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Making the impact of publications within a field comparable by improving the field-weighted citation impact (FWCI): the case of sport management

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Abstract
The Field-Weighted Citation Impact (FWCI) is a metric at the publication level which is standardized across fields. It has obvious advantages over other frequently used metrics, but might also suffer from some potential limitations, raising issues about its reliability. This paper investigates one limitation—the use of different All Science Journal Classification (ASJC) Codes in Scopus for journals from the same field, meaning they may not be assessed against the same benchmark (average citations per article)—and suggests a potential improvement, relative to sport management, which was selected as an exemplar field. A four-step approach was applied: first, identifying sport management journals based on Scimago similarities (percentage of cited publications shared between journals, i.e., shared interests); second, mapping these journals against their different ASJC Codes; third, comparing the different ASJC Codes versus Scimago similarities; fourth, analyzing the consequence of the different ASJC Codes on FWCI. Based on Scimago similarities, 15 sport management journals were identified. They represent 15 different ASJC Codes. Overall, the ASJC Codes are not representative of Scimago similarities. The consequence is that, despite shared interests, sport management journals are not assessed against the same benchmark in the calculation of FWCI. The discussion considers why and how big the issue is. A potential improvement to the FWCI is then suggested: to use Scimago similarities rather than ASJC Codes to determine a field. The paper concludes that the FWCI is superior to other widespread metrics, while acknowledging some remaining issues not addressed by the indicator and its potential improvement.

Keywords All science classification journal · Citation analysis · Scimago · SciVal · Scopus

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Introduction

Career advancement and promotion can depend on decisions based on raw citation metrics at an individual level and/or made by panels composed of academics from different fields. This raises two issues. First, at an individual level, the accumulation of citations over the years may inflate the citation counts and Hirsch (h)-index values of academics who have started their career earlier than others, hence giving them potentially an unfair advantage. A way to overcome this issue is to properly assess the quality of the applicants' research. This leads to the second issue, that is, panel members who are not in the applicants' field might not be able to assess the quality of their research and hence may need to rely on metrics signaling its quality such as citation impact indicators. However, different fields have different citation practices, meaning metrics based on raw cites are not reliable for field comparison (Garfield, 1979). Consistent with this consideration, citation impact indicators such as the Journal Impact Factor (JIF) powered by Clarivate from Web of Science and the CiteScore powered by Elsevier from Scopus should be avoided (Scelles, 2023; Teixeira da Silva, 2017, 2021). Instead, standardized indicators accounting for the different citation practices across fields should be favored (Gómez-Déniz & Dorta-González, 2024). At the journal level, such metrics include the Journal Citation Indicator (JCI) powered by Clarivate from Web of Science, the Source Normalized Impact per Paper (SNIP) powered by Elsevier from Scopus, and the Scimago Journal Rank (SJR) powered by Scimago from Scopus.

Nevertheless, the impact of a publication is different from the impact of the journal in which it is published. While the JCI, SNIP and SJR may be seen as an improvement compared to the JIF and CiteScore, all five indicators fail to address the issue—much bigger than the ones identified in the previous paragraph—that articles in the same journal and in the same year receive always extremely different numbers of citations (Dengler, 2024). This suggests the need to look at a standardized indicator at the publication level. This corresponds to a metric calculated by SciVal, and available on SciVal and Scopus: the Field-Weighted Citation Impact (FWCI). In contrast to raw/average cites that are influenced by publication year, type, and field, the FWCI enables comparisons between any publications across but also within a field. Universities, research centers and units, and academics can communicate about it to evidence the impact of their publications. For example, academics can use it for career advancement/promotion or workload arrangements, in particular within universities explicitly referring to the FWCI alongside journal lists in their objectives (see the subsection about its uses below).

However, the FWCI suffers from several limitations that raise some issues about its accuracy and reliability. One of these limitations—namely, the use of different All Science Journal Classification (ASJC) Codes (considered as the fields in the calculation of the FWCI) in Scopus for journals from the same field—has received limited coverage in previous literature, highlighting a gap. Therefore, the five objectives of the current paper are (1) to identify journals belonging to a field (with sport management used as an exemplar case) based on meaningful criteria, (2) to map the different ASJC Codes used by these (sport management) journals in Scopus, (3) to assess whether these different ASJC Codes are representative of different interests, (4) to analyze the consequence of the different ASJC Codes on the FWCI of documents published in these (sport management) journals, and (5) to suggest how to improve the calculation of the FWCI (in and beyond sport management). If universities, research centers and units, and academics

are to use the FWCI, it is essential that the metric is reliable and can be trusted, yet it is hypothesized in the present research that it requires improvements as it stands.

