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Entrepreneurial ecosystems, knowledge spillovers, and their embeddedness in the sport field: a bibliometric and content analysis

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ABSTRACT

The aim of this article is to review the emerging research on entrepreneurial ecosystems and knowledge spillovers in general, and in the sport field in particular through bibliometric and content analysis. Thus, a bibliometric analysis of the articles published on the Web of Science has been performed. In the general field, a total of 31 articles were found, while in the sport field, the number was very limited. The evolution of papers published by year, country, and journal were analysed in both fields. Moreover, author co-occurrence analysis and bibliographic coupling were performed for the general field. Then, the content of the articles was analysed to identify the main topics within these research fields. The results highlight that both fields are novel areas of research, with the general field exhibiting great growth, while the sport field is still in its infancy. Finally, future avenues for these fields of research are presented.

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sport; bibliometric analysis;
content analysis

1. Introduction

The process of entrepreneurship requires that entrepreneurs interact with their environments to take advantage of opportunities (Ratten, 2014). Thus, entrepreneurs will succeed in their careers if they are supported by the business environment, so the entrepreneurial ecosystem has been recognised by different organisations, including governments, universities, academic researchers, and private consultants, as a key factor in this process (Hermanto & Suryanto, 2017). In fact, previous research has described how interaction among entrepreneurs and contextual elements could create the conditions to ensure long-term entrepreneurial success (Aoyama, 2009; Kenney & Patton, 2005; Neck et al., 2004).

Entrepreneurial ecosystems are defined as a set of interdependent actors and factors that are coordinated in a specific way to enable productive entrepreneurship within a specific territory (F. C. Stam & Spiegel, 2016). In the same vein, Spiegel, 2017, p. 50) defines entrepreneurial ecosystems as “combinations of social, political, economic, and cultural elements within a region that support the development and growth of innovative start-ups and encourage nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures”. Therefore, the concept of entrepreneurial ecosystems has become a very attractive term for policymakers and regional leaders, as the mix of public policies, social attitudes and financing can enhance entrepreneurial activity and lasting innovation as a seductive

promise for leaders on the basis of creating more sustainable growth (F. C. Stam & Spiegel, 2016).

On the other hand, a knowledge spillover (KS) is defined as knowledge created by one individual or a group of individuals that can be used by another, with or without compensation, but always for less compensation than the knowledge is worth (Fischer, 2001). Thus, KS agents are those in charge of the transfer and spillover of knowledge within organisations (universities, firms, government laboratories, etc.) and across organisational and spatial boundaries (Bergman & Schubert, 2005) that are able to promote innovation and cooperation (Montoro-Sánchez et al., 2011; Stejskal et al., 2016). The Knowledge Spillover Theory of Entrepreneurship (KSTE) was proposed by Audretsch (1995); it suggests that “firms exist exogenously and then endogenously seek out and apply knowledge inputs to generate innovative output. It is the knowledge in the possession of economic agents that is exogenous, and in an effort to appropriate the returns from that knowledge, the spillover of knowledge from its producing entity involves endogenously creating a new firm” (p. 179–180). According to the KSTE, start-ups are one way of spreading and converting knowledge into the societal utility (Acs et al., 2009). However, it is also interesting to consider another mechanism that is not in the original version of the KSTE, i.e., labour mobility, which consists of R&D workers who move between different firms (Braunerhjelm et al., 2018). According to these authors, this process can diffuse knowledge and

improve heterogeneous knowledge, generating more innovations within the firm.

Therefore, the holistic approach to entrepreneurship has become a new step in global entrepreneurship policy (Acs et al., 2014; Audretsch & Belitski, 2017; Autio et al., 2014), focusing on the role of the entrepreneurial ecosystem and the processes of its development, adaptation, and maintenance. However, Jones et al. (2018) point out that although there is a strong body of knowledge on entrepreneurial behaviours in the literature, there are still areas to be discovered. This could be the case for knowledge spillovers and entrepreneurial ecosystems and, more specifically, the case of sport knowledge spillovers and entrepreneurial ecosystems.

Then, focusing on sport, according to the broad definition of sport (Vilnius), sport corresponds to NACE code 93.1 “Sport activities” and includes all activities that provide inputs to the sport, meaning all industries that produce goods that are necessary to perform sport and the activities for which sport is an input, such as television broadcasting, hotels accommodating guests doing the sport. Thus, considering this definition, it should be noted that the sport sector has been growing in recent years; in fact, between 2013 and 2018, sport employment in European Union countries increased by 3.20% (Eurostat, 2019). Therefore, due to the high growth experienced in this sector, entrepreneurship in sport has gained special relevance in recent years (González-Serrano et al., 2019). However, according to Ratten (2019), although there has been an increasing interest by policymakers on the impact of entrepreneurship in various regions, few studies have focused specifically on the impact of entrepreneurial ecosystems and knowledge spillovers in sport.

