

**Most Cited Publications in Sports Management and Digital Technology:
A Bibliometric Analysis**

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Abstract

This study explores how digital technology influences global competitiveness in sports management. Using the PRISMA framework and VOSviewer software, a bibliometric analysis was conducted on 2,175 publications from the Scopus database (2012–2022). After applying strict inclusion and exclusion criteria, 852 journal articles were examined. The research highlights major trends, key contributors, and emerging themes within this interdisciplinary field. Findings reveal the most influential authors, journals, and keywords driving the conversation around digital innovation in sports. These insights offer a deeper understanding of how technology continues to shape strategies and research in sports management.

Keywords: Sports management, Digital technology, Bibliometric analysis, Scopus, PRISMA.

الأبحاث الأكثر اقتباسًا في الإدارة الرياضية والتكنولوجيا الرقمية: تحليل بليومتري

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الملخص: أصبحت التكنولوجيا الرقمية عاملاً حاسماً في تعزيز القدرة التنافسية لصناعة الرياضة عالمياً. هدفت هذه الدراسة إلى استكشاف العلاقة بين إدارة الرياضة والتكنولوجيا الرقمية من خلال تحليل بليومتري. تم تنظيم البحث اعتماداً على إطار PRISMA، باستخدام تقنيات التحليل البليومتري باستخدام برنامج VOSviewer. تم تحديد 2175 منشورًا في قاعدة بيانات Scopus في الفترة من 2012 إلى 2022، وبعد تطبيق معايير الاشتغال والاستبعاد المحددة مسبقاً، تم تحليل 852 مقالة علمية مختصة. كشفت الدراسة عن الاتجاهات الرئيسية، والمصادر الأكثر إنتاجاً، والموضوعات الناشئة في تقاطع مجالي إدارة الرياضة والتكنولوجيا الرقمية. وتوفر النتائج رؤى حول أبرز المجالات والمؤلفين والكلمات المفتاحية التي تُشكّل هذا المجال البحثي المتطور.

الكلمات المفتاحية: الإدارة الرياضية، التكنولوجيا الرقمية، قاعدة بيانات سكوبس، بريسا.

Introduction

Digital technology has become a critical driver of innovation and competitiveness across various industries, including sports management. It plays a vital role in enhancing performance, operational efficiency, and audience engagement. In the context of sports, the integration of digital tools has transformed traditional practices and introduced new possibilities for analysis, training, and management.

As Trabal (2008) stated, "Sport and science share the same idea: to continually transcend the limits of the human being." Technology supports this vision by enabling advancements that were once unattainable. Ferreira et al. (2020) also emphasized the synergy between science and technology as a foundation for societal progress. Accordingly, most sports organizations have incorporated digital solutions into their strategies to improve decision-making, performance tracking, and fan interaction.

The use of digital technology in sports spans both structured collaborations and spontaneous innovations. In formal settings, organizations and technology providers develop targeted projects. Conversely, many innovations arise unexpectedly, often adapted from unrelated industries and later applied in sports contexts (Loland, 2002). However, despite its benefits, resistance to technology still exists among some organizations that prefer traditional methods (Mallen, 2019).

The COVID-19 pandemic significantly accelerated the adoption of digital tools in sports. It highlighted the need for agility, creativity, and technological integration in facing global disruptions (Modgil et al., 2022; Kim, 2020). Researchers such as Trischler and Li-Ying (2023) and Volberda et al. (2021) have underscored the importance of digital transformation in shaping future business models, especially under uncertain conditions.

This study aims to analyze the intersection between sports management and digital technology through a bibliometric lens, focusing on publications from 2012 to 2022. The research leverages the Scopus database and visualization tools to map the evolution of academic interest and highlight key contributors, themes, and trends.

To guide this analysis, the following research questions were formulated:

RQ1: What is the annual distribution of publications on sports management and digital technology from 2012 to 2022?

RQ2: Which journals and authors are the most influential in the field?

RQ3: What are the most productive countries and institutions contributing to this research domain?

