1%
Loaded papers from Scopus	318	44.9%
Duplicated removal results:		
Duplicated papers found	189	26.7%
Removed duplicated papers from WoS	3	0.8%
Removed duplicated papers from Scopus	186	58.5%
Duplicated documents with different cited by	101	53.4%
Total papers after rem. dupl.	520	
Papers from WoS	388	74.6%
Papers from Scopus	132	25.4%

Source: ScientoPy output, 2022

analyzing the top authors' keywords with the highest AGR (Sofyan & Abdullah, 2022).

The data from the repossessions used in this study underwent pre-processing. ScientoPy uses the following sorts of documents at present to handle data: conference papers, articles, reviews, and papers (Ruiz-Rosero et al., 2017). Books, book series, and letters are the main outputs of this research. ScientoPy normalizes author names during the pre-processing stage by removing periods, commas, and special characters from metadata retrieved from both (Pabon et al., 2020). The pre-processed summary in Table 1 displays all the files imported for each database and removes any duplicate records.

RESULTS AND DISCUSSION

This study demonstrates the striking manner in which the industry has developed noticeably since 2009. Additionally, according to the percentage of documents published in the most recent two years (2020 to 2021), 18.2% were published on WoS, and 22.77% were on Scopus. The article with the most citations, with a total of 149, was "Why an expert team is more than a team of experts: A social-cognitive conceptualization of team coordination and communication in sport," authored by Eccles & Tenenbaum (2004) and included in the WoS database. The article "Brief communication: Cardiovascular screening practices of major North American professional sports teams," written by Harris et al. (2006), received 46 citations in total, making it the article with the most citations in the Scopus database.

Social Sciences-Other Topics took first place with 154 documents. Communication ranked second (103 documents), Sport Sciences ranked third (53 documents), Business & Economics ranked fourth (43 documents), and Education & Educational Research ranked fifth (31 documents).

The article entitled "Why an expert team is more than a team of experts: A social-cognitive conceptualization of team coordination and communication in sport," written by Eccles, D.W. & Tenenbaum, G in 2004 in the WoS database, became the article that received the most citations, with a total of 149 citations in the field of Social Sciences-Other Topics.

"Sports fans as crisis communicators on social media websites," written by Brown & Billings (2013), received 80 citations in the field of communication. Meanwhile, "Enhancing Physical Education and Sport Science students' self-efficacy and attitudes regarding Information and Communication Technologies through computer literacy," written by Papastergiou, M. (2010), received 49 citations from the Education & Educational Research field.

In line with current trends (2020 and 2021), communication in sports has attracted

Table 2 Most active countries

Pos.	Country	Total	AGR	ADY	PDLY	hIndex
1	United States	110	02.05	09.05	17.03	18
2	China	73	07.00	12.00	32.09	5
3	Spain	35	01.05	04.00	22.09	4
4	United Kingdom	28	00.00	02.05	17.09	8
5	Germany	27	00.00	02.00	14.08	6
6	Canada	21	00.05	01.05	14.03	10
7	Australia	18	01.00	02.00	22.02	6
8	Russian Federation	18	-1.0	02.00	22.02	1
9	Romania	13	00.05	01.00	15.04	2
10	France	9	00.05	01.05	33.03	1

Source: Personal data, 2022

16% of the publications on Social Sciences-Other Topics. Other research areas that have published papers with more than 50% in 2020 and 2021 include Telecommunications (50%), Environmental Sciences & Ecology (50%), Public, Environmental & Occupational Health (57%), Science & Technology-Other Topics (50%), Mathematics (50%), and History (67%).

Only five types of documents are generated from the ScientoPy filter process by default. "Article" is the most common type of document with 368 papers. "Proceedings Paper" (70 papers), "Book Chapter" (34 papers), "Conference Paper" (26 papers), and "Review" (6 papers).

