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The Knowledge Structures of Sustainability in Sport Management - A Bibliometric Analysis of 28 Years

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ABSTRACT

Purpose: This study explores how the knowledge framework of sustainability in sports management might promote safer driving behaviours. How event planners can utilise this data to offer personalised incentives to drivers based on their actual driving behaviours, thus enhancing environmental safety and empowering the driving populace.

Research Methods: The authors conducted a comprehensive bibliometric analysis to assess the scholarly literature on this topic during the last 28 years. The review examined conference papers, journal articles, and relevant publications to map out the existing knowledge in the field.

Results & Findings: The investigation uncovered key research studies, notable authors, relevant publication venues, and countries engaged in collaborative research across several sectors. The findings offer a deep understanding of the intellectual and conceptual foundations that underpin this field, giving valuable insights into its evolution and current state. By critically analysing recent noteworthy works, doing thematic mapping, and cluster analysis, we discovered important research clusters, issues, emerging gaps, and areas for additional exploration.

Implications: In order to enhance the sustainability practices, sports organisations can improve their sustainability practices by implementing a variety of well-informed, research-driven initiatives by utilising the findings of a bibliometric study. The implementation of solutions that reproduce proven case studies, such as the incorporation of renewable energy sources in buildings, displays a dedication to the preservation of resources, as indicated by the literature on the topic.

Keywords: *Sustainable Sports Marketing, Sports Management, Sustainable Sports Management, Bibliometric Analysis.*

1. INTRODUCTION

What is the current knowledge regarding the intersection of sports and sustainability? A search conducted on Google using the phrases "sport and sustainability" yielded approximately 230 million results. Using the exact keywords to search on Google Scholar yielded approximately 560,000 results. Both findings suggest that a significant amount of attention is being given to this topic, indicating its importance. When searching for each keyword, authors found that "sport" yielded approximately 10.5 billion Google results, while "sustainability" yielded 0.8 billion. The widespread enthusiasm for sports suggests that it holds significant potential to influence the public's perceptions and reactions towards the need for greater sustainability. The existence of this potential is a significant factor that justifies conducting a comprehensive investigation of the relationship between sports and sustainability.

The correlation between sports and sustainability is intricate, as sporting activities can greatly disrupt natural systems. Sports facility development and upkeep frequently cause alterations in land use, which can contribute to the destruction and fragmentation of habitats. This phenomenon modifies the environmental circumstances for numerous species, resulting in possible reductions in biodiversity (Brooks, 2006), affecting wildlife (Gossling, 2002), native flora, and fauna (Mack et al., 2000). In addition, the tangible impact of engaging in outdoor sports, such as the formation of trails caused by hiking or bicycling, leads to soil erosion and harm to vegetation (Buckley, 2004), as does the consumption of resources during sports events (Collins, 2007; Collins et al., 2009.

Sustainability:

Sustainability is a widely discussed concept in the realms of business, ecology, and social development. It emphasises the importance of meeting present demands while ensuring that future generations can also realise their requirements without any compromise. The concept, derived from the 1987 study "Our Common Future" by the Brundtland Commission, promotes development that achieves a balance between current needs and the ability of future generations to meet their own needs. This approach supports the preservation of the environment, economic stability, and social fairness. The study established the foundation for contemporary comprehension of sustainability, emphasising the interdependence of economic advancement, environmental conservation, and social fairness (Souza Barbosa et al., 2023; Brundtland, 1987; Roseland, 2000).

Sustainability in the environmental realm is the meticulous stewardship of resources and the safeguarding of natural ecosystems. In their publication "Ecology and Society," Rockstrom et al. (2009) proposed the notion of planetary boundaries, which define the environmental thresholds that mankind safely operates within. From an economic perspective, sustainability refers to the adoption of techniques that promote long-term growth while avoiding any adverse effects on social, environmental, and cultural factors. In their publication "Mismeasuring Our Lives: Why GDP Doesn't Add Up," Fitoussi et al. (2011) offered a critical analysis of conventional economic measures such as GDP. They argued in favour of utilising metrics that take into account environmental and social issues when evaluating economic success. Social sustainability aims to uphold and enhance social welfare, with a particular focus on inclusivity, fairness, and righteousness.

In "The Age of Sustainable Development," Sachs (2015) highlights the significance of tackling poverty and inequality and guaranteeing a high standard of living for everyone as fundamental elements of sustainability. The academic subject further elaborates on the notion of sustainability through the implementation of the United Nations' Sustainable Development Goals (SDGs), which were created in 2015. These goals offer a comprehensive structure for tackling several global concerns pertaining to poverty, inequality, climate change, environmental degradation, peace, and justice. The Sustainable Development Goals (SDGs) emphasise the necessity of a cooperative strategy towards sustainability that encompasses the participation of governments, corporations, and civil society.

Sustainability in sports management:

Sustainability in sports management is critical due to its multifaceted impact on environmental, social, and economic aspects (Lindsey, 2008). From an environmental perspective, sports events and facilities are known to have significant impacts (Ghasemi et al., 2020), such as resource consumption, waste production, and greenhouse gas emissions. Recognising this, academic research (McCullough & Kellison, 2017; McCullough et al., 2016) on environmental sustainability in sport emphasises the urgent need for sustainable practices to mitigate these environmental impacts. They argue that the sports industry must adopt strategies that reduce ecological footprints while promoting conservation and sustainability.

Moreover, sports organisations are increasingly seen as socially responsible entities with a powerful influence on communities and broader societal values. This position entails adopting and modelling sustainable practices (Filizoz & Fişne, 2011). Babiak and Wolfe (2013), in "Perspectives on Social Responsibility in Sport," highlight the role of sports in fostering community engagement and public awareness about environmental issues. They argue for a model of sports management that integrates social responsibility and ethical considerations into its core operations, thus ensuring sustainability.

