Article

Entrepreneurship and Innovation in Soccer: Web of Science Bibliometric Analysis

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Abstract: According to the existing literature, there is growing interest in the sports industry by individuals involved in entrepreneurship and innovation. However, no bibliometric analyses on the importance of and interest that these individuals have in the football industry have been conducted. A total of 220 articles and reviews retrieved from Thomson Reuters Web of Science (Core Collection™) between 1997 and 2019 were analysed. These articles were published in 169 different journals by 609 authors from 340 different institutions in 46 countries. The following basic bibliometric analyses and co-occurrence networks were carried out: co-authorship and co-words. As a result, four clusters that summarise the following four different thematic areas were found: (1) football, entrepreneurship and social development, (2) football, innovation and management, (3) football, efficiency and new technology, and (4) football, injuries and innovation in rehabilitation. A thematic analysis of the four clusters found was carried out. Finally, practical implications and future lines of research were presented.

Keywords: soccer; football; innovation; entrepreneurship; bibliometric analysis; performance

1. Introduction

Globalisation, increasing competitiveness and the emergence of new sports disciplines have forced sports organisations to develop innovative ideas [1]. "Innovation represents new ideas and changes to sport organisations, coaching, sports events, performance and new competitive advantages" [1] (p. 292). The sports sector is considered a competitive market [2], so it is necessary to reinvent itself to differentiate itself from other sports providers [3] and achieve social and economic sustainability. The common objective of any type of sports organisation is to attain a market positioning and achieve the sustainability of its organisation. Nowadays, due to the dynamic and competitive market, innovative and proactive strategies are necessary. In this context, innovation is related to the management, production and marketing of products or services [4] and can provide vital solutions on the way to improve performance and sustainability [5]. A sports organisation, by its nature, in addition to being characterised by the pursuit of economic and social performance, needs to achieve sporting performance [6]. By idiosyncrasy, professional and non-professional sports clubs try to carry out strategies that improve their sports performance. In this context, innovation and the implementation of new technologies play an important role in football.

Similarly, in this dynamic environment, entrepreneurship is a vehicle to develop economic efficiency [7] and achieve the necessary economic sustainability [8]. According to Ratten [4] (p. 58), "Entrepreneurship is an integral part of sports management and creates a competitive advantage for

people and organisations involved in sport". Sports entrepreneurship has attracted the attention of academics and professionals in recent years due to its importance in a strong competition context, however, "is still in its infancy" [9]. Entrepreneurship and innovation play significant roles in sports development [10]. Although innovation is a factor in entrepreneurship, it has been widely considered on an individual level in the field of sport [11–13].

Mediatisation and big data have helped to position football as the king of sports. Today, football moves large masses of fans and money, so it is necessary to take an active position from the entrepreneurial perspective in order to not lose the attention of the fans [13]. During the 1980s, business-oriented entrepreneurs appeared in football clubs [14]. It was from there that football went from being a sport discipline to professionalizing organisations through specialised training and skills, complexity and exclusivity [15]. In this context, entrepreneurship and innovation are perfect allies to improve the identity of the sports organisation and the players, in order to maximise the overall performance.

The role of sports has been widely considered from an entrepreneurial perspective [16] due to its growing importance in different spheres of today's society. However, although soccer is considered one of the most practised and followed sports worldwide [17], it is still in the early stages of its study from an entrepreneurial perspective. Currently, football is the sport with the largest amount of participation, repercussions and income generated worldwide, with influence not only in the sports aspect but also in the social, economic and even cultural aspects. According to Louzada, Moiorano and Ara [18], approximately 270 million people (including officials and referees) are actively involved in football, leading to a stratospheric economic and social impact. However, this popular game seems to have no limit in terms of influence, as one of the main objectives reported by FIFA [19] is that by 2026, more than 60% of the world's population will participate in the game to some extent.

Due to this degree of importance, football, referred to in this study as either football or soccer, encompasses several independent factors that act in a coordinated manner toward the same outcome. Soccer involves a large number of people and organisations and is considered a highly competitive sector. Hence, innovative strategies and an entrepreneurial attitude are vital to attain a competitive advantage and achieve the sustainability that organisations desire after a crisis like the one that occurred years ago. Nevertheless, football can be approached from two different perspectives: professional football and non-professional football. It is undeniable that sports, in general, have special characteristics. These characteristics, together with new technologies and globalisation, have helped make football a well-known sport worldwide. Because of this popularity, football has traditionally been widely used for different educational and social purposes. These social objectives include the formalisation and development of important social difficulties, such as fights against racism [20] and anti-Semitism [21], facilitation of the process of inclusion of refugees in another country [22] and vulnerable groups of expatriates [23], or the empowerment of the female collective [24]. These objectives are only examples of the social power of this sport worldwide.

On the other hand, professional football involves important leagues, tournaments and events that attract masses of individuals worldwide [25]. A clear example of this type of event is the 2018 FIFA World Cup in Russia, in which more than 3,030,000 tickets were sold and on average, 98% of the seats in the 12 Russian stadiums were filled [26]. It is also important to note the large number of fans who follow football, which is currently a mass phenomenon, even in countries where soccer is not the most popular sport [27]. In addition, the number of fans is continuously increasing, as reflected in the data on the latest football world championships; the number of fans increased from 5.2 million for the 2014 FIFA World Cup in Brazil to a total of 7.7 million for the 2018 FIFA World Cup in Russia [26]. As expected, "professional sport is indeed a hyper-competitive environment, which produces constant pressures on organisations to discover and exploit new opportunities to survive, grow, and win competitions" [28] (p. 70). This competitiveness may be one of the reasons why football must involve constant change and innovation. One of the most recent important technological innovations implemented is the *video assistant referee* (VAR), which uses real-time tracking data to

make instant decisions at a later time. This technology was created and implemented to increase competitiveness in professional competitions. Similarly, electronic performance and tracking systems (EPTS) have been introduced recently.

However, despite the importance of football currently and the important technological innovations and entrepreneurial aspects that must be developed to maintain the current levels of competitiveness and sustainability and interest of the society, there are no studies that have investigated the origin and evolution of innovation and entrepreneurship in football from an academic perspective. Thus, this study has two main objectives: (i) to identify and analyse the evolution of articles related to entrepreneurship and innovation in football and (ii) to study the thematic areas related to the search carried out. To that end, a bibliometric analysis will be conducted. Bibliometrics, as it is now known, originated in the early 20th century. However, although bibliometric studies have evolved, they essentially involve analysing existing bibliographic material [29] and representing it in an explanatory and graphical way. Bibliometric analysis has two important uses: performance analysis of study area and science mapping [30]. In this way, the visions of the most important authors, journals, institutions, countries and publications are represented, taking into account the frequency of appearance and the number of citations received. This method is considered an instrument for priority analysis in different fields of science [31]. However, in order to provide a complementary qualitative perspective, this study will be complemented by a thematic analysis of the four clusters found.