In the next sections, the principle, uses, strengths and limitations of the FWCI are first presented. The method used to address the first four objectives is then described, before developing the results, with a focus on sport management and related papers. The discussion and conclusion section further discusses the results related to objective 4 then suggests how to improve the FWCI (objective 5), before acknowledging some limitations and concluding with some final remarks.

The FWCI: principle, uses, strengths and limitations

Principle

Elsevier (2022) defines the FWCI in SciVal as "how the number of citations received by an entity's publications compares with the average number of citations received by all other similar publications in the data universe". More specifically, the FWCI is the ratio between the cites received by a publication and the average cites received by all other "similar" publications over a four-year period covering the year of publication in a journal issue (rather than when first released online) and the following three years. Similar publications are those publications in the Scopus database that have the same publication year, publication type (article, review, note, editorial, book, book chapter), and discipline, as represented by the Scopus journal classification system (Elsevier, 2022). This means that the field component corresponds to the ASJC Codes of the journals in Scopus. An FWCI of 1 indicates that a publication has been cited exactly as would be expected based on the global average for similar publications; an FWCI of 2 or 0.5 means that a publication has been cited twice more or half as many times, respectively, as the global average for similar publications. Elsevier (2022) warns against the use of FWCI when the entity (e.g., a researcher) has a small number of publications because a few highly cited publications can skew the average FWCI value.

Uses

There is some evidence that the FWCI is used in academia, associated rankings and research evaluation. For example, in the Times Higher Education (THE) World University Rankings, the FWCI is used in four of the 18 performance indicators employed (Times Higher Education, 2023). The UK government also relies on the FWCI in its international comparison of the UK research base (Department for Business, Energy & Industrial Strategy, 2022). Manchester Metropolitan University (MMU) refers to a 2026 target of 2 for the FWCI at the university level in its current strategy (Manchester Metropolitan University, 2022). In other words, MMU expects that the average FWCI of the documents published by all its researchers will be 2 by 2026. Although Elsevier (2022) warns against its use at the researcher level, MMU staff members can refer to FWCI in their promotion applications since this is an indicator used internally. In 2021, the University and College Union (UCU) University of Liverpool branch raised the issue that the university intended to use the FWCI for redundancy selection, with the threshold being set at 2 (UCU University of Liverpool Branch, 2021). In response to the concerns raised, the university stopped considering the FWCI as part of the process (University of Liverpool, 2021).

The reference to FWCI is not confined to the UK. For example, Deakin University, Monash University and the University of Melbourne in Australia, as well as the National University of Singapore and Singapore Management University in Singapore mention it on their websites at the time of writing. The FWCI is also used in academic papers internationally, e.g., to assess how it compares to the Relative Citation Ratio (RCR) (Purkayastha et al., 2019), to quantify the publication preferences of leading research universities (Lancho-Barrantes & Cantu-Ortiz, 2020), and to investigate its relationship with publication indicators such as the number of authors, countries, keywords and title length for publications in business, management and accounting (Jang, 2021).

Strengths

The FWCI, being used in academia, suggests that universities and researchers identify some strengths associated with the metric, for example compared to other widely used metrics such as ranking of the journals in which the researchers published (e.g., the JIF or CiteScore), and the total number of citations or the h-index. Accordingly, the FWCI presents at least five strengths compared to these other metrics. First, the FWCI is easy to interpret, e.g., an FWCI of 3 means the document is three times more cited than the average document in the field. Second, this is an indicator at the publication level. Therefore, it can help evidence the impact of publications that are not published in journals considered impactful and/or well rated in journal lists, and yet are well cited (Scelles, 2023); or hardly or non-cited articles in high-impact journals. Third, the FWCI is a standardized indicator at the field level, meaning it can help inform comparisons within, between and across fields (Waltman & van Eck, 2013). This can be particularly useful when panel members need to assess the quality of research not belonging to their field, e.g., if promotions are decided at the university level with panel members from different fields. Fourth, the FWCI controls for the year of publication (Aksnes et al., 2019), i.e., it does not favor older publications as raw cites do and, relatedly, academics who have started their career earlier as the total number of citations and h-index do, since calculations are based on documents published the same year before the FWCI of a document is determined and can then be compared to the FWCI of a document published in another year. Fifth, the FWCI controls for the type of document, e.g., the fact that reviews are more cited than (other) articles on average (Chartered Association of Business Schools, 2021). This is because reviews (articles) are compared to other reviews (articles) in the field in the calculations, before the FWCI of a review (article) is determined and can then be compared not only to the FWCI of other reviews (articles) but also to the FWCI of an article (review).