RQ4: What are the most frequently occurring keywords in studies on sports management and digital technology?

Through this investigation, the study seeks to provide insights into the development of digital transformation within sports management and identify emerging research directions.

Related Work

In recent years, digital technology has undergone rapid development, significantly shortening the life cycles of products and services (Ratten, 2008). According to Cantisani (2006), technological innovation involves the structured application of scientific methods to create new techniques, tools, or processes that improve or transform human activities. These innovations not only arise within the sports industry but are often adapted from advancements in other fields (Cantisani, 2006).

The role of social networks in spreading technological practices is also critical. People tend to learn about new technologies through communities and affiliations such as sports teams or fan groups, which serve as platforms for knowledge exchange and technology adoption (LaRose & Eastin, 2004). As Rogers (2003) defines, technology serves as "a design for instrumental action that reduces uncertainty in the cause-effect relationships involved in achieving a desired outcome," highlighting its centrality in sports. Over time, its role has evolved from a basic support tool to a strategic enabler of performance enhancement (Balmer et al., 2012; Foster et al., 2012; Stefani, 2012), safety (Beiderbeck et al., 2020; Schlegel &

Hill, 2020), and officiating (Tamir & Bar-Eli, 2021; Collins & Evans, 2012; Winand & Fergusson, 2018).

The relationship between digital technology and sports management is dynamic and reciprocal. Sports management not only adapts to technological advancements but also influences their direction by presenting new challenges and needs. Sports managers are increasingly expected to navigate complex environments that require strategic use of technology to optimize both performance and operational efficiency (López-Carril et al., 2019; Mestre, 2013).

As the sports sector becomes more professionalized, there is a growing need for specialists in areas such as legal affairs, marketing, finance, and digital tools, including data analytics (Méndez, 2014; González-Naveros et al., 2020). Higher education institutions must align their curricula with these evolving industry demands (Cancela et al., 2010; López-Carril et al., 2019).

In the context of sports education, digital devices have proven to enhance student engagement and learning outcomes by stimulating sensory interaction and supporting independent learning (An, 2018; Leight et al., 2009; Wattelez et al., 2019). Studies show that incorporating technology into physical activity programs—such as interactive applications or activity trackers—can effectively increase student motivation and physical engagement (Galy et al., 2019; Brannon & Cushing, 2015; Depper & Howe, 2017).

Moreover, digital tools like the Coach's Eye app enable users to record, analyze, and share athletic performance, promoting collaborative learning and skill refinement (Mossier, 2014). These technologies

not only enhance educational strategies but also contribute to long-term sports development.

Despite its growing importance, scholarly research on digital technology in sports remains limited (Ratten, 2017, 2018). There is a clear need for systematic reviews that organize the fragmented literature across various subdomains of sports technology.

In conclusion, a precise and scalable method—such as machine learning-assisted bibliometric analysis—is essential for mapping the intellectual structure of this evolving field. The increasing volume of research on digital technology and sports management reflects a fertile ground for future inquiry, guiding scholars in identifying key trends and areas of impact.

Materials and Methods

In order to fill a gap in the literature, this study was structured using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework by Moher et al. (2015). This framework guided the extraction of relevant documents under the theme “Understanding the Relationship Between Sports Management and Digital Technology.” The objective of this review was to provide an overview of research conducted over the last ten years on how sports management and digital technology intersect.

To structure this investigation, the following research questions were proposed:

RQ1: What is the annual distribution of publications on sports management and digital technology from 2012 to 2022?

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RQ4: What are the most frequently occurring keywords in studies on sports management and digital technology?

This study combined bibliometric and visualization techniques to achieve its objectives. Bibliometric analysis focused on tracking works on the topic and disseminating findings by examining numerous publication features (Martí-Parreño et al., 2016). The analysis included only English-language, open-access journal articles indexed in the Scopus database; conference proceedings and non-journal sources were excluded.