Economically, sustainability in sports management is also significant (Downward et al., 2009). Adopting green initiatives can lead to cost savings in the long run through more efficient use of resources. Moreover, there is a growing consumer demand for eco-friendly and socially responsible practices, which can influence fan loyalty and engagement and open up new sponsorship and partnership opportunities. In the book "Economics, Sports, and the Environment: Incentives and Intersections" (Sanderson et al., 2017), the author discusses the economic implications of environmental initiatives in sports, including their impact on revenue and brand value. Thus, sustainability in sports management is both a moral imperative (Babiak & Wolfe, 2013) and a strategic one. It encompasses a commitment to the environment, a responsibility towards the community, and an opportunity for economic innovation and growth, making it an indispensable aspect of contemporary sports management.

In light of the ongoing expansion of research in this field, it is imperative to perform a bibliometric review in order to gain a comprehensive understanding of the current body of knowledge structure, identify recurring themes and trends in the literature, and suggest potential directions for future research. This can be achieved through an examination of scholarly publications sourced from academic journals, conferences, and other online platforms (Anugerah et al., 2022). Bibliometrics, which maps the research landscape of a particular field through the quantitative analysis of publications, citations, and collaborations, is a method that offers a structured framework (Donthu et al., 2021; Ellegaard & Wallin, 2015). The author’s intention is to offer an impartial evaluation of the current state of knowledge in sustainability in sports management by employing an objective and data-driven methodology.

Based on the above understanding, the authors are motivated to explore the knowledge structure of sustainability in sports management using bibliometric analysis. Furthermore, the authors have analysed the knowledge framework of sustainability in sport management from two different viewpoints: conceptual and intellectual (Donthu et al., 2021). Furthermore, it has the capability to analyse the effects and contributions of many research elements, such as authors, documents, institutions, and countries, on a research topic. This addresses the shortcomings of narrative reviews (Aria & Cuccurullo, 2017; De Bellis, 2009; Donthu et al., 2021). Conducting a bibliometric trend study will assist in identifying and recommending future research directions in the selected subject area.

The study attempts to answer the following research questions:

RQ 1: What are the scholarly contributions, trends, and documented descriptive statistics on sustainability in sports management over the last 28 years?

RQ 2: What are the influential and highly productive components (countries and regions, authors, studies, publications, citations, and cooccurrence) of sustainability in sports management research?

RQ 3: What are the conceptual and intellectual structures that will lead to future areas of research (sports management over the last 28 years)?

RO4: How sustainability in sports management will affect organisations and policymakers.

2. METHODOLOGY FOR BIBLIOMETRICS:

Bibliometrics is a field within the domain of library and information sciences that employs quantitative methodologies to examine bibliographic materials (Broadus, 1987; Pritchard, 1969). Bibliometrics is a commonly employed method for synthesising the most significant outcomes of a collection of bibliographic documents. Within the existing body of literature, a diverse array of bibliometric studies can be found across various disciplines, such as management (Podsakoff et al., 2005), economics (Bonilla et al., 2015), innovation (Fagerberg et al., 2012), and entrepreneurship (Landstrom et al., 2012).

The present study employs bibliometric indicators (Garfield, 1955) to depict the bibliographic information, encompassing the overall count of publications and citations (Long et al., 2014). Typically, the quantity of publications used to measure productivity and the number of citations used to measure influence (Svensson, 2010). Additional metrics that integrate both publications and citations, including citations per paper, are the h-index (Alonso et al., 2009). It is important to note that the h-index is a metric that quantifies the number of scholarly documents that have received at least a certain number of citations. Specifically, it represents the highest number, denoted as X, such that there are X documents with X or more citations, while there are no more than X+1 documents with X+1 or more citations.

Furthermore, the research also considers various citation thresholds to determine the quantity of documents that meet a particular threshold (Merigo et al., 2015). In certain circumstances, the study provides additional measures of a particular variable, such as the number of publications and citations per individual for the country analysis and the overall university rankings for the analysis of universities.

The analysis employs the Scopus database, which was verified with data available on Scopus for data retrieval and examination. This study aims to provide an overview of the current state of the research area in light of its 28 years. It is essential for the reader to note that theoretical-based analyses typically involve a critical literature review approach, which is not commonly used in bibliometric-based studies. Although a hybrid approach could have been employed, we have primarily focused on utilising bibliometric methods.

3. RESULTS:

Descriptive Statistics:

Table 1 presents the pertinent data from 580 publications as of January 15, 2024. The study analysis comprised articles published from 1996 to 2024, retrieved from the Scopus database. The articles were published in a total of 367 sources and had a combined number of 1673 authors. The researchers employed a total of 1912 keywords to classify their investigations. Figure 1 illustrates the distribution of the articles for the study period (1996–2024).

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1996:2024
Sources (Journals, Books, etc)	367
Documents	580
Annual Growth Rate %	3.07
Document Average Age	6.48
Average citations per doc	15.32
References	27926
DOCUMENT CONTENTS	
Keywords Plus (ID)	2531
Author's Keywords (DE)	1912
AUTHORS	
Authors	1673
Authors of single-authored docs	82
AUTHORS COLLABORATION	
Single-authored docs	85
Co-Authors per Doc	3.22
International co-authorships %	21.72

Table 1, Descriptive analysis from 1996-2024

The observation of a significant number of articles published in the research area has been documented throughout the past 28 years. Firstly, let us undertake an analysis of the annual progression of the number of published works. The findings are depicted in Figure 1. During its initial phase of 12 years (1996–2008), the trend exhibited an annual publication of a single-digit number of articles. Since the year 2009, there has been a significant rise in this statistic. However, the current statistics of publications year-wise have witnessed a decline. It is crucial to recognise that, when considering the larger context, this result is not in line with the number of publications happening across the world because of the substantial rise in the global population of researchers and scientists (Merigo et al., 2015).