Finally, the structure of the present study after the introduction section is as follows: the data collection and methods (Section 2), results and discussion (Section 3), conclusions, limitations and future lines of research (Section 4), acknowledgements and bibliographical references.

2. Materials and Methods

All data analysed in this article were retrieved on 31 December 2019 from the Thomson Reuters Web of Science database (WoS), specifically from the Web of Science Core Collection™, the main component covering a wide range of high-impact journals and high-quality articles that were previously reviewed by experts in the fields of study [32]. For the search, the terms football*, soccer*, innovate* and entrepreneur* were used in the topic search field, without limitations on the publication year or language of the documents. The previous terms have been used since innovation is the most recognised dimension of entrepreneurship [4], thus thinking that we would include the largest number of interesting documents in the search collection. Terms entered in the topic field are searched in the titles, abstracts, keywords (provided by the authors) and KeyWords Plus® (index terms automatically generated from the titles of articles cited by the Web of Science). Moreover, Boolean operators (AND-OR) were used to optimise the search for related documents.

Therefore, in the search field topic, the following terms were entered [(football* OR soccer*) and (innovate* OR entrepreneur*)]. In the first stage, 435 results met the predetermined search criteria. However, a criterion for the type of document was established. Only articles and reviews were considered in this study; therefore, five book chapters, three early access articles, 90 proceeding papers, six editorial materials, three meeting abstracts and a book review were excluded. Therefore, the total number of articles and reviews included in this study was 345, 323 articles and 22 reviews, which were published between 1993 and 2019.

However, because the word "football" can refer to different sports, the abstracts of the 345 documents were analysed. Afterward, 47 articles and three reviews were excluded because they referred to American football, the National Football League (NFL) and the National Collegiate Athletic Association (NCAA); 20 articles were excluded because they referred to Australian football; two articles were excluded because they referred to Gaelic football, and; 41 articles and 12 reviews that were not related to football (soccer) or innovation and entrepreneurship were excluded. They had only been added by KeyWords Plus, but the terms used for our search did not appear throughout the text or they included the search terms in the abstract, but were not related to the area of study. In the end, a total of

220 related articles and reviews were analysed. For analysis, the data were downloaded in plain text with the complete record and references cited.

To perform a bibliometric analysis, there must be a set of selected nodes and connections [33]. In this case, the nodes were the published articles, authors, citations and keywords, and the relationships between the nodes were the connections. Connections can also occur between words or authors; hence, co-word and co-authorship analyses were performed. The 220 records were downloaded as plain text files for use in HisCite (Software LLC, New York, NY, USA, version 10.12). However, the data were previously reviewed to eliminate duplicate data, review incomplete data, and aggregate the articles with authors, countries, journals, and institutions that referred to the same content but had been reported differently. First, basic bibliometric analyses were carried out to identify the authors, countries, journals and institutions with the largest number of articles and citations. In this study, qualitative indexes were considered: global citation score (GCS) and local citation score (LCS) [34]. GCS includes the number of citations the document has received in the Web of Science Core Collection, and, LCS is related to the number of citations that a document (always included in our search) has been cited by other different documents within the same collection [35].

Second, the co-occurrence networks between the authors and keywords were analysed by a similarity visualisation perspective (VOS) and the algorithm provided by VOSviewer [36]. This software was used to analyse and represent the existing relationships and networks between the authors and keywords.

Figure 1 shows the methodology followed, which involved 5 steps: (step 1) the keywords related to football/soccer, entrepreneurship and innovation were identified. Afterward, the search was defined, (step 2) 435 results were found, and after the analysis, 220 articles were finally included. (step 3) The articles were categorised by year, author, number of citations, journal, country and institution. (step 4) The co-authorship, co-citation and co-word maps were created. (step 5) The content on the networks was analysed, and the results were obtained.
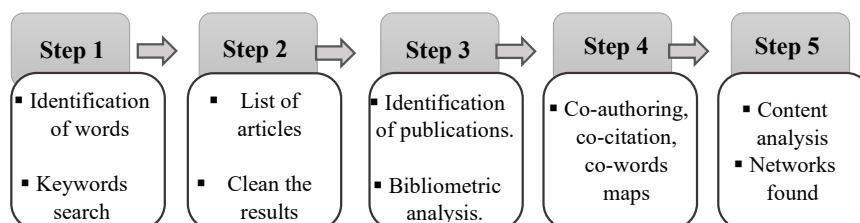

Step 1	Step 2	Step 3	Step 4	Step 5
▪ Identification of words ▪ Keywords search	▪ List of articles ▪ Clean the results	▪ Identification of publications. ▪ Bibliometric analysis.	▪ Co-authoring, co-citation, co-words maps	▪ Content analysis ▪ Networks found

Figure 1. The bibliometric analysis process.

3. Results and Discussion

In the present study, after the data retrieved were organised, a total of 220 articles published in 169 different journals between 1997 and 2019 were analysed. Considering the results and as shown in Figure 2, an increasing trend can be observed from 2015 to the present; 65.45% (n = 144) of the total articles were published in the last five years (2015–2019). In fact, from 1997 to 2010, only 35 articles (15.90%) had been published, but since then, an increasing trend in the number of publications has been observed (Figure 2). However, the number of articles is extremely low (average of 10 articles published per year since 1997), so it can be considered a "niche" study area [37]. The change in the number of articles took place in 2011, with an increase from four articles in 2010 to 13 articles in 2011. This increase may be due to the impact of the global economic crisis that forced academics and professionals to analyse innovative strategies and develop entrepreneurial attitudes to maintain the sustainability of their organisations.
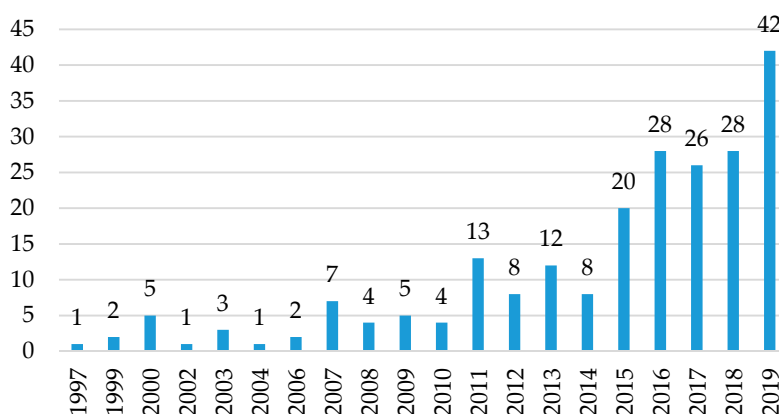
Figure 2. Number of articles published per year (1997–2019).