Using the “Topic” search option, keywords were searched within the title, abstract, and keyword fields on August 20, 2023. The search terms included “sports management” and “digital technology.” Publications were manually screened using the inclusion and exclusion criteria presented in Table 1, ensuring the relevance to the research topic. A total of 852 publications were selected for final analysis. Figure 1 presents the PRISMA framework guiding this selection.

To further explore the structure of the research field, the VOSviewer software was used for bibliometric mapping. The analyses included:

- Co-authorship Analysis – to reveal collaboration patterns among authors and institutions.
- Keyword Co-occurrence Analysis – to explore the conceptual framework of the field through frequently appearing keywords.
- Citation Analysis – to evaluate the impact and scholarly influence of journals and individual publications.

These analyses provided a comprehensive understanding of the research landscape, with visualizations showing the clusters and relationships among key themes and actors.

Figure 1. Analytical research framework

Diagram of the PRISMA 2020 process for new systematic reviews that merely involved searching databases and registries.

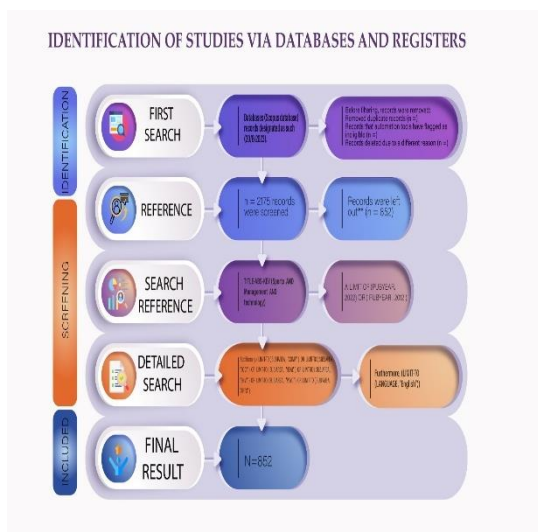


Table 1.

Criteria for Inclusion and Exclusion

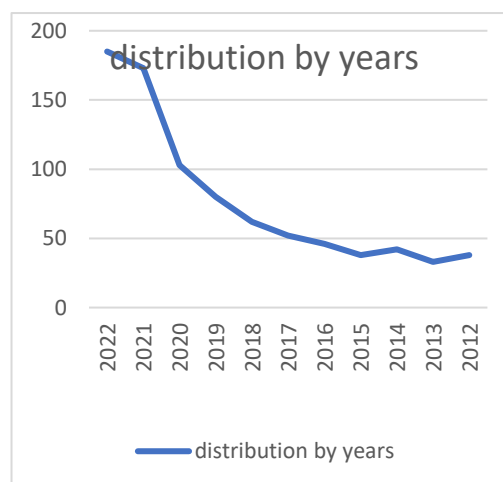
Inclusion criteria	Sports and technology
	Sports management and digital technology
	Publications between 2012 and 2022. The research was conducted in the English language. Subject areas (Sports, Sports Management, Digital Technology, Social Sciences, Psychology, Environmental Science, Arts and Humanities, Health Sciences, Computer Science).
Exclusion criteria	Exclusion of all other languages.
	Not being a part of physiology, training, or kinesiology.
	Not paying attention to student involvement or online learning.

Study Findings

The first aspect analyzed in the context of content analysis is the publication timeline of articles related to sports management and digital technology over the past decade. It was observed that the majority of the articles had been published within the last few years. Specifically, 185 publications were recorded in 2022, 173 in 2021, and 103 in 2020, with the remaining distributed over earlier years, as illustrated in Figure 2.

Figure 2.

Distribution by Years



(RQ2) What are the most relevant journals and authors in sports management and digital technology?

To identify the leading journals and authors in the research domain, the analysis considered several bibliometric indicators, as presented in Table 2 and Table 3.

The analysis parameters used in determining the most cited journals were “Total Publication”, “Total Citation”, “Cite Score of the Journal”, “The Most Cited Article”, “Times Cited”, and Publisher!, as shown in Table 2.

Table 2.