Limitations

Although the FWCI is a good option and is easily and widely available when it comes to compare the impact of publications across fields, it presents at least three limitations. First, there can be a difference in the values displayed by SciVal and Scopus. This can lead to potential disagreement between individuals if they do not rely on the same source. Second, a citation is removed if it is in a paper that was published online in the four years considered then in a journal issue after the four years. This means that the FWCI of a paper can decrease despite the four years considered being over. Third, the fields are the ASJC Codes in Scopus. These can be very different for journals from the same field, meaning their papers are not assessed against the same set of papers (or benchmark). While the

lack of relevance of the ASJC Codes and the consequence on the FWCI have already been established in the literature (Waltman, 2016; Wang & Waltman, 2016), they have not been covered yet in sport management and an original solution is suggested later in this paper.

Method

The next sections focus specifically on investigating the third limitation of the FWCI, relative to sport management. To do so, a four-step approach was applied, addressing the first four objectives of the paper. First, journals belonging to sport management were identified (objective 1). This identification was based on Scimago similarities at the time of making the calculations required in the present paper (2023), i.e., the percentages of referenced publications shared between journals. For example, *International Journal of Sport Finance* and *Journal of Sports Economics* have an 86% Scimago similarity. This means that 86% of the publications cited in the reference lists of the papers published in these journals are the same, suggesting shared interests. The selection criterion to consider that a journal belongs to sport management was the journal being more similar to sport management journals than journals from another field. This was determined through observation of the highest similarity scores provided on the Scimago page on each journal. The process started with the Scimago page of a journal explicitly belonging to sport management (i.e., *European Sport Management Quarterly*), observation of its highest similarity scores with other journals, then a snowballing approach by looking at the Scimago pages of these other journals and their highest similarity scores with other journals.

Then, the sport management journals identified were mapped against their different ASJC Codes in Scopus in 2023 (objective 2), before comparing this mapping with their Scimago similarities to assess whether these different ASJC Codes are representative of different interests (objective 3). The consequence of the different ASJC Codes in Scopus for sport management journals on the FWCI of their papers was then analyzed (objective 4). This was achieved by comparing the benchmarks against which these journals and subsequently their papers were assessed, i.e., the average cites per paper in the ASJC Code(s) in Scopus to which a journal belongs. The comparison focused on papers published in 2019 and their citations over 2019–2022. The benchmarks are not readily available on SciVal and Scopus. Therefore, to calculate them, the number of citations of the most cited 2019 article over 2019–2022 in each sport management journal analyzed was calculated first, then this number of citations was divided by the FWCI of the article, which gives the benchmark against which the most cited 2019 article of the journal considered (and all other 2019 articles of this journal) was assessed. It must be noted that the choice of the most cited 2019 article rather than another article does not matter; as long as a 2019 article had at least one cite over 2019–2022 and consequently an FWCI different from 0, it would have enabled the calculation of the benchmark.

To illustrate why the comparison of the benchmarks against which papers are assessed in the calculations of FWCI is important, an example is provided here. Consider a paper published in journal A and another paper published in journal B, with both papers cited 20 times and both journals belonging to sport management. One would expect that both journals and subsequently both papers belong to the same ASJC Code(s) in Scopus and are therefore compared to the same benchmark. However, consider now that both journals do not belong to the same ASJC Codes in Scopus, with the benchmark being 10 average cites per paper in journal A's ASJC Code and 20 average cites per paper in journal B's ASJC

Code. The paper published in journal A will have a FWCI of 20/10 = 2 while the paper published in journal B will have a FWCI of 20/20 = 1. Yet, it seems odd to conclude that the first paper is twice more impactful than the second paper, considering that they both have been cited 20 times. Instead, the conclusion is that it is more challenging for the second paper to reach the same FWCI as the first paper because the benchmark against which it is compared is higher.

The last objective about how to improve the FWCI (objective 5) is covered in the discussion subsequent to the results, which focus on the first four objectives. The sources of the data used are Scimago and Scopus. Calculations were made in Excel based on data retrieved on 7th September 2023.

Results

Identification of sport management journals based on Scimago similarities (objective 1)

Based on their Scimago similarities and the snowballing approach described above, 15 journals were identified as belonging to sport management, see Table 1. As indicated in the last column of the table, the eight journals that focus specifically on sport management in their title are the most similar in average, except *Sport Management Education Journal*, which can be explained by its specific focus on education. This journal is less similar to the seven other journals that focus specifically on sport management than the two sport marketing journals and *International Journal of Sport Communication*. In addition to these 11 most similar journals, it is worth insisting on the four less similar ones. The 12th most similar journal is *Women in Sport and Physical Activity Journal* which does not benefit from stronger similarities than with sport management journals when extending to non-sport management journals (except 33% with *Sport in Society*, which is more similar to sport sociology journals). The 13th most similar journal is *International Journal of Sport Policy and Politics* which tends to be more similar to sport management than sport sociology journals, e.g., its highest (second), third (fourth), fifth (sixth), seventh (eighth), 10th (ninth), 11th and 12th (13th), 15th (16th), 17th and 18th highest similarities are with sport management (sociology) journals.