The results suggest that football is a subject that has aroused the interest of academics and professionals in recent years, although it is not possible to state unequivocally whether this trend will continue in the coming years. However, according to Price's law [38], the process of research involves four phases: (i) pioneers begin to publish on a field of research, (ii) there is exponential growth since many academics are attracted to the subject of study, (iii) there is a consolidation of knowledge and research related to the subject, and (iv) there is a decrease in the number of publications. Considering the above process, it can be considered that football is currently at a point of interest for academics and professionals, so the number of related publications is constantly growing compared to previous years. The data obtained confirm that the growing interest over recent years towards entrepreneurship and innovation in the sports industry [16] is also reflected in one of the most important sports in the world, football/soccer [17,28].

3.1. Analysis of the Authors by the Number of Publications and Number of Citations

Considering the 220 articles analysed in this study, there were a total of 609 authors from 46 countries who belonged to 340 different institutions. Table 1 shows the authors with the highest number of published articles on entrepreneurship and innovation in football/soccer. The order followed in Table 1 was (i) the highest number of publications to identify the productivity of the author in the analysed field of study and (ii) the highest number of citations, which is frequently used to analyse the impact of the papers [39] and the researchers.

Table 1. Authors with the highest number of publications in the search (≥ 2).

Author	Affiliation	No.	LCS	GCS	GCS/No.
Esson, J	Loughborough University (UK)	3	6	54	18
Lemmink, K	University of Groningen (Netherlands)	2	1	160	80
Jones, GA	Digital Imaging Research Centre (UK)	2	1	55	27.50
Orwell, J	Digital Imaging Research Centre (UK)	2	1	55	27.50
Ren, J	Northwestern Polytechnic University (China)	2	1	55	27.50
Xu, M	Xi'an Jiaotong Liverpool University (China)	2	1	55	27.50

No.: number of articles; LCS: local citations score; GCS: global citations score.

Therefore, the most important author was identified to be James Esson, who has three articles and a total of 54 citations in WoS (GCS). This author has published only these three articles, which are related to a common theme: the influence of football on the development and migration of the Ghanaian population. Second, Koen Lemmink has published two articles with a total of 160 citations in WoS. This author analysed the tactical performance of football teams using positioning data. Finally, Graeme A. Jones has published two articles in the same field of study as the last author. However,

despite the fact that some authors are more productive than others, there is no clear "reference author(s)", so it can be considered a fragmented area of study.

However, the most important authors considering the number of citations are shown in Table 2 and partially coincide with the authors with the highest number of publications related to entrepreneurship and innovation in football. The most cited authors are Benoît Demil and Xavier Lecocq [40], for their article "*Business Model Evolution: In Search of Dynamic Consistency*", which presents an innovative business model and its evolution based on the Arsenal FC. The authors shown in Table 2 were determined to be the most relevant authors in the search carried out because they have a large number of citations [40]; however, Peters, Kraker, Lex, Gumpenberger and Gorraiz [41] stated that much of the information collected in the existing literature is not cited in a rigorous manner.

Table 2. Authors with the highest number of citations (≥156).

Author	Affiliation	No.	LCS	GCS	GCS/No.
Lecocq, X	University of Lille (France)	1	0	430	430
Demil, B	University of Lille (France)	1	0	430	430
Lemmink, K	University of Groningen (Netherlands)	2	2	160	80
Pongsakornrungsilp, S	Walailak University	1	0	120	120
Schroeder, J.E.	Rochester Institute of Technology (USA)	1	0	120	120

No.: number of articles; LCS: local citations score; GCS: global citations score.

Taking into account the countries of authors, the UK is the country with the highest number of articles published (n = 50), with 521 GCS, followed by the USA (39) with 486 GCS, and Germany (23) with 226 citations. A total of 50.90% (n = 112) of the articles analysed in this paper were published in the UK, USA and Germany (Table 3). This result is understandable because the most important football leagues are located in the most productive countries in terms of the number of publications: UK (English Premier League), USA (Major League Soccer), Germany (Bundesliga), Italy (Serie A) and Spain (LaLiga).

Table 3. Primary countries in which the authors conducted research (≥8).

Country	No. Art	LCS	GCS	GCS/No.	%
UK	50	11	521	10.42	22.62
USA	39	2	486	12.46	17.65
Germany	23	0	226	9.83	10.41
Italy	20	0	98	4.90	9.05
Australia	15	3	110	7.33	6.79
Spain	13	1	17	1.31	5.88
China Republic	12	1	88	7.33	5.43
Switzerland	10	0	57	5.70	4.52
Portugal	10	1	93	9.30	4.52
France	10	1	481	48.10	4.52

No.: number of articles; LCS: local citations score; GCS: global citations score.

Of the 220 articles, 87.27% (192) were written in English, eight were in Spanish (3.64%), and five were in Russian (2.27%). This result is consistent with the results obtained in previous studies, as English is known to be the most frequently used language in WoS academic publications.

3.2. Analysis of the Main Journals and Publications

The journals that have published the most articles on entrepreneurship and innovation in football/soccer include "*Sport, Business and Management: An International Journal (SBM)*", with six articles, "*European Sport Management Quarterly*", with five articles, and "*International Journal of the History of Sport*", with five articles. However, when we took into account the total number of citations received,

the most important journal was found to be "*British Journal of Sports Medicine*", with 111 citations in WoS and four articles published (Table 4).

Table 4. Main journals (≥3 articles).

Journal	No.	LCS	GCS	SJR	HI
Sport, Business and Management: an International Journal (SBM)	6	1	17	0.28	12
European Sport Management Quarterly	5	0	45	1.28	24
International Journal of the History of Sport	5	1	3	0.35	17
British Journal of Sports Medicine	4	0	111	4.14	141
International Journal of Sport Policy and Politics	3	1	8	0.76	22
Journal of Organizational Change Management	3	1	38	0.60	62
Managing Sport and Leisure	3	0	8	0.29	29
Sustainability	3	0	5	0.55	53
PLoS ONE	3	0	7	1.1	268

No.: number of articles; LCS: local citations score; GCS: global citations score; SJR: Scimago Journal Rank: HI: h-index.

However, when we considered the number of citations received in the publications analysed in this study, we found that "*Long Range Planning*" had 430 citations in WoS (GCS) for a published article, "*Organisation Studies*" had 156 citations GCS for a published article, and "*Marketing Theory*" had 120 citations for a published article (Table 5).

Table 5. Most cited journals (≥107 citations).