Most Prolific Journals

N	Journal	TP	TC	Cite Score (2022)
1	Lecture Notes in Computer Science	79,131	174,042	2.2
	Most cited publication (Albuquerque et al., 2022)	Times cited 93	Publisher Springer Nature	
2	Sustainability	48,515	281,274	5.8
	Most cited publication (Holeczek et al., 2022)	Times cited 101	Publisher Multidisciplinary Digital Publishing Institute (MDPI)	
3	ACM International Conference Proceeding Series	45,524	49,408	1.1
	Most cited publication (Finnie et al., 2022)	Times cited 38	Publisher Conference Proceeding	
4	International Journal of Environmental Research and Public Health	44,775	241,049	5.4
	Most cited publication (Liu et al., 2014)	Times cited 113	Publisher Multidisciplinary Digital Publishing Institute (MDPI)	
5	Advances in Intelligent Systems and Computing	29,624	26,852	0.9
	Most cited publication (Gangwar et al., 2021)	Times cited 81	Publisher Springer Nature	
6	Lecture Notes on Data Engineering and Communications Technologies	7,664	5,436	0.7
	Most cited publication (William et al., 2022)	Times cited 31	Publisher Springer Nature	

N	Journal	TP	TC	Cite Score (2022)
7	Wireless Communications and Mobile Computing	4,310	9,730	2.3
	Most cited publication (Wu, Di, et al., 2022)	Times cited 52	Publisher Hindawi	
8	Mobile Information Systems	2,595	3,541	1.4
	Most cited publication (Suman et al., 2022)	Times cited 30	Publisher Hindawi	
9	Journal of Physical Education and Sport	1,762	4,307	2.4
	Most cited publication (Popovych et al., 2022)	Times cited 27	Publisher Editura Universitatea din Pitesti	
10	Computational Intelligence and Neuroscience	1,113	4,319	3.9
	Most cited publication (Mishra et al., 2022)	Times cited 53	Publisher Hindawi	

TP= Total Publications, TC= Total Citation, TP**= Total publications in the area of digital technology and sports management.

Table 2 shows that “Lecture Notes in Computer Science” was the most productive journal in the field of sports management and digital technology, with 79,131 total publications and 174,042 total citations. Sustainability came in second with 48,515 total publications and 281,274 total citations, and the journal *ACM International Conference Proceeding Series* with 45,524, total publications, and 49,408 total citations. Additionally, Table 2 displays the distribution of the most productive publications concerning sports management and digital technology.

RQ2 also looked into the most well-known writers in the fields of sports management and technological research. In the content analysis made for the prolific authors in sports management and digital technology research area, “Author”, “Total Publications”, “h – index”, “Total Citations”, “Current Affiliation”, and “Country” were selected as the criteria for analysis, as indicated in Table 3.

Figure 3.

Most Prolific Journals

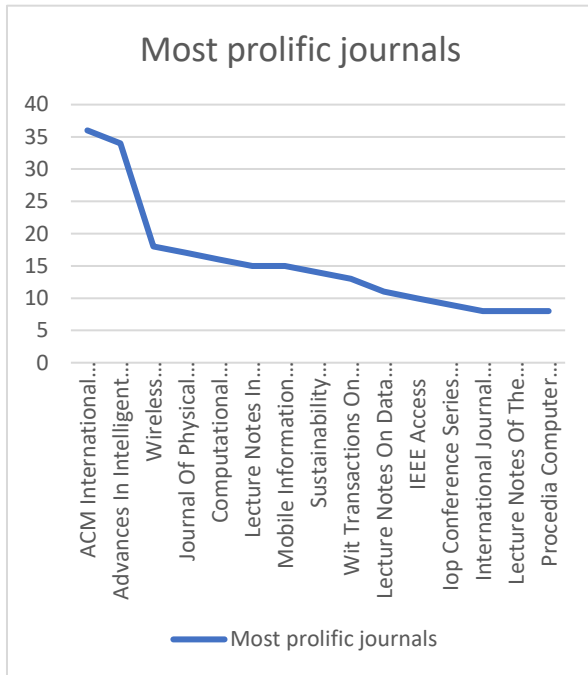


Table 3.