In the type of article document in 2021, "Mobile communication technology of sports events in the 5G era" by Dujuan, H. (2021) received the most citations, namely nine citations. The type of proceedings paper 2021, "Prospective Exploration of Cognitive-Communication Changes with Woodcock-Johnson IV Before and After Sport-Related Concussion," by Hardin, K. Y. (2021), received two citations.

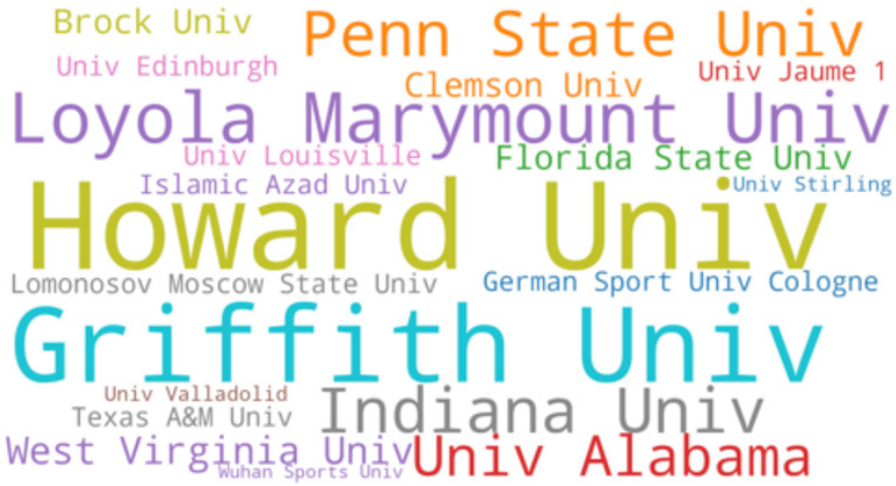
The peak of publication for this type of article document will occur in 2021, with 45 documents. For proceedings papers, the peak of publication occurred in 2012 with 13 documents. For book chapters, the peak of publication occurred in 2010 with five documents. For conference papers, the peak of publication will occur in 2021 with seven documents, and for article reviews, the peak of publication will occur in 2016 with a total of 2 documents.

Table 2 shows the ten most active countries in publishing academic papers related to communication in sports. The United States was ranked first with a total of 110 documents, followed by China (73 documents) and Spain (35 documents).

China has positive growth per year and the highest compared to other countries, with a total AGR of 7. It shows that scholars from China are paying more attention to this field. In contrast, the Russian Federation, which is the only country in the top 10 with a negative AGR growth of-1.0.

Publications list authors according to their specific institution or affiliation. Researchers have been able to choose research stations and create future collaborations thanks to their knowledge of which institutions are best represented in sport communication. A word cloud in Figure 2 shows the top 20 institutions that produce studies on communication in sports. According to Figure 2, Howard University has the most articles of any institution (7 papers). Griffith University and Loyola Marymount University took second and third, respectively (5 papers).

The University of Alabama has a document entitled "Sports fans as crisis communicators on social media websites," published in 2013, which received 80 citations in the first position. The University of Louisville, which has a document entitled "Twitter as a Communication Tool for Nonprofits: A Study of Sport-for-Development Organizations," published in 2015, received 53 citations and placed second.