Bibliometric analysis is a methodology for investigating published documents within a scientific category in a region or country (Ivanović & Ho, 2017). This methodology allows the identification of the current gaps in a specific research discipline, content-wise as well as in terms of geographical localisation (Gall et al., 2015). Moreover, this technique can play a key role in the decision-making process related to science and is widely used to evaluate the performance of journals, countries, and institutions (Van Nunen et al., 2018). Thus, in this paper, a bibliometric analysis has been applied to the field of entrepreneurial ecosystems and knowledge spillovers in general and in the sport context. Specifically, the relationship between innovation processes and the phenomenon of knowledge spillovers and entrepreneurial ecosystems in the sport sector is a very interesting and promising field of study. Hence, there are two main aims of this study. The first is to review the extant literature on entrepreneurial ecosystems and knowledge spillovers, perform a content analysis and suggest several research

directions for guiding future theoretical and empirical research, with the goal of contributing to a better understanding of this phenomenon at national and regional levels. The second goal is to review the state of the research on entrepreneurial ecosystems and knowledge spillovers in the sport context to discover the current state of this sector and to shed light on future research.

Thus, this paper provides an overview of the main characteristics of entrepreneurial ecosystems and knowledge spillovers and their embeddedness in sport publications based on a bibliometric and content analysis. Combining different methods of analysis provides strength and some validity to these studies (Zanjirchi et al., 2019), which is very appropriate for a work that analyses a new discipline. In this sense, it is not uncommon for this type of analysis to deal with little data given the novelty of the topic (e.g., Spiegel-Rosing, 1977). The information presented by this analysis provides a clear image of the research progress achieved in these two fields of research, and it can help researchers and practitioners identify important influences from authors, journals, countries, institutions, references, and research topics.

The structure of this study is as follows. First, the data collection procedure and the data analyses of the information gathered in the search are presented. Second, the results of this study are divided into two groups: (1) the results of the research field on entrepreneurial ecosystems and knowledge spillovers in general and (2) the results of this research in the sport field are explained (sport entrepreneurial ecosystems and knowledge spillovers) and then divided into the results of sport entrepreneurial ecosystems vs sport knowledge spillovers. Third, the results obtained in this paper are discussed. Finally, the conclusions are presented, and future avenues for these fields of research are suggested.

2. Material and method

2.1. Data collection

The searches were performed on the Web of Science Core Collection™ using the following indicators (-1900–2019): Web of Science Core Collection, Current Contents Connect, Derwent Innovations Index, KCI-Korean Journal Database, MEDLINE, Russian Science Citation Index, and SciELO Citation Index. The WoS database was chosen because the impact factor remains the most commonly used assessment tool for ranking and evaluating scientific journals (Yang & Zhang, 2013) and because it is the world leader in the search for scientific citations and is widely used by global researchers in almost all domains of knowledge (Li et al., 2018).

All indexes were gathered from the online database run by Thomson Reuters, which contains academic publications and information regarding the authors and publications. In the four searches, the same filters and conditions were applied: (1) the search was performed in the topic field (TS), (2) the chronological filter end-year of 2019 was applied and (3) the “only articles” filter was applied.

Moreover, the following indices were also considered during these searches: Science Citation Index Expanded (1900 to present), Social Sciences Citation Index (1956 to present), Arts & Humanities Citation Index (1975 to present), Conference Proceedings Citation Index-Science (1990 to present), Conference Proceedings Citation Index-Social Science & Humanities (1990 to present), and Emerging Sources Citation Index (2015 to present). The search was conducted on February 15 2020. It is important to highlight that date of data collection because the database is constantly changing and updated (Liu et al., 2013).

2.1.1. General search

The first search performed was the general search using these research terms in the search string in the topic field: TS = ((knowledge* AND spillover*) AND (entrepreneur* AND ecosystem*)). With this search, 31 documents were retrieved. All the documents were revised to ensure that they were related to the topic, and it was not necessary to delete any of them.

2.1.2. Specific sport search

Second, a new search was performed adding the term sport to the search string leaving the search string as follows: TS = (sport* AND ((knowledge* AND spillover*) AND (entrepreneur* AND ecosystem*)). This search yielded only one article. Due to the limited results of this search, it was also decided to perform this search string separately: on the one hand, focusing only on the articles related to knowledge spillovers and sport and, on the other hand, focusing on the articles related to entrepreneurial ecosystems and sport.