List of the 15 Most Prolific Authors in Sports Management and Digital Technology

N	Author	T P	h-index	Current affiliation	Country
1	Bendiksen, Fredrik	3	5	The Norwegian Olympic Training Centre (Olympiatoppen), Oslo, Norway	Norway
2	Budgett, Richard Gm	3	32	International Olympic Committee, Lausanne, Switzerland	Switzerland
3	Borjesson, Mats Å.	3	53	Göteborgs Universitet, Gothenburg, Sweden	Sweden
4	Derman, Wayne Elton	3	37	Stellenbosch University, Stellenbosch, South Africa	South Africa
5	Engebretsen, Lars	3	109	Universitetet i Oslo, Oslo, Norway	Norway
6	Erdener, Uğur Ur	3	13	International Olympic Committee, Lausanne, Switzerland	Switzerland

N	Author	T P	h-index	Current affiliation	Country
7	Ioannidis, John P.A.	3	184	Stanford University School of Medicine, Stanford, United States	United States
8	Miran-Khan, Karim M.	3	85	The University of British Columbia, Vancouver, Canada	Canada
9	Klügl, Martin	3	8	Deutsches Herzzentrum München, Munich, Germany	Germany
10	Ljungqvist, Arne	3	22	Anti-Doping Foundation, Stockholm, Sweden	Sweden
11	Lu, Changchun	3	1	Leshan Normal University Physical Culture Institute, Leshan, China	China
12	Martinez, Rodrigo	3	3	Stanford University School of Medicine, Stanford, United States	United States
13	Matheson, Gordon	3	39	Stanford University School of Medicine, Stanford, United States	United States
14	Mountjoy, Margo Lynn	3	42	McMaster University, Hamilton, Canada	Canada

(RQ3) What are the most productive countries and academic institutions in sports management and digital technology?

Table 4

The 15 Most Productive Countries and Academic Institutions

N	Most productive academic institution	Country	TP
1	Alma Mater Studiorum Università di Bologna	Italy	8
2	Wuhan Sports University	China	6
3	Aspetar Orthopaedic and Sports Medicine Hospital	Qatar	6
4	Wuhan Business University	China	6
5	University of Cape Town	South Africa	5
6	Norges idrettshøgskole	Norway	5
7	East China Jiaotong University	China	5

N	Most productive academic institution	Country	TP
8	Hebei University	China	5
9	University of Georgia	United States	5
10	Kyung Hee University	South Korea	4
11	Amsterdam UMC – Vrije Universiteit Amsterdam	Netherlands	4
12	Universiteit van Amsterdam	Netherlands	4
13	Harvard Medical School	United States	4
14	Jiangnan University	China	4
15	Bohai University	China	4

TP= Total Publications

Figure 4.