The two sports economics and finance journals are highly similar (86%) but not so similar to the other sport management journals covered, despite their highest similarities being with these journals. *International Journal of Sport Finance* has 10 of its 11 highest similarities with sport management journals (the exception being *International Journal of the History of Sport*, 15%). *Journal of Sports Economics* has its highest Scimago similarities with *International Journal of Sport Finance* (86%), *European Sport Management Quarterly* (22%), *Sport, Business and Management: An International Journal* (19%) and *International Journal of Sport Management and Marketing* (16%) then five economic journals (13% to 15%) and *Journal of Global Sport Management* (13%).

Sport management journals mapped against their ASJC codes in Scopus (objective 2)

Although the word "Sport" does not appear as an independent ASJC Code in Scopus, one may expect that sport management journals belong to "Tourism, Leisure and Hospitality

Table 1 Scimago similarities of sport management journals

	IJSC	*IJSF*	*IJSMM*	*IJSMS*	*IJSPP*	*JGSM*	*JSE*	*JSM*	*MSL*	*SBM*	*SMEJ*	*SMQ*	*SMR*	*WSPAJ*	Average
ESMQ	48%	28%	**77%**	**62%**	41%	**82%**	22%	**62%**	**79%**	**79%**	12%	**50%**	**75%**	30%	**53%**
IJSC		7%	**57%**	**53%**	21%	**59%**	10%	45%	45%	**52%**	34%	43%	48%	28%	39%
IJSF			21%	15%	7%	19%	**86%**	12%	15%	24%	5%	11%	17%	5%	19%
IJSMM				**74%**	29%	**80%**	16%	**67%**	**68%**	**80%**	47%	**63%**	**76%**	33%	**56%**
IJSMS					21%	**65%**	10%	**54%**	**53%**	**63%**	34%	**71%**	**62%**	23%	47%
IJSPP						45%	8%	27%	**56%**	28%	8%	8%	39%	25%	26%
JGSM							13%	**71%**	**77%**	**70%**	44%	**60%**	**80%**	33%	**57%**
JSE								9%	10%	19%	10%	10%	11%	10%	17%
JSM									**58%**	**55%**	**58%**	**74%**	**85%**	33%	**51%**
MSL										**66%**	37%	42%	**80%**	38%	**52%**
SBM											42%	49%	**63%**	34%	**52%**
SMEJ												43%	**50%**	37%	33%
SMQ													**64%**	25%	44%
SMR														38%	**56%**
WSPAJ															28%

A Scimago similarity of 48% between *ESMQ* and *IJSC* means 48% of the publications in the reference lists of the papers published in these journals are the same. Similarities of 50% and above are identified in bold. Average per journal means average similarity with the 14 other journals

ESMQ European sport management quarterly, *IJSC international journal of sport communication*, *IJSF* international journal of sport finance, *IJSMM* international journal of sport management and marketing, *IJSMS* international journal of sports marketing and sponsorship, *IJSPP* international journal of sport policy and politics, *JGSM journal of global sport management*, *JSE* journal of sports economics, *JSM* journal of sport management, *MSL* managing sport and leisure, *SBM* sport, business and management: an international journal, *SMEJ sport management education journal*, SMQ *sport marketing quarterly*, *SMR* sport management review, *WSPAJ* women in sport and physical activity journal

Management". This would be consistent with Web of Science classifying them in the category "Hospitality, Leisure, Sport & Tourism". However, ASJC Codes in Scopus were very different across the 15 sport management journals analyzed in the present paper with 15 areas covered (Fig. 1). Only nine of the 15 sport management journals covered belonged to "Tourism, Leisure and Hospitality Management". Besides, only one of these journals (namely *Managing Sport and Leisure*) solely belongs to this ASJC Code. *Journal of Sport Management* has "Organizational Behavior and Human Resource Management" in common only with *Sport Management Review* and "Physical Therapy, Sports Therapy and Rehabilitation" only with *Women in Sport and Physical Activity Journal*, while *Journal of Sports Economics* is isolated since it is the only sport management journal belonging to "Economics, Econometrics and Finance (miscellaneous)".