Journal	No.	LCS	GCS	IF *	HI *
Long Range Planning	1	0	430	2.04	89
Organization Studies	1	0	156	2.36	130
Marketing Theory	1	0	120	1.52	55
British Journal of Sports Medicine	4	0	111	4.14	141
European Journal of Sport Science	1	1	107	1.17	41

[1] No.: number of articles; LCS: local citations score; GCS: global citations score; IF: impact factor; HI: h-index; * = extracted from Scimago Journal Rank (SJR).

Table 6 shows the papers in our search collection that receive the most citations in WoS (GCS). The most cited article to date was that published by Demil and Lecocq [40], which analysed a business model that valued sustainability and interactions between the activity components of an English football club (Arsenal FC); it had received a total of 430 citations in WoS by the day the search was performed. The second highest-ranked article in terms of the number of citations was published by Pongsakornrungsilp and Schroeder [42], which received 120 citations; in that study, the authors studied the role of online football fans and related communities in co-creating value. Finally, the third highest-ranked article is published by Frencken et al. [43] which analysed the position of the players on the field and predicted their performance.

On the other hand, the number of articles that have been cited within the documents included in the search carried out is 9091, that is, an average of 41.32 references were included in each article analysed in the present study. The most-referenced article in our search collection was the book published by Yin [44], with a frequency of 8, the second most-referenced was the article published by Harvey [45], with a frequency of 7, and the third most-referenced was the one published by Ratten [4], which provides novel information on the theory of sports entrepreneurship in sport management (Table 7).

Table 6. Most cited articles by external papers (≥35 citations).

Article	Year	Authors	Journal	LCS	GCS
Business Model Evolution: In Search of Dynamic Consistency	2010	Demil, B. Lecocq, X.	*Long Range Planning*	0	430
Understanding value co-creation in a co-consuming brand community	2011	Pongsakornrungsilp, S. Schroeder, J.E.	*Marketing Theory*	0	120
Oscillations of centroid position and surface area of soccer teams in small-sided games	2011	Frencken, W. Lemmink, K. Delleman, N. Visscher, C.	*European Journal of Sport Science*	1	107
Current Approaches to Tactical Performance Analyses in Soccer Using Position Data	2017	Memmert, D. Lemmink, K. Sampaio, J.	*Sports Medicine*	1	53
A body and a dream at a vital conjuncture: Ghanaian youth, uncertainty and the allure of football	2011	Esson, J.	*Geoforum*	3	35

LCS: local citations score; GCS: global citations score.

Table 7. Most referenced articles in our search collection (≥5).

Article	Year	Authors	Journal	*f*	∑C
Case study research: Design and methods	2003	Yin, R	Book	8	568
The roots of geographical change: 1973 to the present	1989	Harvey, D.	*Geografiska Annaler: Series B, Human Geography*	7	7
Sport-based entrepreneurship: towards a new theory of entrepreneurship and sport management	2011	Ratten, V.	*International Entrepreneurship and Management Journal*	6	205
Supporters, followers, fans, and flaneurs: A taxonomy of spectator identities in football	2002	Giulianotti, R.	*Journal of Sport & Social Issues*	6	825
Building theories from case study research	1989	Eisenhardt, K.M.	*Academy of Management Review*	5	55.121
Football Academies and the Migration of African Football Labor to Europe	2007	Darby, P. Akindes, G. Kirwin, M.	*Journal of Sport and Social Issues*	5	219
The English football industry: profit, performance and industrial structure	1997	Szymanski, S. Smith, R.	*International Review of Applied Economics*	5	350

f: frequency, ∑C: citations in Google Scholar.

3.3. Co-Occurrence Analysis

Co-occurrence analyses provide information about the relationship or interaction between two nodes. Each node can be a publication, an author or a keyword. In this study, co-authorship and co-words were analysed.

3.3.1. Co-Authorship Analysis

A large number of co-authored publications indicate a close relationship between authors within the same field of study, which may encourage collaboration in future research [46]. However, in the present study, the average number of authors for each publication analysed was 2.77 (609/220). It can be concluded that there is collaborative research in entrepreneurship and innovation in football, but the level of collaboration is not extensive, as shown in Figure 3.
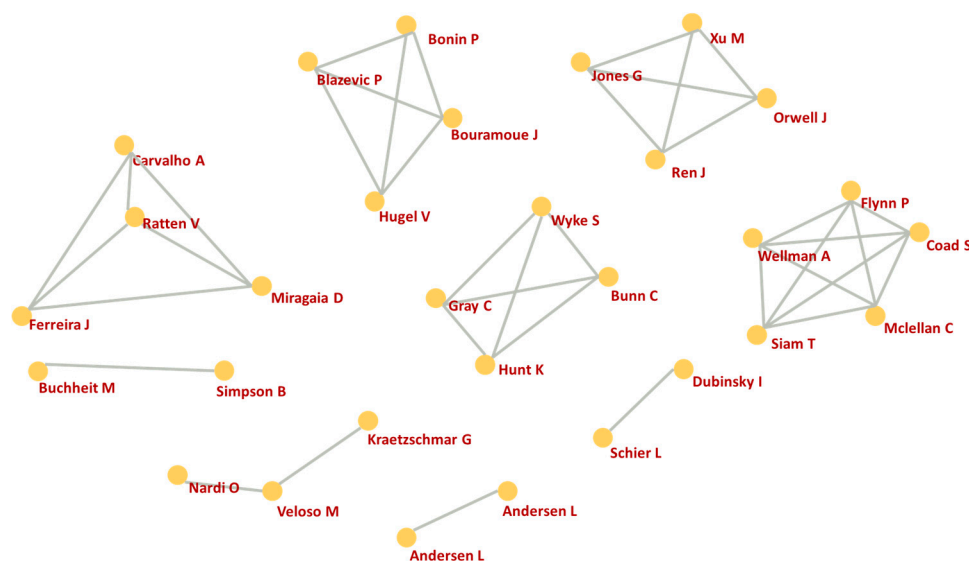
Figure 3. Co-authorship networks (≥2).