Most Prolific Universities in the Research Area

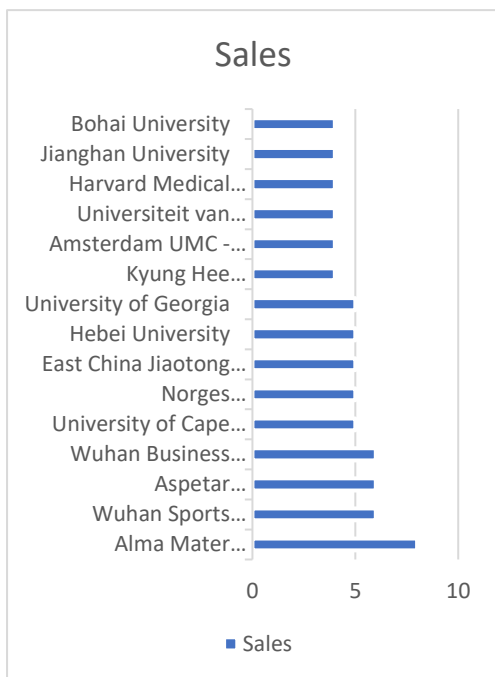
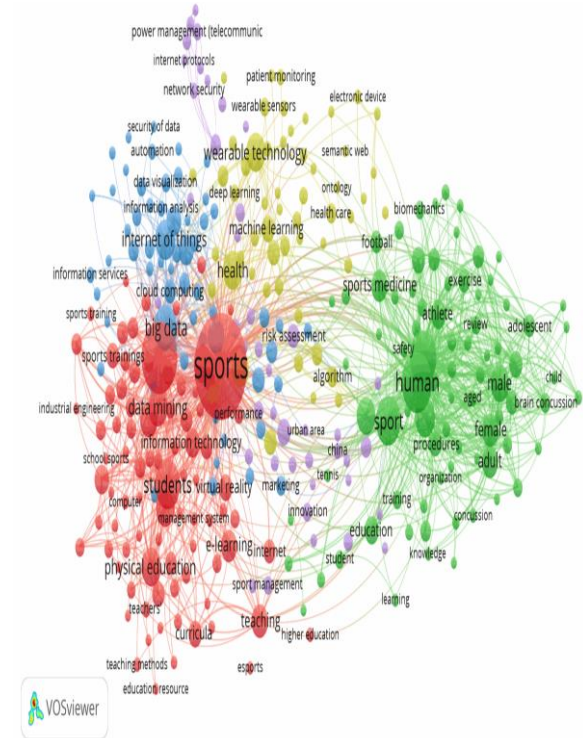


Figure 4 shows the most productive countries and academic institutions. The most productive academic institution was Alma Mater Studiorum Università di Bologna, Italy with a total of 8 publications, followed by China, Wuhan Sports University with 6 publications, in addition to Qatar, Aspetar Orthopaedic and Sports Medicine Hospital with 22 publications, Moreover, the distribution of the most productive countries and academic institutions thus, in relation to sports management and digital technology, are presented accordingly in Table 4.

(RQ4) What are the major research keywords concerning sports management and digital technology?

Figure 5.

Analysis Results of Co-occurrences Between all Keywords



When Figure 5 and Table 5 were examined, the keywords used in the studies were listed as “Sports” (Co-occurrences “Oc” = 335), “Human” (Oc - 111), “Information management” (Oc - 158), “Students” (Oc - 74), “Article” (Oc = 50) and “Males” (Oc - 43). These were followed by “Females”, “Health”, “Engineering Education”, “Physical Education”, “Technology”, and “Athlete”.

Table 5.

Analysis Results of Co-occurrences Between Keywords

Keywords	Co-occurrences
Sports	335
Human	111
Information management	158
Students	74
Article	50
Males	43
Females	35
Health	47
Engineering education	43
Physical education	48
Technology	43
Athlete	27

Discussion

Based on the 852 research articles that were extracted from the Scopus database, this study review provides an overview of the relationship between sports management and digital technology. Sports management and digital technology has seen a growth in publications, which shows how important this area has become. For instance, 185 papers were published in total in 2022. This analysis of research review trends shows that sports management and digital technology research is becoming a more popular field of study. A review of the published sources reveals that multidisciplinary disciplines that concentrate on how different sports interact with one another are the most helpful to sports management and digital technology (see Figure 3). Additionally, this analysis revealed that *Lecture Notes in Computer Science* was the most prolific journal in the area of sports management and digital technology, while the papers that were most often mentioned (93 times) were by Albuquerque et al. (2022). This demonstrates the trend among studies that links sports management with digital technology. Italy made a major contribution to the literature under analysis, with the Alma Mater Studiorum Università di Bologna being the most productive educational institution, with a total of eight publications. Wuhan Business University in China came in second with six articles. Furthermore, scientific research on collaboration indicates that areas and nations with greater interest in international cooperation – such as South Africa, Norway, United States, and South Korea – are likely to develop more quickly. The principal research keywords pertaining to the connection between sports management and digital technology are listed last. The most pertinent area for research on sports management has been highlighted by this study. These topics are (1) sports management, (2) digital technology.