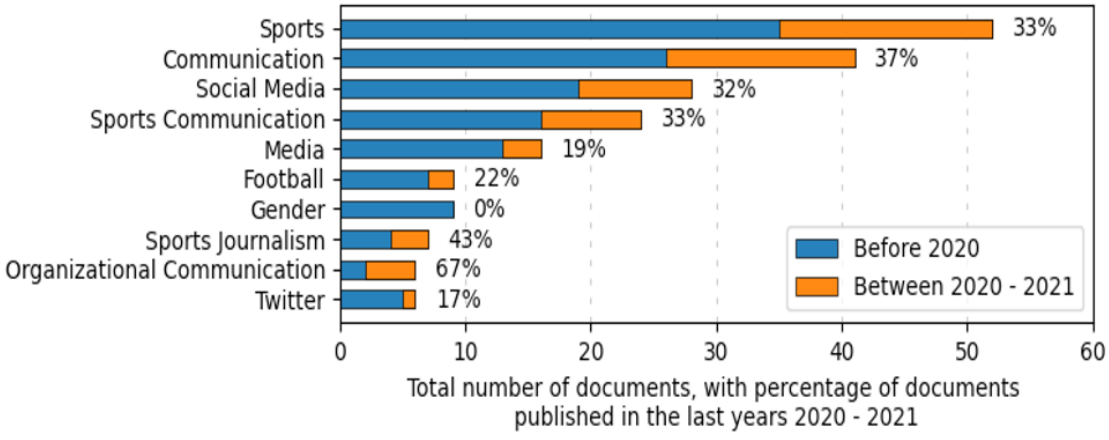
Source: ScientoPy output, 2022

Figure 2 Word cloud of institution

Author keywords are the terms that the author selects to describe the document's information. Author keywords make crucial passages in the paper easier to find for future readers and scholars. Many electronic search engines, databases, and journal websites employ the keyword author to locate pertinent papers. In this situation, ScientoPy could use the author's keywords to follow the development of the research question or search thesis.

This section examines the writers' primary keywords from earlier studies on sports communication. Research trends are discovered based on the author's keywords to complete the workflow. Similar terms with British and American spellings and keywords in the single and plural have been suggested to be combined. This manual exercise promotes data organization and prevents term duplication, producing more reliable findings.

Figure 3 illustrates the ten keywords used previously in the previous research. The five most frequently used keywords were "sports", "communication", "social media", "sports communication", and "media". Although Figure 3 illustrates the first ten keywords, ScientoPy allows us to see unlimited keywords. Figure 3 also depicts the percentage of documents issued in previous years (2020–2021) as a measure of relative growth. This indicator shows that "organizational communication" ranks ninth on this list but has the highest PDLY (66.7%



Source: ScinetoPy output, 2022

Figure 3 Author keyword

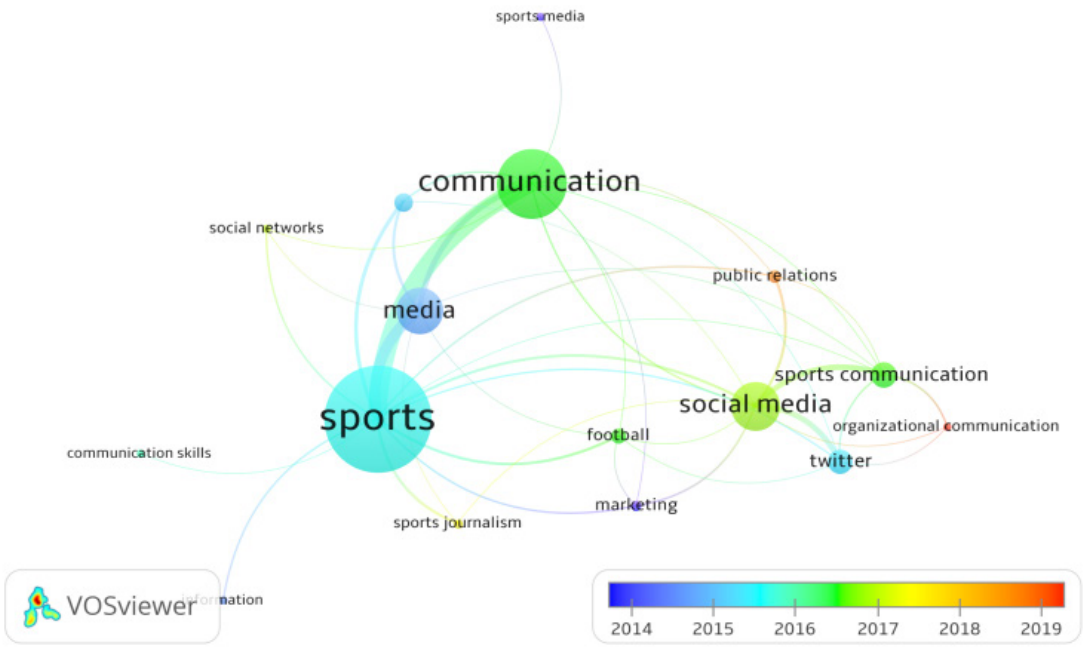
rounded to 67%).