The minimum criterion established for representation is two co-authors. The five largest networks of co-authors included (i) Jones, G., Ren, J., Xu, M. and Orwell, J., who published articles related to the thematic area "performance and efficiency", and (ii) Bouramoue, J., Bonnin, P., Hugel, V. and Blazevic, P., who also published articles in the thematic area "performance and efficiency". The following network of co-authors, including (iii) Carvalho, A., Ratten, V., Miragaia, D. and Ferreira, J., published in the thematic area "innovation and management". (iv) Flynn, P., Wellman, A., Slam, T. and Mclellan, C. published articles in the thematic area "performance and efficiency", (v) another network of co-authorship with Wyke, S., Gray. C., Hunt, K. and Bunn, C. of whom published in the area of "performance and efficiency", (vi) there was a network between Dubinsky, I. and Schler, L., who published in the thematic area "entrepreneurship and migration policy", (vii) another network between Simpson, B. and Buchheit, M. published articles in the thematic area "performance and efficiency", (viii) Veloso, M., who has a network of co-authorship with Nardi, D. and (v) another network of co-authorship with Kraetzschmar, G., both of whom published in the area of "performance and efficiency", (ix) Dubinsky, I. and Schier, L published in the thematic area "entrepreneurship and migration policy", and finally, (x) Andersen L. and Andersen, L. published articles related to "injuries and rehabilitation"

3.3.2. Co-Word Analysis

Keywords have a fundamental role in the field of research since they can be a tool by which the evolution of a specific area of knowledge can be identified [47]. In the present study, a total of 1.092 keywords (keywords set by the authors and the keywords set by ISI WoS) were identified, of which 73.08% (798) were repeated only once, while only 292 (26.92%) co-occurred, i.e., they appeared more than once. Co-word analysis is "a content analysis technique that uses the words in documents to establish relationships and build a conceptual structure of the domain" [33] and it means that the concepts are closely related. Figure 4 reflects the main co-occurrence relationships present in the analysed articles.

In Table 8, the most cited keywords are listed; the most cited keyword was football/soccer (GCS = 756), followed by business (GCS = 461), evolution (GCS = 440) and consistency (GCS = 430) (Table 8). The criteria to select the keywords in Table 8 was, a frequency of appearance in the search collection equal or superior to 10 times for the most frequent keywords, and global citations in WoS (GCS) equal or superior to 140 citations for most cited keywords. The words football/soccer were considered as one word since they referred to the same sport discipline (F = 102; LCS = 12; GCS = 756). In the same way, in sport* all the variants were included, such as sporting, sports or sport (F = 51; LCS = 4; GCS =

327) and in innovate* were included innovative or innovation (F = 19; LCS = 1; GCS = 140). However, the keywords that receive more citations vary slightly from the most frequently used keywords.
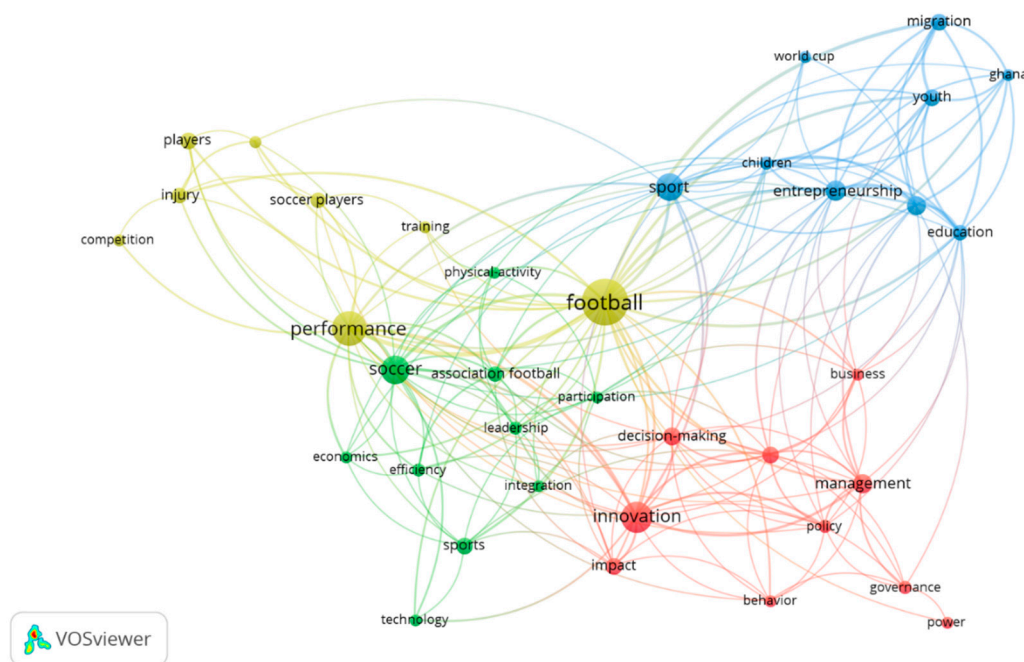

Figure 4. Co-word network.

Table 8. Most frequent keywords.

Most Frequent Keywords (≥10)				Most Cited Keywords (≥140)			
Keyword	*f*	**LCS**	**GCS**	**Keyword**	*f*	**LCS**	**GCS**
Football/Soccer	102	12	756	*Football/Soccer*	102	12	756
*Sport**	51	4	327	*Business*	10	1	461
*Innovat**	19	1	140	*Evolution*	4	0	440
*Entrepreneur**	14	5	226	*Consistency*	1	0	430
Professional	13	0	50	*Dynamic*	1	0	430
Elite	13	1	73	*Sport**	51	4	327
Development	12	4	83	*Entrepreneur**	14	5	226
Business	10	1	461	*Institutional*	2	0	165
Performance	10	1	77	*Innovat**	19	1	140

sport + sports; *f*: frequency; LCS: local citation score; GCS: global citations score.

Currently, with advanced analysis software such as VOSviewer, keywords can be identified, studied and represented in a systematic way. To show a co-word network, a map was created based on bibliographic data. To standardize the association values of the keywords, the "association strength" was applied [48], while the "Visualization of Similarities" (VOS) technique was used to position each term on the map in a graphic way [36]. Finally, to detect the different clusters, the VOSviewer algorithm gives the option to include different resolution parameters. In our case, we determined finally 37 keywords that were selected and the total strength of the co-occurrence links with other keywords was calculated.

After this analysis, four different clusters were differentiated by colours (blue, yellow, green and red). Figure 4 shows the graphical representation of the co-occurrence of keywords or co-words. This describes in a generalised way the structure of the knowledge or concepts that exist in the previous literature [49]. The analysis of the terms is represented by circles of different sizes and colours. The size of the circles represents the frequency of appearance of a specific term; that is, the larger the circle

is, the larger the number of occurrences in the titles and abstracts of the analysed publications [50]. The colours of the circles correspond to the different clusters found in the search. The distance between the circles (keywords) provides relevant information about their relationship; the shorter the distance between the circles is, the stronger the relationship. This relationship is determined by the number of occurrences in which the terms appear together in the titles and abstracts [51].