ASJC codes vs. Scimago similarities for sport management journals (objective 3)

The comparison between the ASJC Codes in Fig. 1 and the Scimago similarities in Table 2 casts doubt about the relevance of ASJC Codes for sport management journals in Scopus. *European Sport Management Quarterly* and *Journal of Global Sport Management* belonging to the same ASJC Codes makes sense based on their Scimago similarity (82%). However, this is not the case for *International Journal of Sport Finance* and *International Journal of Sports Marketing and Sponsorship*, based on their Scimago similarity of only 15%. Besides, *International Journal of Sport Finance* and *Journal of Sports Economics* have no ASJC Codes in common despite these two journals having the highest similarity in the sample studied (86%). More generally, the ASJC Codes of the sport management journals covered do not tend to reflect their Scimago similarities, otherwise the eight journals that focus on sport management in their title would belong to at least one similar AJSC Code.

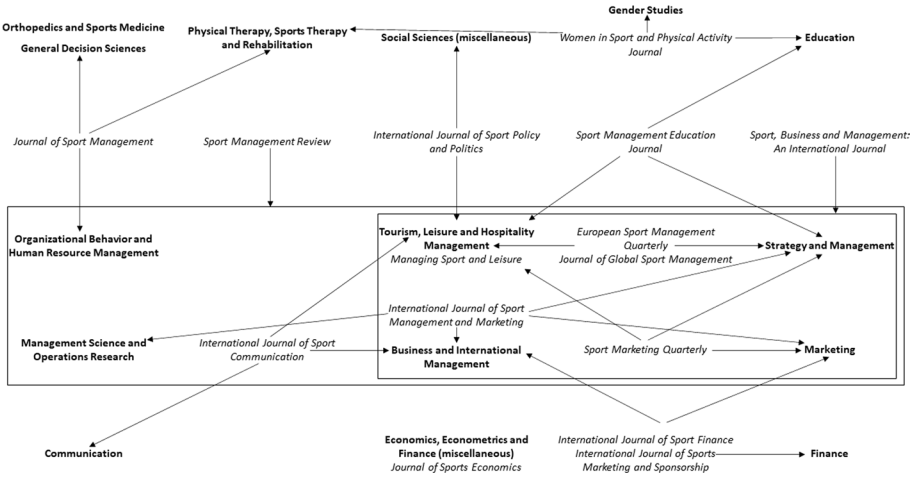

Fig. 1 ASJC codes of sport management journals in scopus. ASJC codes are in bold and journals in italics. Arrows link a journal to one of the ASJC Codes it belongs to, unless a journal belongs to a single ASJC Code (no arrow then, see Journal of Sports Economics and Managing Sport and Leisure). The arrow from Sport Management Review links it to a rectangle because the journal belongs to all six ASJC Codes included in the rectangle; similarly, the arrow from Sport, Business and Management: An International Journal links it to a rectangle because the journal belongs to all four ASJC Codes included in the rectangle

Table 2 Benchmarks against which sport management journals are assessed

Article title	Journal	Number of citations					FWCI	Benchmark (citations 2019–22/FWCI)
		2019	2020	2021	2022	2019–22		
Unfolding the Twitter scene of the 2017 UEFA Champions League Final: Social media networks and power dynamics (https://doi.org/10.1080/16184742.2018.1517272)	*ESMQ*	0	8	21	11	40	2.72	14.71
Sporting women and social media: Sexualization, misogyny, and gender-based violence in online spaces (https://doi.org/10.1123/ijsc.2019-0079)	*IJSC*	0	1	6	13	20	2.09	9.57
Insolvencies in professional football: A German Sonderweg? (https://doi.org/10.32731/IJSF.141.022019.05)	*IJSF*	2	5	11	12	30	2.61	11.49
Psychological contract fulfilment and innovative work behaviours of employees in sport-based SBEs: The mediating role of organisational citizenship (https://doi.org/10.1504/IJSMM.2019.097020)	*IJSMM*	0	2	2	3	7	0.52	13.46
Consumer acceptance of sports wearable technology: The role of technology readiness (https://doi.org/10.1108/IJSMS-06-2017-0050)	*IJSMS*	5	17	25	41	88	7.67	11.47
Event legacy framework and measurement (https://doi.org/10.1080/19406940.2018.1490336)	*IJSPP*	4	10	20	22	56	6.45	8.68
Portuguese fight against match-fixing: Which policies and what ethic? (https://doi.org/10.1080/24704067.2018.1493357)	*JGSM*	1	6	3	3	13	0.88	14.77
The effects of physical activity on social interactions: The case of trust and trustworthiness (https://doi.org/10.1177/1527002517717299)	*JSE*	2	4	10	13	29	5.11	5.68
Sport and happiness: Understanding the relations among sport consumption activities, long- and short-term subjective well-being, and psychological need fulfillment (https://doi.org/10.1123/jsm.2018-0071)	*JSM*	0	7	9	20	36	3.92	9.18
User engagement from within the Twitter community of professional sport organizations (https://doi.org/10.1080/23750472.2019.1630665)	*MSL*	0	5	11	10	26	1.8	14.44
The unintended consequence of Financial Fair Play: An examination of competitive balance across five European football leagues (https://doi.org/10.1108/SBM-03-2018-0025)	*SBM*	0	5	7	13	25	1.79	13.97
You study like a girl: Experiences of female sport management students (https://doi.org/10.1123/smej.2018-0020)	*SMEJ*	0	0	2	3	5	0.48	10.42
eSport vs. Sport: A comparison of spectator motives[1] (http://hdl.handle.net/20.500.12613/7113)	*SMQ*	1	3	19	22	45	3.57	12.61