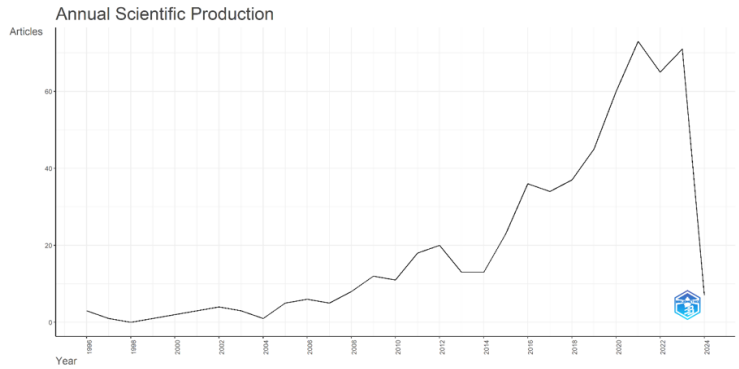

Figure 1: Annual Scientific production in Research area from year 1996-2024

Prolific authors, institutions, and countries:

This section offers a comprehensive introduction to prominent authors, institutions, and countries. The aim is to examine individuals achieving higher success levels in terms of publications and citations. There were 1673 authors in all, with an average of 15.32 per article, 1.96 writers per document, and an average of 3.22 co-authors in each paper.

Element	h_index	TC	NP	PY_start
MALLEN C	7	280	9	2010
TRENDAFILOVA S	5	759	8	2011
ALGUACIL M	4	31	4	2020
CHARD C	4	109	4	2011
MCCULLOUGH BP	4	154	8	2015
SCHULENKORF N	4	208	4	2010
BURGIN S	3	30	3	2010
COOKE SJ	3	753	3	2005
DADDI T	3	29	3	2021
DIMITROPOULOS P	3	24	3	2017

Table 2: The 10 Productive authors (Sorted by h_index)

To identify the prolific authors, Lotka's Law is used. Lotka's Law, proposed by Lokta in 1926, examines the productivity of authors on a specific topic. Lotka's Law states that the ratio between the number of core authors who produce a certain number of articles and the number of occasional authors who publish only one article is constant (Lokta, 1926). Additionally, it confirms the inverse correlation between the overall quantity of published articles and the quantity of core writers (Lokta, 1926). Table 2 displays the ten most prolific authors who have demonstrated the highest level of productivity. It should be noted that the ranking is based on the h-index. Furthermore, in the event of a draw in the number of publications, the ranking takes into account the number of citations. As per Table 2, Mallen C. and S. Trendafilova are the two most productive authors, with Mallen having a slightly higher h-index but Trendafilova having a significantly higher overall citation count. Mallen's elevated h-index indicates a broader reach of impact across multiple publications, whereas Trendafilova's increased citation count may reflect the presence of a few exceptionally significant pieces. All of the other writers mentioned (M. Alguacil, C. Chard, B.P. McCullough, and N. Schulenkorf) have an h-index of 4, indicating a comparable level of influence in their respective areas of expertise. Nevertheless, the cumulative citation counts of McCullough and Schulenkorf exhibit significant disparity, with larger counts suggesting that their work has received greater recognition within the academic world.

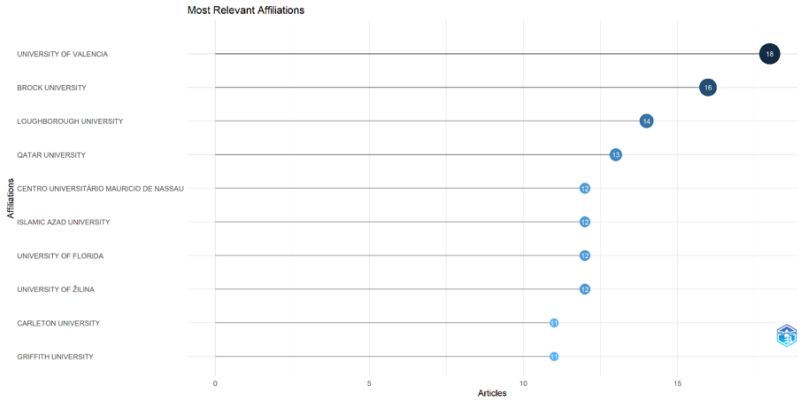

Figure 2: Most productive Institutes/ Universities

This section analyses the most productive institutions. The University of Valencia demonstrates the highest level of productivity among institutions in the research area; the University of Valencia is situated in Spain. However, when we look at Table 3, which shows the most cited country, Spain is ranked 5, and the USA tops the list. Furthermore, it is important to consider that Brock University, which is at rank two as per Figure 2, has attracted significant citations and positions its country (Canada) at rank 2 in Table 3.

Country	TC	Average Article Citations
USA	2175	29.40
CANADA	1161	50.50
AUSTRALIA	681	25.20
UNITED KINGDOM	517	18.50
SPAIN	378	8.80
GERMANY	339	17.00
ITALY	217	9.90
MALAYSIA	199	33.20
THAILAND	130	32.50
POLAND	114	12.70

Table 3: The 10 Most cited countries (Sorted by TC) Notes: TC = total citations

Notes: TC = total citations; NP= number of publications; HI= h-index; PY_start = Year of first publication

Citations:

The 580 documents collectively yielded 15.32 citations per document. The mean annual citation rate per article was 2.13. Figure 3 illustrates variations in the mean annual citation count. The presence of peaks and troughs indicates fluctuations in the impact or number

of publications throughout the years. The graph exhibits significant fluctuations, potentially attributed to multiple sources, including shifts in research emphasis, the emergence of new fields or disciplines, or alterations in citation tracking and recording methods. Figure 3 displays the average number of article citations annually. The average annual citation count reached its highest point in 2002, suggesting the presence of one or more publications that received a significant number of citations in that year. But the average citation per year has gone down.