Thematic analysis was conducted considering the terms that appear in the total of keywords, i.e., the keywords set by the authors and the keywords set by ISI WoS. The criterion of inclusion was an occurrence frequency of ≥ 4 times. Finally, a total of 37 terms were used in this study. The software VosViewer found four different clusters according to the thematic area and differentiated by four different colours:

- Blue cluster—"Football, entrepreneurship and social development"; the following keywords stand out: Sport, entrepreneurship, migration, education and politics. This cluster is composed of nine terms and related to the importance of football in the politics of less developed countries (e.g., Ghana) and its relationship with migration, policy and education, which was analysed from an entrepreneurial perspective.
- Red cluster—"Football, innovation and management": Composed of 10 terms; the following keywords stand out: innovation, management, organisations and football. This cluster relates to innovation policies and the impact on the management of soccer-related sports organisations.
- Green cluster—"Football, Performance and efficiency": Formed by 10 terms, which relate to the introduction of new technologies and innovations to improve the performance and efficiency of athletes and organisations.
- Yellow cluster—"Football, Innovation in injury treatment and rehabilitation": Composed of eight terms, which refer to the study and implementation of innovations and new technologies to treat injuries of professional and non-professional football players in order to improve their overall performance.

Cluster 1—Blue: Football, Entrepreneurship and Social Development

In general, this cluster aggregates papers related to the social function of sport, with football as a central element of contributions to social development. Even so, we can observe two approaches: on the one hand, we find studies that analyse football as a means of educating and developing people [52–55] through entrepreneurs who developed educational initiatives in the form of schools or academies [56,57]. Innovative football-based programmes can promote ethical and civic values while improving the health and well-being of participants [54,58–60]. On the other hand, we find papers related to social development through football in less-developed countries and its innovations in those communities, such as Ghana [61–64] or South Africa [65]. Similarly, there can be connection and learning between countries through football [66,67], encouraging entrepreneurship among the population and a possible path to success.

Sport is an important agent of social change and development because of its democratic, educational and inclusive nature [68]. This is why it is considered a vital element in modern and developed societies [69], however, due to globalisation and the mediatisation of information in today's society, the influence of sport, and in particular football, has reached every corner of the planet. Football has worldwide media coverage and generates a huge amount of money, and this can be exposed in the less developed countries as a future opportunity that would ensure personal economic sustainability [70]. One of the most cited articles in this cluster is the paper published by [61], which relates the possible causes of the increase of professional football players in West Africa. Football is used as a lens to expand opportunities and general development for young people. Consolidating a career in football is seen as a source of income, but also to demonstrate masculinity. The article discusses that professional football players are "entrepreneurs of self". Moreover, the aspirations and "self-starter" aspects that lead people with fewer resources and chances of success to a career in football were also identified.

The football industry in Ghana is notable for exporting young Ghanaian footballers to foreign leagues, and the author with the largest number of publications in our research collection, James Esson, conducts a case study to understand the causes and consequences of this entrepreneurial business [63]. According to Poli, Ravenel and Besson [71], 46.7% of professional football players in the top five football leagues are expatriates. This percentage is very high and strengthens the importance of this cluster in the search carried out. This area of knowledge involves the ability of football to motivate and inspire people from different regions of the world [61]. In addition, it is closely related to the institutional logic that surrounds different multi-sport sports organisations, among which football stands out as a key sport [72].

"Football has become a bridge between communities, and a vehicle for mobilising national and transnational solidarities that cut across deep-seated ethnic divides" [56]. In the existing literature in our search collection, a collaboration between countries with football as both a means and an end has been a topic of interest for academics and professionals in recent years [67]. One country can learn from another in different facets in which it excels, with football in Ghana, for example, is an outstanding activity to show the world [67]. In the same way, British entrepreneurs (players and coaches) were of significant importance in spreading the word about football around the world, as studied by Smith [73] in his study. Football has important entrepreneurial activities associated with it, such as major events, associations, sports clubs, etc. The big football events could help the development of slums that need more innovative strategies to improve economic activity and sustainability [65,74]. Similarly, thanks to the help of entrepreneurs, very important teams and events have been created at a national level [75].

On the other hand, in the context of the development of underdeveloped societies, is the creation of academies and organisations such as the Mandela Soccer Academy, aspiring the imaginations and hopes of entrepreneurs and promoting the development of young people in the country [57]. The above authors, included in our search collection, analyse the social and developmental role of innovative football academies in underdeveloped countries such as Ghana. Through football, young people and adults can find a path to success and sustainability, both in their home countries and in countries to which they migrate [64]. However, it is not only important to develop people in their own countries but to achieve equal treatment and inclusion with immigrants when they migrate to other countries. Football, supported by the changing behavior of whites towards blacks, has facilitated the desegregation process of professional football teams [53]. This paper reviews the role of African Americans in professional football and suggests avenues for future research.

This area of knowledge is attracting the attention of academics, governments and professionals, as entrepreneurship in sports is a vital aspect of success [4]. Sport plays a major role in government policies, and social enterprises related to football can be included in social innovation policies. Reid [76], an article within our search collection, analyses the efforts and innovative strategies made by football social enterprises and their social impact on a deprived community. In the same way, the impact of football is so significant that it has been used as the main activity in innovative social programmes developed by organisations and governments to improve the health of African citizens [58], raise concerns about gender equality [54] or approach ethnic issues [21,55]. Moreover, football has been used as a vehicle for mental health interventions [77] or develop sexual health education [52] from an entrepreneurial approach. For example, innovative activities to achieve social goals, such as midnight football in disadvantaged slums, are carried out within these government sports initiatives to promote social change [78], or innovative football-related programmes have been developed at universities, having a significant social impact on students [79]. Similarly, Gray et al. [80] developed a programme called Football Fans in Training (FFIT) to achieve a reduction in obesity through an innovative sports programme using club facilities. In this way, the participants, generally sedentary, felt an added motivation by having a close relationship with their favourite football club. This innovative program achieved good results so it was implemented and studied in South Africa [58]. However, this area of study must continue to develop entrepreneurial initiatives to combat existing discrimination in football [59,60].

Cluster 2—Red: Football, Innovation and Management

In cluster 2, represented by the colour red, there are also 10 keywords. This cluster includes papers related to innovation and entrepreneurship in the management of sports organisations (usually football clubs) and major football events. The studies that conform to our cluster can be divided into two different areas: (i) innovation in sports organisation management, and (ii) entrepreneurship in sports events.

The development of pay-TV and the increase in the cost of the domain to offer football matches in free access could have been a determining factor in the dizzying increase of professionalisation in the football sector and its growing commercialisation [81] until sport became a business. Similarly, changes related to the signing of image rights and television contracts, the participation of capitalist entrepreneurs in football projects and the construction of football stadiums, have transformed the management of football into a business today. In our search, the most cited article analyses the concept of "business model evolution" taking as a case study a professional football team of the English Premier League. This concept can be used as a tool to develop changes and innovations in the organisation towards a business model [40]. The initiatives and strategies adopted by football clubs have been analysed due to the great importance that football has at an economic, sportive and social level in our society [72], and in the way that their football players have been defined as superstars and are at the top end of the market value distribution. In our search, authors like Hoeber and Hoeber [82] stand out, they analyse the innovations developed by community sports organisations (CSOs) (among them soccer clubs) and classify them according to their form, type and magnitude. This study improves knowledge about entrepreneurship and innovation in small nonprofit sports clubs.