We can use ScientoPy's extended results to check related publications by the author's keywords. The most famous keyword in this research is "sports." This keyword is in 52 articles. The paper with the highest number of citations for this term is "*Transformational leadership and task cohesion in sport: The mediating role of intrateam communication.*" This article was published in 2013 and has obtained 79 citations to date. The keyword "social media" has become the third most popular, but the article gets the highest ranking in this analysis. These keywords were applied in 28 publications to describe the content of the articles. The highest quote from an article using this keyword is "Sports fans as crisis communicators on social media websites." This article was published in 2013 and collected 80 citations.

This study uses cluster mapping to determine the co-occurrence of the author's keywords to identify themes or topics relevant to communication in sports. The data set (a combination of Scopus and WoS metadata) was pre-processed with ScientoPy before creating a network map with VOSviewer. Furthermore, this study uses a thesaurus file to map the co-occurrence of the author's keywords. Thesaurus files are essential for combining similar terms, spelling variations, and singular or plural terms such as "sport" and "sports," "sport communication," and "sports communication."

The node's size affects how often specific terms display in VOSviewer (see Figure 4). Relationships between keywords are shown as lines. The line's thickness, which represents the degree of co-occurrence, determines the strength of the nexus link. The overlay diagram in Figure 4 shows the author's keyword, emphasizing its relationship to other keywords through color, node size, text size, and connecting line thickness. The diagram's blue nodes reflect previously researched terms, while the red nodes show the terms that have just been discovered. The minimal number of keyword occurrences required for this analysis is 16, and 16 of the 1,284 keywords do so.

According to VOSviewer results, "media" (17 occurrences), "sports media" (6 occurrences), and "marketing" (5 occurrences) were the most popular keywords in 2014 and 2015. Keyword strength with "sports" reveals that "media" produces 12 link strengths, "communication" (6 link strengths), "gender" (3 link strengths), "social networks," "sports journalism," "football," and "sports communication" (respectively). Each link has



Source: VOSviewer, 2022

Figure 4 Overlay visualization based on keyword

one strength.

The author's keyword cluster mapping of publications from 2015 and 2016 showed that "sports" (54 occurrences), "gender" (9 events), "Twitter," "communication skills," and "information" contributed to the majority of articles (6 events). Given the strength of link 4, this age group emphasizes the association between "sports" and "gender."

"Public relations" is the most recent term that appeared after 2019 and has an emergence of 8. With "sports communication," "social media," "sports," and "communication," this keyword has seven link strengths in total (1st link strength). With the rise of 6, "organizational communication" has also emerged. With the terms "sports communication," "social media," and "Twitter," this keyword has a connection strength of 2. (1 link strength).

CONCLUSION

This study has shown the growth pattern for sports communication research from 2010. Academics and practitioners are getting more and more involved in sports communication research. Many people's lives revolve around communication, especially in the context of modern sports, where the growth of the sports sector is crucial for the continuation of effective communication. Indirectly draws attention to and makes it easier for present and upcoming researchers who want to learn more to be interested in sports communication.

Communication research in sports has piqued the interest of academics and professionals from various organizations. The participation of professional researchers is essential and has become the cornerstone of communication research in sports. It is because skills that increase the absorptive capacity of clubs and companies are essential for carrying out good marketing management of products and services in the sports industry.

Additionally, it has been predicted that the study's findings will encourage the creation of fresh concepts as a result of keyword analysis, enabling more effective dissemination and communication of academic works about communication research in sports and the formation of fresh, more pertinent concepts. This study is anticipated to serve as a springboard for future work in developing sports communication research on issues like sports communication and club performance, the effect of sports communication on consumer purchasing power in the form of sports products, as well as in-depth studies on specific themes or issues raised in this study.

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