Table 4 shows the most productive journals. Sustainability (Switzerland) has gained prominence while being relatively new, having been published since the year 2013. The h-index of this entity is 16, indicating a significant level of impact. It has accumulated a total of 646 citations across 64 articles. These findings indicate that the journal rapidly gained recognition as a leading source in its area of expertise, with an average of roughly ten citations per paper, demonstrating strong involvement from the academic community. With an h-index of 15, the journal "Sport Management Review" has been around since 2006 and has had a significant impact. The 20 papers have garnered a total of 1292 citations, indicating a remarkably high average citation rate per publication. This number of citations demonstrates the journal's crucial influence in shaping discussions in the field of sustainability in sports management.

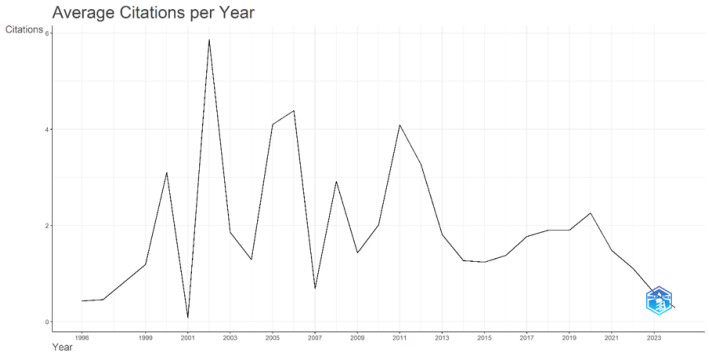

Figure 3: Average citation per year from 1996-2024

Other journals listed cover a range of topics, including sustainability, sport management, and environmental health. The h_index and total citations show that the data reflects a significant variation in their academic impact. With publication years starting from 1996 to 2019, some journals have established a strong citation presence in a relatively short time, indicating that their contributions are both current and influential. The h_index across these journals varies from 16 to 3, which could reflect the maturity of the journal, the frequency of publication, the size of the research community engaging with the content, or the journal's scope within its field. Journals with a higher h_index and total citation count, such as "Sustainability (Switzerland)" and "Sport Management Review," are indicative of significant research impact and a robust scholarly dialogue.

The total citation counts suggest that some journals have a wide-reaching influence, potentially because they are publishing high-impact research or because they serve a broad research community. Conversely, journals with lower citation counts might focus on niche areas or emerging fields.

Element	h_index	TC	NP	PY_start
SUSTAINABILITY (SWITZERLAND)	16	646	64	2013
SPORT MANAGEMENT REVIEW	15	1292	20	2006
EUROPEAN SPORT MANAGEMENT QUARTERLY	6	207	8	2010
JOURNAL OF SPORT AND TOURISM	6	194	7	2008
JOURNAL OF SPORT MANAGEMENT	6	289	7	2011
MANAGING SPORT AND LEISURE	6	85	10	2017
FISHERIES RESEARCH	4	48	5	2000
INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH	4	59	5	2019
ECOLOGICAL APPLICATIONS	3	46	3	1996
FISH AND FISHERIES	3	323	3	2002

Table 4: The 10 Productive Journals (Sorted by h_index)

Notes: TC = total citations; NP= number of publications; HI= h-index; PY_start = Year of first publication

Furthermore, Table 5 displays the top 15 articles that have received the highest number of citations. Most of these articles were published in sports-related journals, such as Sport Management Review. The article titled "CSR and Environmental Responsibility: Motives and Pressures to Adopt Green Management Practices" (Babiak and Trendafilova, 2011) received the highest number of citations, with a total of 570. This is significantly higher than the average citation counts of 15.32.

	Articles	TC

1	Babiak, K., & Trendafilova, S. (2011). CSR and environmental responsibility: Motives and pressures to adopt green management practices. *Corporate social responsibility and environmental management*, *18*(1), 11-24.	570
2	Cooke, S. J., & Cowx, I. G. (2006). Contrasting recreational and commercial fishing: searching for common issues to promote unified conservation of fisheries resources and aquatic environments. *Biological conservation*, *128*(1), 93-108.	395
3	Cooke, S. J., & Suski, C. D. (2005). Do we need species-specific guidelines for catch-and-release recreational angling to effectively conserve diverse fishery resources?. *Biodiversity & Conservation*, *14*, 1195-1209.	349
4	Gibson, H. J., Kaplanidou, K., & Kang, S. J. (2012). Small-scale event sport tourism: A case study in sustainable tourism. *Sport management review*, *15*(2), 160-170.	274
5	Arlinghaus, R., Mehner, T., & Cowx, I. G. (2002). Reconciling traditional inland fisheries management and sustainability in industrialized countries, with emphasis on Europe. *Fish and fisheries*, *3*(4), 261-316.	262
6	Skinner, J., Zakus, D. H., & Cowell, J. (2008). Development through sport: Building social capital in disadvantaged communities. *Sport management review*, *11*(3), 253-275.	230
7	McPhee, D. P., Leadbitter, D., & Skilleter, G. A. (2002). Swallowing the bait: is recreational fishing in Australia ecologically sustainable?. *Pacific conservation biology*, *8*(1), 40-51.	228
8	Packer, C., Brink, H., Kissui, B. M., Maliti, H., Kushnir, H., & Caro, T. (2011). Effects of trophy hunting on lion and leopard populations in Tanzania. *Conservation Biology*, *25*(1), 142-153.	179
9	Dayton, P. K., Sala, E., Tegner, M. J., & Thrush, S. (2000). Marine reserves: parks, baselines, and fishery enhancement. *Bulletin of Marine Science*, *66*(3), 617-634.	137
10	Gholami, H., Rezaei, G., Saman, M. Z. M., Sharif, S., & Zakuan, N. (2016). State-of-the-art Green HRM System: Sustainability in the sports center in Malaysia using a multi-methods approach and opportunities for future research. *Journal of Cleaner Production*, *124*, 142-163.	129
11	Trendafilova, S., Babiak, K., & Heinze, K. (2013). Corporate social responsibility and environmental sustainability: Why professional sport is greening the playing field. Sport management review, 16(3), 298-313.	109
12	Martin, S. A., & Assenov, I. (2012). The genesis of a new body of sport tourism literature: A systematic review of surf tourism research (1997–2011). Journal of Sport & Tourism, 17(4), 257-287.	90
13	Daly-Smith, A., Quarmby, T., Archbold, V. S., Corrigan, N., Wilson, D., Resaland, G. K., ... & McKenna, J. (2020). Using a multi-stakeholder experience-based design process to co-develop the Creating Active Schools Framework. International Journal of Behavioral Nutrition and Physical Activity, 17, 1-12.	86
14	Casey, M. M., Payne, W. R., & Eime, R. M. (2012). Organisational readiness and capacity building strategies of sporting organisations to promote health. Sport management review, 15(1), 109-124.	85
15	Schulenkorf, N. (2010). The roles and responsibilities of a change agent in sport event development projects. Sport Management Review, 13(2), 118-128.	82