In the same vein, Schuhmacher and Kuester [83] collected ideas from users who participated in an "idea contest" to improve new online services for football clubs. "An idea contest is an invitation by a firm to the general public or a targeted group to submit contributions to a specific topic within a given timeline" [83] (p. 428). The authors show that lead user analysis increases the potential for creating useful and attractive innovations for the organisation. Just as the opinion of users/members is important, so also the opinion of football fans is vital. Pereira et al. [84] proposed a theoretical model in which fans of football clubs throughout Brazil would express their perception of innovation and their intention to renew the annuity. This study provides information to club managers about the variables that influence the perception and behaviour of their fans.

Various authors have studied the role of fans of specific football teams on important marketing and management variables of the organisation. Pongsakornrungsilp and Schroeder [42] analyse the role of fans of specific football teams on the creation of value through their consumption practices, while Sotelo Gonzalez [85] analyses the Spanish professional football league from the innovative perspective of social media. In the same vein, Vimieiro [86] examines and discusses the importance of communication material and production projects run by football fans in Brazil. Fans create stories and news through various formats that manage to promote an innovative and close approach that brings added social value to the football industry.

However, due to the growing economic, sporting and social impact of professional football leagues, several authors have analysed the changes and innovations that have taken place in English football in recent years [87], leading to the creation of the English Premier League (EPL), "the most lucrative worldwide" [88] (p. 136). The process followed by sponsors to improve the new service development (NSD) of two EPL teams has also been studied. EPL has been studied from different perspectives, Olson et al. [89] analyse the structure, strategy and culture of football clubs competing in EPL. The authors analyse the innovation orientation within the organisational behaviour of sports clubs, providing information relevant to the entrepreneurial and sports environment. On the other hand, Buraimo, Forrest, and Simmons [90] present an innovative model that estimates attendance at EFL matches through quantitative variables.

Sport entrepreneurship is an important factor for sports organisations. Along these lines, Radaelli et al. [28] carry out a longitudinal analysis with sports directors of Italian Serie A football

clubs to find out the impact of adopting an entrepreneurial attitude as opposed to not adopting it. Along the same lines, Cohen and Peachey [91] examine the impact of a sport-for-development initiative and motivations towards becoming a social entrepreneur in Street Soccer USA. However, the overall performance of sports clubs and their sustainability is a common concern and goal for all of them. In this line, Miragaia et al. [92] analysed the influence of different variables on sports performance in European professional football clubs from a sustainable entrepreneurial approach, in the same way that Garcia et al. [93] evaluated the impact that marketing innovations could have on the income of football clubs, providing valuable information regarding economic performance. Finally, important aspects for football clubs have also been addressed, such as the analysis of an innovative and specific construction system for the pitch [94]. However, innovation and entrepreneurship in football is still in its infancy and several authors are analysing future changes and trends in professional football [95].

Another broad area of study within this cluster is that of large football events and stadiums, as these are generally related to important socio-cultural and economic opportunities for the host cities or countries [96]. This author analyses the "urban entrepreneurship" and security aspects of the European Football Championships 2008 in the eight host cities of Austria and Switzerland (Euro 2008), as well as a way of sustaining the urban entrepreneurial strategy realised in UEFA European Championship (Euro 2012). However, for an event to take place, the host city or cities must first be selected. In this context, Müller [97] analyses the important process known as "event seizure" of the 2018 World Cup in Russia. At a time when the hosts have been questioned, Ludvigsen [98] analyses the "multiple host format" by providing an innovative strategy to address the organisational and security implications.

In relation to major events, a large area of study emerges: football stadiums. In recent years, considerable efforts have been made to learn about innovative techniques and enterprising management models to achieve maximum profitability and make the most of their resources. Various authors have analysed innovative techniques in relation to structural aspects of football stadiums such as the roof [99,100] and even to transform the football stadium into a pro-environmental stadium design through innovations and initiatives developed by entrepreneurs, owners and investors [101]. However, this type of event and the construction or remodeling of stadiums involves the movement of large amounts of money, hence Eick [102] studied the shadows that exist after the celebration of the FIFA World Cup in Germany 2006, providing first a description of the "neo-communitarian entrepreneur" of the 20th century.

Cluster 3—Green: Football, Efficiency and New Technology.

In cluster 3, represented by the colour green, there are 10 keywords, such as soccer, football, technology, efficiency and sports. However, it should be noted that it is very close to the term performance because of its close relationship in terms of content. This cluster includes papers related to the analysis of technique and tactics during training and competitions through innovations or new technologies to achieve maximum efficiency.

Football sports clubs are characterised by their sporting objective, which is considered an idiosyncratic feature of competitive sports clubs, compared to other organisations in other sectors of activity. Hence, exploring new processes or materials to achieve greater efficiency has been the subject of study for many academics and professionals. However, this interest has increased in recent decades due to the extensive professionalisation of football sports clubs and their growing economic, sporting and social impact. In this context, player tracking has become one of the most developed aspects in the control of the load in football, so that seeking innovations and implementing them can have considerable improvements in the final efficiency of the player, the team, and, consequently, the football club [103]. In their study, the previous authors discuss the limitations of some traditional methods and present powerful innovative variables that can always be used from a cost/benefit approach. In the same line, other studies study the position of the player or the ball itself through innovative and proactive materials and processes. The most cited article in this cluster, investigates the positions of players on the field to know the flow of attack and defense in professional football for men. To do

so, they used an innovative player tracking system that provides important information, mainly about goal plays, and that can be implemented by other football clubs to improve their performance and sustainability [43]. Memmert, Lemmink, and Sampaio [104] offer in their paper an overview of position data in soccer, based on two professional soccer clubs, in addition to providing new ways to develop this important technique. One of the studies that has provided an entrepreneurial vision in training is that of Yang [105], in which he explores the innovative applications of the computer virtual reality technology in football, explaining practical cases and providing new information for the field of education.