Table 2 (continued)

Article title	Journal	Number of citations					FWCI	Benchmark (citations 2019–22/FWCI)
		2019	2020	2021	2022	2019–22		
The antecedents and consequences of positive organizational behavior: The role of psychological capital for promoting employee well-being in sport organizations (https://doi.org/10.1016/j.smr.2018.04.003)	*SMR*	6	12	20	30	68	5.41	12.57
Final thoughts on women in sport coaching: Fighting the war (https://doi.org/10.1123/wspaj.2019-0030)	*WSPAJ*	1	1	7	12	21	3.56	5.90

Source of the data: Scopus (accessed 7 September 2023)

ESMQ European sport management quarterly, *IJSC* international journal of sport communication, *IJSF* international journal of sport finance, *IJSMM* international journal of sport management and marketing, *IJSMS* international journal of sports marketing and sponsorship, *IJSPP* international journal of sport policy and politics, *JGSM* journal of global sport management, *JSE* journal of sports economics, *JSM* journal of sport management, *MSL* managing sport and leisure, *SBM* sport, business and management: an international journal, *SMEJ* sport management education journal, *SMQ* sport marketing quarterly, *SMR* sport management review, *WSPAJ* women in sport and physical activity journal

[1] Article from 2018 and citations over 2018–2021 due to articles from 2019 published by *Sport Marketing Quarterly* not listed on Scopus

Specifically, they would all belong to the AJSC Code "Tourism, Leisure and Hospitality Management", while this is not the case for *International Journal of Sport Management and Marketing* and *Journal of Sport Management*.

Consequence on FWCI of sport management journal not belonging to the same ASJC codes (objective 4)

The consequence of sport management journals not belonging to the same ASJC Codes in Scopus is that the benchmark—i.e., the average citations generated by all publications in the ASJC Code(s)—against which their publications are compared in the calculations of FWCI is different. Therefore, it is more challenging to reach a high FWCI when publishing in some journals rather than others, as the benchmark they face is higher, meaning an article in those journals needs more cites to reach the same FWCI as a paper in journals facing a lower benchmark. Table 2 presents the benchmarks against which each of the 15 sport management journals considered are assessed.

Table 2 allows to derive that, for an article published in 2019, it was around 2.6 times more challenging to reach a high FWCI when publishing in *European Sport Management Quarterly* or *Journal of Global Sport Management* (that faced the highest benchmark) than in *Journal of Sports Economics* (that faced the lowest benchmark). More exactly, based on the benchmarks provided in Table 2, it was 14.71 to 14.77/5.68 = 2.59 to 2.60 times more challenging to reach a high FWCI when publishing in *European Sport Management Quarterly* or *Journal of Global Sport Management* than in *Journal of Sports Economics*.

Discussion and conclusion

Following the four-step approach described in the method, the results have addressed the first four objectives of the paper. First, based on Scimago similarities, 15 sport management journals were identified, hence illustrating how Scimago similarities can help identify the journals belonging to a field (objective 1). The 15 sport management journals were then mapped against their ASJC Codes (objective 2), which revealed that they represent 15 different ASJC Codes, with journals belonging to between one and six ASJC Codes and only a few journals displaying the same ASJC Codes. Overall, the ASJC Codes are not representative of Scimago similarities (objective 3). The consequence is that, despite shared interests, sport management journals are not assessed against the same benchmark (average citations per article) in the calculation of FWCI (objective 4). This is an issue since this means that the comparisons the FWCI is supposed to enable are biased. In the present section, this issue is further discussed. Then, a potential improvement to the FWCI is suggested (objective 5): making the fields based on Scimago similarities between journals.

Different benchmarks for journals in the same field: why and how big an issue?