Table 5: The 15 most productive articles, Notes: TC = total citations

Conceptual structure: keywords, co-occurrence, and thematic evolution

The conceptual framework present in a collection of articles provides insight into the prevailing topics and changing patterns of a research field. By employing the method of keyword co-occurrence analysis with the aid of tools such as VOSviewer, authors condensed extensive scholarly discussions into visual representations that illustrate the interconnections between ideas and topics. The research uncovers a focused discussion centred on the concept of "sustainability." This term appears frequently and exhibits a significant connection to other ideas, indicating its pivotal position in current discourse.

A total of 1912 author's keywords and 2531 Keywords Plus by Scopus were discovered from a pool of 580 documents. Because Keywords Plus in Scopus has so many keywords and so many different meanings for each one, it is great for using bibliometric analysis to look at the make-up of scientific fields (Zhang et al., 2016). The phrase "sustainability" was the most commonly used term in the authors' keywords and Keywords Plus.

Figure 4: Keyword analysis, Source(s): Figure extracted from VOSviewer

Figure 4 displays a cloud showcasing the top keywords and Keywords Plus, highlighting the significant themes in sustainability research within sports management. The magnitude of the phrase is directly proportional to its frequency of occurrence in the collection. The word cloud studies reveals that the primary areas of inquiry have been sustainability and sustainable development and their influence on sports.

Further, as per Table 6, the frequent occurrence and strong connections of terms like "sport," "sustainable development," and "human" suggest that there is an academic emphasis on integrating sustainability with the human-centred features of sports. This exemplifies an interdisciplinary methodology that integrates environmental considerations with socio-cultural aspects in the field of sports. Conversely, keywords such as "decision making" and "environmental management," although less common, maintain substantial link strength, indicating their specialised yet crucial roles in generating research narratives. The discrepancy in frequency between the prominent usage of "sustainability" and the relatively seldom usage of phrases such as "fishery management" and "health promotion" does not undermine the significance of the latter. Alternatively, it proposes the development of distinct areas of focus that could eventually transform into core concepts as the discipline grows and broadens.

The clusters identified by VOSviewer offer a thematic breakdown, revealing separate groupings of keywords that represent various aspects of the area. For instance, these clusters can depict the managerial and consumer viewpoints on sustainability in sports. These clusters have the ability to change, combine, or separate over time, demonstrating the dynamic nature of study interests and the influence of societal and academic advancements on the focus of scholarly investigation. Figure 5 depicts four clusters identified and circles whose sizes correspond to the frequency of co-occurring terms in the chosen document. Circles that are tightly linked together create clusters of the same colour. Van Eck and Waltman (2010) and Donthu et al. (2021) both support these findings. Figure 5 demonstrates the grouping of often co-occurring terms into two primary groups using VOSViewer. The *green* cluster consists of terms that are lexically pertinent to sustainable practices in the field of sports management. These terms include sports management, tourism, ecology, sustainability, etc. To be more precise, the concepts contained in the green cluster mostly embody the managerial viewpoint of sustainability in sports management. In contrast, the second cluster (*red*) centres on aspects of humans, illustrating the extent to which sustainability initiatives in sports management impact them. The red cluster encompasses the influence of sustainability on humans and many other aspects, such as health promotion, policy, and lifestyle behavioural elements of consumers.

Similarly, cluster three (*blue*) puts emphasis on ecosystems, ecology, fishery management, and biodiversity, whereas cluster four (*yellow*) talks about sports, stadiums, climate change, conservation, etc.