However, to achieve high performance and improve the competitiveness of the team, planned, controlled and proactive training is necessary. Training can be very varied in physical demands, technique, tactics, etc, and these, in turn, are different from competitive matches. Therefore, Abbott, Brickley, and Smeeton [106] analyse the position of the players through a novel global positioning system (GPS) during training sessions of different physical demands and their comparison with the real competition. Similarly, Szwarc et al. [107] analyse goalkeeper information by proposing two innovative instruments in the sector: the goalkeeper's activity index (GAI) and an analysis of 5-min periods performed with a video tracking system, while Murgia et al. [108] analyse the effectiveness of perceptive training on goalkeeper skills by innovatively including a training protocol in which goalkeepers schedule training sessions on their own. Van Maarseveen, Oudejans, and Savelsbergh [109] explore the skills of talented female soccer players through two innovative methods of analysis and behavioural gaze data.

In addition to developing the skills of players individually and also as a team, another important aspect in the world of professional football is to detect talent. In this sense, Maanijou and Mirroshandel [17] introduce an innovative system of talent detection in football players. This entrepreneurial approach processes information available on the Internet through classification algorithms. This could help coaches, physical trainers and managers to categorise football players according to their ranking. This experimental research was carried out with the Persian first division league and obtained good results, which can be cautiously extrapolated to other international football leagues in the future. Similarly, Diquigiovanni and Scarpa [110] developed an innovative hierarchical grouping method to divide participants according to their playing style and predict team performance. This study was conducted with the Italian Serie A teams.

However, in addition to the players, the ball is one of the characteristics of football compared to other sports. In this context, several authors have analysed the trajectory and behaviour of the ball through innovative techniques and state-of-the-art cameras [111–114]. The valuable information provided by the above authors improves the knowledge of football, but can also be used from an entrepreneurial lens in the sports ball market.

However, it is not only footballers, coaches, managers and trainers who are important: referees also play a key role. In this context, Kolbinger and Link [115] presents the initiative developed in recent years for referees to use spray to improve compliance with the rules. However, in order to enforce the rules, decision making is fundamental in this collective, hence Samuel et al. [116] analyse a new and successful decision-making simulator for soccer referees that could become a potential training method for referees. Finally, in this cluster appear the soccer robot systems. Yoshida [117] introduced an innovative design approach of autonomous soccer robots designed to play in the RoboCup League. In the article he discusses different types of robots as a new system used in system life concept.

Cluster 4—Yellow: Football, Injuries and Innovation in Rehabilitation

In this cluster, represented by the colour yellow, there are eight keywords; the following keywords are considered the most important: soccer player, injury, performance and competition. This area of study is most related to injuries and recovery in soccer players, specifically those involved in professional soccer. It should be noted that the word soccer is closely related to word performance.

"The marketing of elite sport consequently produces extreme performance pressures on clubs, teams, managers, coaches, trainers, sports associations and athletes, especially those at the highest levels in their sports. One of the consequences is a conspicuous high rate of injury" [88] (p. 136). In this context, prevention is the best way to reduce the number of injuries, and therefore implementing new techniques and innovations can help improve both prevention and treatment, and has attracted the attention of academics and practitioners in recent years. There is currently a great deal of pressure on professionals and researchers to innovate and achieve the fastest and most effective treatments to treat professional football players' injuries, and thereby return them to peak performance. In this line, Faulkner et al. [88] analyse conventional therapies and access to innovative techniques in professional football and cycling.

The application of artificial intelligence (AI) has opened up an innovative and useful perspective in the prediction and treatment of injuries. Pares et al. [118] examine the effectiveness of Physium, an innovative device that could be used to prevent the risk of injury in football players at risk of injury according to the Saló Darder (SD) test. This research was totally innovative in the field of player injury prevention and recovery. For their part, Claudino et al. [119] conducted a systematic review of studies encompassing 11 techniques or methods that included the use of AI in the risk of injury in team sports, including football, providing practical implications for sports entrepreneurs. Sousa, Cabri, and Donaghy [120] conducted a detailed review to provide novel information on sports physiotherapy, with football as one of the most common sports to be studied. Twenty-seven percent of the documents analysed included innovative approaches that can improve understanding of the area of study, giving rise to novel practical implications.

But what factors can influence injuries? In this context, Contrò et al. [121] analysed the phenotype of professional football players to determine whether it influenced injuries and performance in a novel way. This cluster also included articles that analysed forms of injury prevention such as masks [122] or innovative operating and treatment techniques for more frequent injuries in football, such as pubalgia [123] or vestibular dysfunction after impact on the head [124].

Finally, several authors analysed new techniques and surgical procedures for football injuries, such as Contreras-Muñoz et al. [125] or Mithoefer et al. [126]. The latter authors investigated the evolution and results derived from new changes and innovations related to autologous chondrocyte implantation (ACI), a technique used in football and analysed in this article in football players.

4. Conclusions, Limitations and Future Lines of Research

The results of this study partly help us understand the current state and evolution of entrepreneurship and innovation in football. This information is important because it provides an overview of the publications, authors, countries, institutions and journals with the highest number of publications and the highest number of citations according to an analysis of a total of 220 articles. In addition, perhaps one of the greatest contributions is the identification of the thematic areas in which research related to innovation and entrepreneurship in football is developed. This allows, on the one hand, to identify the topics and areas of interest for researchers and academics, and on the other hand, to point out future lines of research in the perspective of the development and state of each of the clusters mentioned. The thematic areas addressed by each of them converge on a common theme, which is none other than the entrepreneurial ecosystem known as football, but they differ profoundly in the subject matter from which they are approached: from an approach to social development in which football can even function as a social elevator, to a technical-health or sports performance perspective, as well as a cluster related to innovation in sports management.

This variety shows how around a successful activity with a high social and economic impact, a high academic interest is developed from multiple fields. This high interest also has another, less friendly side: there are important gaps in the existing bibliography, most of the articles found are of a transversal nature and do not follow up the sample to analyse the evolution of performance measures, and the collaboration networks found among the authors are few and far between, which makes it

difficult to establish a coherent connection. Despite this, entrepreneurship and innovation in football continue to develop, showing an upward trend in growth, as evidenced by the evolution of the number of publications.

The study may have limitations that should be discussed. The search was carried out in Web of Science, as this database is widely used for academic searches and has been used in previous studies [32,50], but valuable information may have been missed in our study. Nevertheless, we ensured that the quality and impact of the publications are high. In the same way, a qualitative analysis was performed to determine whether to include or exclude articles in the study; this process may have involved biases, but it increased the credibility of the study results by excluding articles referring to American football, Australian football and Gaelic football and including only those referring to football/soccer.

In a bibliometric analysis, the information is analysed quantitatively; therefore, important qualitative information is not interpreted [49]. In future research, it is proposed that a qualitative study of the search results is conducted so that valuable information for academics and professionals can be obtained. This type of study may provide detailed information on the gaps in the existing literature. The area of sports, specifically football, from an entrepreneurial and innovative perspective, is still in its infancy, so it is important to focus attention on its theoretical and empirical development.

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