Results related to objective 4 establish that, in sport management, there is a 2.6-fold difference in the benchmarks against which journals are assessed. While this is presented as an issue, there is a need to further elaborate on where this comes from, and whether and when this 2.6-fold difference really is problematic. One may wonder whether the reason why the involved ASJC Codes differ in their benchmarks comes from the respective partial disciplines having a different citation culture, e.g. short vs. long reference lists. In other

words, it may be that economics (applying to *Journal of Sports Economics* that faced the lowest benchmark) tend to use shorter reference lists than management (applying to *European Sport Management Quarterly* and *Journal of Global Sport Management* that faced the highest benchmark), hence giving more value to one cite in economics than management once standardised, as done with the FWCI at the publication level and the SNIP at the journal level. The comparisons of the CiteScores and SNIPs of the three aforementioned journals tend to confirm this, as indicated by the ratio CiteScore 2023/SNIP 2023 where a higher ratio suggests a longer reference list in the relevant partial discipline, explaining a lower impact of the journal when standardised. Indeed, the ratios are 7.8/2.199 = 3.55 for *European Sport Management Quarterly*, 4.4/1.181 = 3.73 for *Journal of Global Sport Management* and 3.2/1.378 = 2.32 for *Journal of Sports Economics*. While the differences (3.73/2.32 = 1.60 between *Journal of Global Sport Management* and *Journal of Sports Economics*, and 3.54/2.32 = 1.53 between *European Sport Management Quarterly* and *Journal of Sports Economics*) are lower than the 2.6-fold difference found with the FWCI, they can partially explain it.

In terms of how big the issue is, the 2.6-fold difference can be compared to the often more than 100-fold difference (see e.g., Dengler, 2024) when authors are judged by the JIF or CiteScore of the journal where they published. Even in the best journals, some papers are never cited or maybe cited once, while others have hundreds of citations. Yet, in a journal-based assessment, all are treated the same. Compared to that, one may feel that a 2.6-fold difference is close to nothing. However, we still argue that it can have important consequences. For example, in the UK system, research is evaluated every six to seven years for public funding purposes to the different UK universities through the Research Excellence Framework (or REF), with outputs being allocated stars (four stars for the best outputs) and funding to universities depending on performance. In this context, evaluated outputs with four stars generate much more funding than evaluated outputs with three stars. If panel members are influenced by the FWCI, the difference between three and four stars may come from an output rated 2.6 times higher or lower. In other words, a 2.6-fold difference in the FWCI may have important financial implications for UK universities, and yet correspond to outputs that are similarly impactful. This may be less of an issue when comparing academics' respective FWCIs in a field. This is because the 2.6-fold difference would only play out if one author publishes only in the journal with the lowest benchmark and another only in the journal with the highest benchmark. In reality, it is likely that all authors will have articles spread over many journals, leading to an average benchmark much more similar.

Fields based on Scimago similarities between journals (objective 5)

The ASJC Codes in Scopus are not always meaningful (Thelwall & Pinfield, 2023), leading to potentially biased FWCI. Existing issues with field classification are not specific to Scopus but also apply to Web of Science, with some authors looking at the latter performing clustering to classify at the publication level (Ruiz-Castillo & Waltman, 2015; Waltman & van Eck, 2012). Clusters are also applied by SciVal, which leads to the identification of around 1,500 topic clusters and 94,000 topics (Elsevier, n.d.). However, their use would not correspond to a field-weighted approach, as the topic level is far more specific, while topic clusters are too broad, e.g., the topic cluster "Discrimination; Educational Policy; Regression Analysis" includes not only sport management but also other sport fields and even publications not specific to sport.

A better alternative to the use of ASJC Codes inspired by the present paper is to rely on Scimago similarities between journals. This could be done by applying our approach to the identification of journals from the same field based on Scimago similarities (objective 1) then calculating the FWCI of their documents based on this set of journals representative of a field. In other words, the benchmark would be the average cites for all articles published in the set of journals in the year considered. As an illustration, the benchmark for papers published in *Journal of Sport Management* in the calculation of FWCI would be similar to papers published in other sport management journals, while under the current ASJC Codes it was lower for its 2019 articles than, for example, *European Sport Management Quarterly* (9.18 vs. 14.71). The 2019 *Journal of Sport Management* article that was most cited over 2019–2022 received 36 cites and its FWCI is 36/9.18 = 3.92, while the 2019 *European Sport Management Quarterly* article that was most cited over 2019–2022 received 40 cites (i.e., four more cites than the 2019 *Journal of Sport Management* article the most cited over the same period) but its FWCI is only 40/14.71 = 2.72. If panel members in evaluations such as the Research Excellence Framework in the UK described previously are influenced by the FWCI and feel that an article with an FWCI around 4 can be deemed four stars while an article with an FWCI around 3 can be deemed three stars, the difference in FWCI between the aforementioned *Journal of Sport Management* and *European Sport Management Quarterly* articles (or similar differences in FWCI between other articles from the same field having received fairly similar citations) can have important financial consequences for universities despite not being really justified. If relying on Scimago similarities instead of ASJC Codes, the subsequent FWCI values would be more meaningful.