Keyword	**Occurrences**	**Total link strength**	**Keyword**	**Occurrences**	**Total link strength**
Sustainability	209	781	Physical activity	20	196
Sport	96	579	Health promotion	18	181
Sustainable development	96	408	Organization and management	18	189
Human	56	550	Environmental protection	17	121
Sports	55	359	Environmental protection	17	121
Fishery management	26	105	Sport management	17	40
Environmental sustainability	25	110	Tourism	17	71
Decision making	22	102	Environmental impact	16	121
Environmental management	22	124	Climate change	15	85
Management	22	93	Sport fishing	15	64

Table 6: Top 20 frequently co-occurring keywords in sustainability in sports management

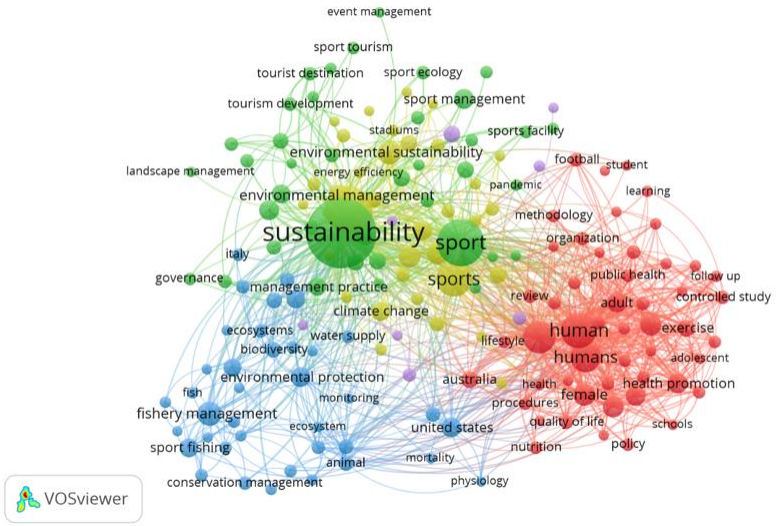

***Figure 5: Co-occurrence analysis,* Source(s): Figure extracted from VOSviewer**

Subsequently, an analysis was conducted to investigate the progression of themes, aiming to comprehend the inclination of some subjects to amalgamate or for a topic to be divided into multiple themes (Aria & Cuccurullo, 2017). The temporal progression of thematic development was established based on prior research conducted by Pan et al. (2022) and Wang et al. (2022). Using the publication count per year as a basis, we established two thresholds, resulting in the two cutting-edge years by Biblioshiny: 2015 and 2019. Upon analysing the distribution of publications across the years, it was seen that there were two notable surges in publications, occurring in 2015 and 2019, respectively.

Hence, it was considered suitable to divide our data into three temporal segments by utilising 2015 and 2019 as demarcation markers. Figure 6 illustrates that sustainability, tourism, and environmental sustainability were prominent topics in sustainability research in sport management between 1996 and 2015. The study conducted between 2016 and 2019 uncovered emerging issues such as fisheries, event management, waste management, strategic management, and behavior, along with the sustainability. Furthermore, recent studies in sports management between 2020 and 2024 have specifically concentrated on sports fishing, circular economy, and recreational and physical activity; some of the areas are extended versions of themes that started work in 2016 and 2019.

The examination of thematic evolution, divided into historical periods marked by important years, highlights the changes in study emphasis, from initial topics such as sustainability and cause-related marketing to subsequent focuses on sports management. Temporal mapping facilitates comprehension of how the academic community's goals change in response to both internal scholarly discussions and external world concerns and trends. Essentially, keyword analysis serves as both a quantitative measure and a qualitative indicator of the intellectual trends within a research field. It reveals the longstanding principles as well as the cutting-edge areas of academic investigation.

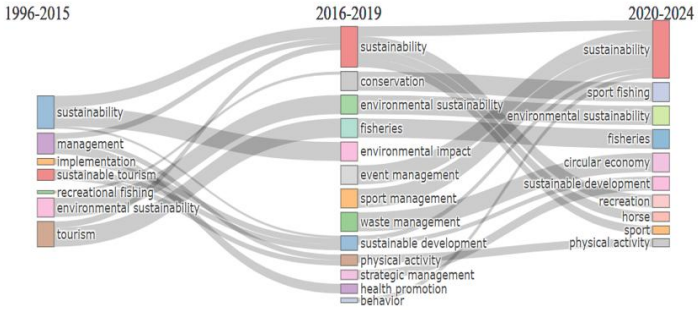

Figure 6: Thematic Analysis, Source(s): Figure extracted from biblioshiny

Intellectual structure: co-citation analysis.

The co-citation network offers a broad perspective on the intellectual structure of the study domain. It helps identify significant scholars, essential research themes, and the interconnectedness of scholarly publications. It functions as a strategic instrument for finding crucial literature, comprehending the development of study subjects, and acknowledging prominent figures in academic discourse.

The process of co-citation analysis involves examining the scholarly articles that reference a specific set of sources. This is achieved by gathering relevant data from various databases and utilising analytical and graphical methods for display, as outlined by McCain (1990). The aforementioned citation method has the potential to indicate content similarity, thereby facilitating the identification of topic and author groups and their potential interrelationships (Pilkington & Liston-Heyes, 1999; Ramos-Rodriguez & Ruiz-Navarro, 2004). The data and results are utilised for conducting bibliometric mapping through the application of VOS, as proposed by Van & Waltman (2010).

According to Borner et al. (2005), this strategy is especially helpful when dealing with sources from interdisciplinary domains. Figure 7 displays the result of the co-citation study, which reveals a well-organised intellectual landscape in the research field. The analysis yielded the following significant findings: Central Authors such as "Mallen C." hold a prominent position within the network, suggesting their work is fundamental to the subject and often cited in connection with other research.