These findings align with prior literature emphasizing the role of digital transformation in reshaping sports organizations (Ratten, 2017; Ferreira et al., 2020). The increased output in recent years, especially post-2020, also reflects the impact of global events such as the COVID-19 pandemic, which accelerated digital adoption across many sectors, including sports (Kim, 2020; Modgil et al., 2022).

Moreover, the prominence of journals such as *Lecture Notes in Computer Science* and *Sustainability* indicates a growing interdisciplinary convergence where computer science,

environmental studies, and sports management intersect. This trend mirrors what Trischler & Li-Ying (2023) highlighted about the need for digital business models in times of disruption.

The findings regarding authorship and institutional productivity also suggest that regions with strong academic infrastructures and international collaboration frameworks are leading this research field. These patterns are consistent with Volberda et al. (2021) who emphasized the strategic importance of digital competencies in institutional innovation.

Future research could delve deeper into the qualitative impact of digital tools in sports, such as performance analytics, fan engagement technologies, and ethical challenges. This would enrich our understanding beyond publication patterns and help shape more effective sports management practices in the digital age.

Conclusion

This study provided a comprehensive bibliometric analysis of the intersection between sports management and digital technology over the past decade. By utilizing the Scopus database and applying visualization tools such as Vosviewer, a detailed overview of publication trends, prolific journals, leading authors, and key thematic areas was presented.

The results highlighted a significant increase in research output in recent years, indicating growing academic interest in the digital transformation of the sports industry. It was found that journals like *Lecture Notes in Computer Science* and *Sustainability* played a central role in disseminating knowledge in this domain, while institutions such as the Alma Mater Studiorum Università di Bologna and Wuhan Sports University emerged as key contributors.

Moreover, the findings underscored the importance of interdisciplinary collaboration and the centrality of topics such as digital tools, performance analysis, and technological integration within sports management research. Despite the progress observed, gaps remain in geographic diversity and in-depth case-based studies, which opens pathways for future exploration.

In conclusion, this study contributes to a better understanding of the scholarly landscape surrounding sports management and digital technology and lays a foundation for informed

academic inquiry and strategic development in the field.

Limitations of the Study

Despite the comprehensive nature of this bibliometric review, several limitations must be acknowledged. First, the analysis was based solely on data retrieved from the Scopus database. Consequently, relevant publications indexed in other major databases such as the Web of Science (WoS) may have been excluded, which could limit the breadth of coverage.

Second, the search was limited to two specific keywords: “digital technology” and “sports management.” This keyword selection, while focused, may have restricted the inclusion of studies that used alternative terminologies to describe similar concepts. Expanding the keyword range in future research may yield broader insights.

Lastly, while this study focused on quantitative bibliometric indicators, it did not delve into the qualitative aspects of research content. Further studies incorporating content analysis or case studies are recommended to enhance contextual understanding. Moreover, incorporating variables such as sports marketing may provide a more comprehensive view of the interplay between digital technologies and sports management.

Recommendations

In light of the findings of this bibliometric review, several recommendations are proposed to guide future research and practical applications in the domain of sports management and digital technology:

- Interdisciplinary collaboration is encouraged among researchers in sports science, information systems, and digital innovation to foster integrated approaches that address the multifaceted challenges in the digitalization of sports.

- Emerging technologies such as artificial intelligence, blockchain, and virtual reality should be further investigated to assess their implications on operational efficiency, athlete performance, and fan engagement.

- Broader geographic inclusion is recommended to diversify perspectives, particularly by encouraging research contributions from underrepresented regions such as Africa and Latin America.

- Case-based research approaches are needed to explore real-world implementations of digital tools in sports contexts, with emphasis on practical challenges, success factors, and policy implications.

- Standardization of bibliometric indicators is advised to ensure comparability across studies and enhance the reliability of citation-based evaluations within the field.

- Ethical dimensions of digital transformation in sports—such as privacy concerns, data security, and technological accessibility—should be systematically addressed in future investigations.

These recommendations are expected to contribute to the advancement of scholarly inquiry and professional practices within the rapidly evolving landscape of digital sports management.

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