It is recognized that the proposed solution is not without challenges as it would have to be applied to about 48,000 journals on Scopus for which Scimago similarities will be required, while Scimago currently lists about 29,000 journals, that is, not all journals listed on Scopus. The approach applied 'manually' to objective 1 would require some kind of 'automation' based on clustering journals. In addition, it is acknowledged that any classification always has arbitrary aspects: elements close to the border of two categories can happen to be in the one or in the other category. Nevertheless, in the proposed solution, journals could still be in more than one category (field), for example a journal like *Journal of Sports Economics* could belong both to sport management and to economics.

Limitations

The current paper may help make the FWCI more reliable and trustworthy not only in sport management but also more broadly in academia if the suggested improvement (i.e., making the fields based on Scimago similarities rather than ASJC Codes in Scopus) is applied. However, there is a need to replicate the study to other journals and fields to verify that our findings hold true in other research areas. Besides, even an improved FWCI would need to be used with caution, like any citation impact indicator (Teixeira da Silva, 2020). Such metrics tend to assume that any cite has the same positive value (Bornmann et al., 2020; Bu et al., 2021). Macdonald (2023) evidenced some limitations of encapsulating quality in a single number, e.g., about 25% of citations in top journals turn out to be wrong (Smith & Cumberledge, 2020) and authors are unfamiliar with at least 40% of the works they cite (Teplitskiy et al., 2018).

A way to address this issue would be to evaluate how much each cited reference contributes to the paper. However, this may be technologically challenging and prone to

subjectivity as to what exactly can be associated to the cited reference, while still not necessarily capturing the value of the cite: does a cited reference extensively used positively contribute to the paper if the content identifies only weaknesses associated with it? A four-tier citation classification system distinguishing between "background", "supportive", "contradictory" and "manipulative" references has recently been suggested and could help solve the issues mentioned here (Teixeira da Silva & Nazarovets, 2023). It remains that the limitations of citation impact indicators such as the FWCI show that they should never be used in isolation, but instead be associated with other forms of evidence of achievement and assessment such as more qualitative narrative as to why a research is meaningful, important and impactful, not only in academia but also for society. This means that it is important to provide academics with the opportunity to justify why their research is valuable beyond their sole impact as measured by the FWCI, especially if this determines the number of hours they can dedicate to research in their workload. It is equally important that qualitative assessment and feedback are given by colleagues, and a discussion can take place to agree with the assessment, with the possibility for the author to appeal the decision to their institute if they feel it is unfair.

Final remarks

Based on the information presented in the paper, the FWCI can clearly be deemed superior to the other widespread ways of assessing individual researchers, namely, the impact of the journal in which they published, total number of citations, and h-index. Nevertheless, some remaining issues should be addressed, such as the somehow untransparent Scopus categorization in subject areas and article types; our proposed solution to improve the FWCI could help address the first issue related to subject areas. Also, the FWCI alone does not solve the issue of how to rate articles between 1 and 1000 or more co-authors, nor the question whether the integrated impact over all articles is the relevant measure (e.g., one high-impact paper is as good as three medium-impact papers or 10 low-impact papers) or the average impact per paper should count (i.e., one researcher who publishes every five years a single high-impact paper is better than another who publishes every year 10 medium-impact papers). It remains to be seen whether the use of the FWCI can be recommended for the assessment of individual researchers.

Although the FWCI should not be used in isolation, it may affect the way a publication is perceived. Therefore, the improvement suggested in the present paper may contribute to a perception more in line with the reality. It is acknowledged that alternatives have already been suggested in the literature, e.g., performing clustering to classify fields at the publication level (Ruiz-Castillo & Waltman, 2015; Waltman & van Eck, 2012). However, the subsequent fields are not publicly available, unlike the Scimago similarities between journals. Therefore, the suggested improvement here may be easier to implement, assuming that Elsevier (Scopus and SciVal) and Scimago (the research group using Scopus data but not belonging to Elsevier) can work together on them. It is the authors' hope that this potential improvement can be discussed with colleagues from different fields and, if an agreement is reached about their relevance, considered by Elsevier and Scimago.

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Declarations

Conflict of interest The authors have no competing interests to declare that are relevant to the content of this article.

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