Cluster Analysis: The visualisation displays clearly defined clusters, which indicate sub-themes or closely connected groups of studies within the larger research field. As an illustration, the *green* cluster, comprising terms such as globalisation (Thibault, 2009) and sustainability (Schulenkorf, 2012), indicates a concentration on sustainability's worldwide and communal dimensions. The academic literature in sports management has increasingly focused on the complex interplay between sports, society, and the environment, resulting in a more comprehensive comprehension of the discipline. The publications authored by Schulenkorf and Thibault serve as prime examples of this advancement. Schulenkorf promotes the use of sports as an effective tool for fostering community development, emphasising the need for strategic methods to maximise the social, economic, and environmental advantages of sports. Thibault's research provides a discerning perspective on the worldwide expansion of sports, emphasising the intricate relationship between financial interests and moral deliberations, such as the ecological consequences of global sporting events. The convergence of these issues signifies a notable change in the discussion around sports management, highlighting the significance of sustainable and ethical methods in light of the increasing global impact and the acknowledgment of sport as a means for constructive progress. This collection of work advocates for a thoughtful and responsible approach to sports management that places a higher importance on long-term welfare than short-term benefits. This strategy guarantees that the sports industry makes a positive and constructive contribution to the global community and the environment.

The red cluster shows the research and ideas that have been created in the field of sustainability in sports management (McCullough et al., 2010; Mallen & Chard, 2011), the new themes that are coming up in the field of sports management (McCullough et al., 2020), and the plans for the future in the field of sustainable sports management (McCullough et al., 2019; McCullough et al., 2016). The collection of essays exhibits a coherent topic progression that offers a full narrative on the incorporation of environmental sustainability in sports management. Since 2010, McCullough and Cunningham's work has focused on a conceptual model that aims to comprehend the motivations and expected results of organisations that participate in green projects. This central theme emphasises the motivation for sports organisations to embrace environmentally sustainable practices and the advantages they anticipate from these endeavours. In 2011, Mallen and Chard made a valuable contribution to the discussion on the future of environmental sustainability in sports academia. They presented a framework that focuses on the issue of academic responsibility and how education might shape future sports management practices.

In 2012, Casper, Pfahl, and McSherry conducted research that delved into the practical implications of these notions. Their study focused on examining the level of knowledge and the measures taken towards environmental sustainability among NCAA athletic departments. This theme highlights the practical consequences of sustainability in sports and the measures taken by athletic departments to tackle environmental issues. Orr and Inoue (2019) explore the concept of vulnerability and resilience in the context of sports organisations, specifically focusing on the impact of climate change and the corresponding strategies employed to address it. This is a strategic perspective on the topic, emphasising the need for sports organisations to evaluate and minimise the risks associated with climate change. The works of McCullough et al. in 2020 demonstrate the subject of defining and expanding new academic territory. They introduce the concept of sport ecology' as a developing subdiscipline. This theme highlights the dynamic nature of the area, creating room for specialised research and application that integrates sports management with ecological considerations. The "green waves" motif, developed by McCullough, Pfahl, and Nguyen in 2016, effectively represents the overall patterns in environmental sustainability initiatives within the sports business. This overarching issue examines the collective effect of sustainability measures over a period of time and their influence on the sports industry. The publications collectively demonstrate a continuum from conceptual comprehension to practical implementation and academic development, reflecting the increasing focus on and complexity of environmental sustainability in the field of sport management.

Blue Cluster: A compilation of academic publications has been released to investigate the intersection between environmental sustainability and sports administration. Mallen et al. (2010a) utilised the Delphi technique in their published article "Environmental Sustainability in Sport Facility Management: A Delphi Study" in the European Sport Management Quarterly. The purpose was to gather expert viewpoints on sustainable methods in the management of sports facilities. The study aimed to build a consensus on the optimal methods for integrating environmental factors into the operation of sports facilities. Later, Mallen et al. (2011) published "A Content Analysis of Environmental Sustainability Research in a Sport-Related Journal Sample" in the Journal of Sport Management. This publication conducts a content analysis to evaluate the scope and attributes of sustainability research in the field of sport management literature. It accomplishes this by analysing the dominant methodological and thematic trends in this specific field. Paquette et al. (2011) conducted a study published in Sport in Society titled "The Interpretation of Environmental Sustainability by the International Olympic Committee and Organising Committees of the Olympic Games from 1994 to 2008." The study aimed to analyse how the International Olympic Committee and organising committees of the Olympic Games have understood and implemented environmental sustainability. This study aims to provide a historical analysis of the sustainability policies and activities of one of the world's major athletic events, the Olympic Games. It will critically examine the development of sustainability practices within the Games over a period of fourteen years.

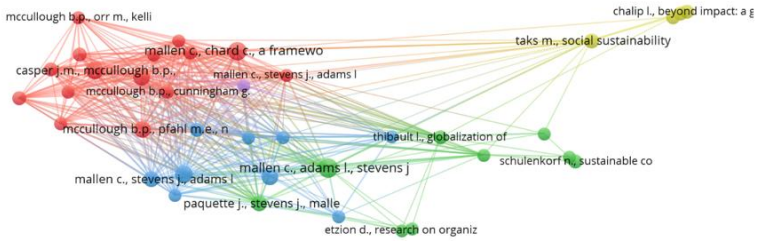

Figure 7: Co-citation analysis, Source(s): Figure extracted from VOSviewer

Managerial Implications:

By utilising the findings of a bibliometric study, sports organisations can implement a range of well-informed, research-driven measures to improve their sustainability practices. Implementing strategies that replicate proven case studies, such as incorporating renewable energy sources in buildings, demonstrates a dedication to preserving resources, as evidenced in the literature of the area (McCullough & Kellison, 2017). These endeavours are in accordance with the most effective methods and environmentally conscious procedures specified by prominent researchers, and they contribute to solidifying the trustworthiness of an organisation's sustainability initiatives.

Establishing strategic partnerships with renowned sustainability-focused universities, such as the University of Valencia, can facilitate the development of innovative initiatives and expand international influence (Schulenkorf, 2012). Interacting with prominent figures in the field of sustainability through industry events or direct consultation can offer new perspectives for creating policies and developing strategies, ensuring that organisations remain at the forefront of sustainable practices (McCullough et al., 2019). Integrating concepts like sport ecology into operational processes can help an organisation stand out in the field, as these themes gain more importance. The creation of green spaces and eco-centric activities aligns with community involvement and environmental responsibility, demonstrating the increasing environmental awareness within the sector (McCullough et al., 2016; McCullough et al., 2020).

Marketing efforts that highlight an organisation's dedication to sustainability can effectively involve supporters and entice sponsors, taking advantage of the consumer trend towards environmental responsibility (Babiak & Trendafilova, 2011). Likewise, well-informed efforts to promote policies can help establish industry norms, demonstrating an organisation's commitment to sustainability (Trendafilova et al., 2013). According to academic research, allocating resources towards technology and innovation can result in the implementation of ecologically sustainable practices. Adopting energy-efficient infrastructure and digital platforms can improve the organisation's sustainability profile and operational efficiency (McCullough et al., 2016). Implementing educational efforts, based on the most recent research findings, helps foster a culture of sustainability among both staff members and athletes. Training programmes that incorporate thorough academic analyses guarantee that the entire team possesses extensive knowledge and unwavering dedication to sustainability objectives (Casper et al., 2012). Furthermore, the utilisation of bibliometric tools for continuous monitoring and reporting empowers organisations to measure the influence of their sustainable endeavours, offering measurable data to inform stakeholders and direct future strategies (Donthu et al., 2021). By integrating these technologies, which are based on rigorous academic research, the industry can guarantee that its sustainability efforts are not only firmly established but also capable of adapting to the changing problems and opportunities in the field of sports management.

Future directions of research:

Continuously growing issues and topics are a result of the ever-changing nature of sustainability in sports management. An example of this is the recent emergence of the internet and eSports and their ecological effects, which have not been well examined in discussions about sustainability. McCullough et al. (2020) propose that future studies should explore the alignment of digital sports platforms, virtual events, and sustainability ideals. Furthermore, there is an opportunity to further investigate the influence of sustainability measures on fan involvement and customer behaviour in greater detail. A potential area of research might explore the impact of sustainability messaging and practices on fan loyalty, attendance, and spending patterns. According to Babiak & Trendafilova (2011), this study would fill a gap in the existing literature. Furthermore, the relationship between the creation of policies and the implementation of sustainable practices in sports is an area that is yet to be investigated. Subsequent research could investigate the influence of policies at different levels, ranging from organisational to worldwide, on the development of sustainable practices in sports organisations and events. According to Trendafilova et al. (2013), future studies could offer useful insights into the effectiveness of these programs and recommendations for policymakers.

Limitations and scope for further studies:

The bibliometric analysis, although offering useful insights, has certain limits that present opportunities for further research. A significant constraint is the reliance on published literature found in specific databases, which may not include all pertinent studies, especially those published in languages other than English or in less widely available publications. According to Donthu et al. (2021), this emphasis might overlook significant contributions from countries where English is not the primary language or from up-and-coming researchers.

Another constraint is the inherent prejudice in the choice of keywords and search queries. The selection of particular terms may unintentionally disregard pertinent papers that employ alternative vocabulary, resulting in a biassed portrayal of the area. The matter emphasises the necessity of adopting a more thorough and all-encompassing strategy in choosing keywords, as deliberated by Casper et al. (2012). In addition, the bibliometric study mainly focuses on quantitative characteristics of the literature, such as the number of publications and citation analysis. Although these criteria hold value, they may not comprehensively depict the qualitative influence or the profoundness of research contributions in the field. According to McCullough et al. (2016), incorporating qualitative analyses, such as

content or thematic analysis, into future studies can improve the comprehension of the literature. To summarise, the bibliometric analysis provides a thorough understanding of sustainability in sports management. However, its limitations emphasise the necessity for continuous research. Future research endeavours should strive to employ approaches that are more inclusive, investigate new topics, conduct in-depth analyses of consumer behaviour, and evaluate the influence of legislation on sustainable practices in sports management.

4. CONCLUSION:

The research explores how sustainability is incorporated into sports management, creating a detailed and vivid portrayal of the thematic environment. The scope of this field encompasses the examination of the environmental consequences of sports events and facilities, the advancement of ethical practices within sports organisations, and the financial ramifications of environmentally friendly activities. The mentioned themes demonstrate the thorough and all-encompassing approach that the area of sports management is adopting in addressing sustainability, recognising its intricate and diverse characteristics. The study also indicates emergent research areas that require additional investigation. An example of such a field is sport ecology, which examines the connection between sports and the natural environment, with a particular emphasis on the necessity of implementing measures that safeguard and conserve ecological systems. Another emerging field involves the use of sustainability principles in the administration of eSports and virtual sports, which reflects the changing nature of sports consumption and the necessity for sustainability in digital environments. Furthermore, investigating the impact of fan interaction and marketing on the promotion of sustainable measures offers a promising area for research. This entails examining the impact of sports marketing on shaping public attitudes towards sustainability and the potential for fan involvement in sustainable practices to strengthen brand loyalty and community backing for sports teams and events.

The data also indicates that future research might explore the policy ramifications of sustainability in sports, investigating how rules and standards can influence sustainable behaviours. This pertains to the analysis of the contribution of sports towards the attainment of the United Nations' Sustainable Development Goals (SDGs), with a specific focus on promoting health and well-being and creating fair and just communities. The utilisation of new technologies and innovation in sports sustainability, such as the application of artificial intelligence to optimise resource utilisation and reduce waste, is a promising area for research. The convergence of technology, sports, and sustainability is expected to become a prominent field of study, with the capacity to transform the industry's approach to environmental and social accountability. Therefore, the bibliometric analysis not only summarises the current knowledge but also highlights the future direction for research and practice, encouraging the sports management community to adopt these developing issues and contribute to the advancement of sustainability in the area.

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