Thus, the third search string was as follows: TS = (sport* AND (knowledge* AND spillover*)) yielded five results, which were reviewed to ensure that they were related to the topic. Four articles were deleted because they were not related to the topic, leaving finally one article about this topic. Subsequently, the four-search string was performed using the following terms: TS = (sport* AND (entrepreneur* AND ecosystem*)). This search yielded seven results, although these documents were revised and three articles were deleted. Thus, four articles were found on this topic.

2.2. Data analysis

Once the different advanced searches were performed, they were saved in a plain text format with the

following fields: Authors, Keywords, abstract, Year Published, Subject Category, Publication Name, ISSN, and Times Cited. Then, the first step was to review and standardise all the gathered data. Thus, duplicated records and unknown data were resolved, and author names were standardised.

In this bibliometric analysis, quality, and quantity indicators were considered to analyse the research productivity of the knowledge spillovers and the entrepreneurial ecosystems fields of research. The quantity indicators considered were the number of articles published, while the quality indicators used was the citation frequency (Shen et al., 2018) considering both the local citation score (LCS) and the global citation score (GCS). The LCS refers to the number of times that an article included in a collection has been cited by other articles within the same collection, whereas the GCS refers to the number of times that a paper included in a collection has been cited in the whole WoS Core Collection (Garfield et al., 2003).

Then, the second step was to calculate the basic quantitative (number of articles published by year, by author, by country, by an institution and by the journal) and quality indicators previously presented (the LCS and GCS by author, year, country, institution, and journal) using the statistical software HistCite (version 2010.12.6; HistCite Software LLC, New York). This step was conducted on the four searches performed.

In the general search (but not the other searches because the number of publications was very limited), the third step was to perform the co-occurrence analysis to determine the relationship between authors; BibExcel (version 2011.02.03; Olle Persson, Umea University, Umea, SWE) was used to prepare the data to create the networks, and Pajeck (version 3.14, 2013.11.12; Batagelj and Mvar, University of Ljubljana, Ljubljana, Slovenia) was used to visualise the data and create the bibliographic maps. For a correct interpretation of these bibliographic maps, it is important to bear in mind that the size of the vertices indicates the frequency (in this case, the number of articles published by the authors), with the size being larger if the frequency is higher. Moreover, the thickness of the lines indicates the relationship between the vertices; thus, the thicker the line is, the higher the number of co-occurrences between these vertices (authors).

Then, in the general search, the fourth step was to perform a bibliographic coupling analysis to identify the different clusters. Bibliographic coupling is a kind of citation analysis that measures the similarity between the two articles by identifying the number of references they share. It is based on the assumption that the degree of common references between two articles indicates similarity in the topic investigated (Vogel & Güttel, 2013). Because the

number of cited references in the articles does not changeover time, bibliographic coupling, in comparison with other bibliometric tools, is not influenced by the time when the analysis is performed (Bartolacci et al., 2019); thus, it is considered to be particularly useful when adopted to inform systematic literature reviews (Caputo et al., 2018). The bibliometric software VOSviewer (Van Eck & Waltman, 2017) was used to perform this analysis. For its correct interpretation, it is necessary to consider that each cluster is associated with a colour, and the darker the colour of the cluster, the higher the density of the cluster is. Likewise, the distance of the articles must be interpreted as an indication of the relationship between the references cited. When the articles belong to the same group, it is suggested that they are strongly linked as a group based on their shared references, indicating that a given group represents a current stream of research on a particular topic. As a result of this bibliographic analysis, five groups were identified with the general data from this study.

Finally, the fifth and last step was to perform a detailed examination of the five groups to detect, from a qualitative point of view, the topics of the papers grouped together. Each article was read, the relevant parts of the text were selected, and the content was analysed and summarised. The same procedure was also carried out with the articles about (1) sport entrepreneurial ecosystems and knowledge spillovers, (2) sport entrepreneurial ecosystems and (3) sport knowledge spillovers.

3. Results

This section will present and analyse the results of the two bibliographic searches performed. First, the results of the bibliographic search for “entrepreneurial ecosystems and knowledge spillovers” will be presented, and second, the bibliographic search for “sport entrepreneurial ecosystems or sport knowledge spillovers” will be presented.

3.1. Entrepreneurial ecosystems and knowledge spillovers

The results of the bibliographic search on entrepreneurial ecosystems and knowledge spillovers are presented below. The articles published by year are presented first, followed by the authors with the highest number of articles published, the universities and countries that have published the most articles on this subject, the articles of the search, the networks of co-authors and finally, the keyword networks.

3.1.1. Articles published by year

Analysing the number of articles published by year, Figure 1 shows that the first article published on this subject is quite recent (2015), and since then, the number of articles published has increased to 21 articles in 2019. In relation to the number of global citations received over the years throughout the WoS, the 2017 articles are those that have received the most citations over the years (GCS = 113), as well as the most citations within searches (LCS = 10).

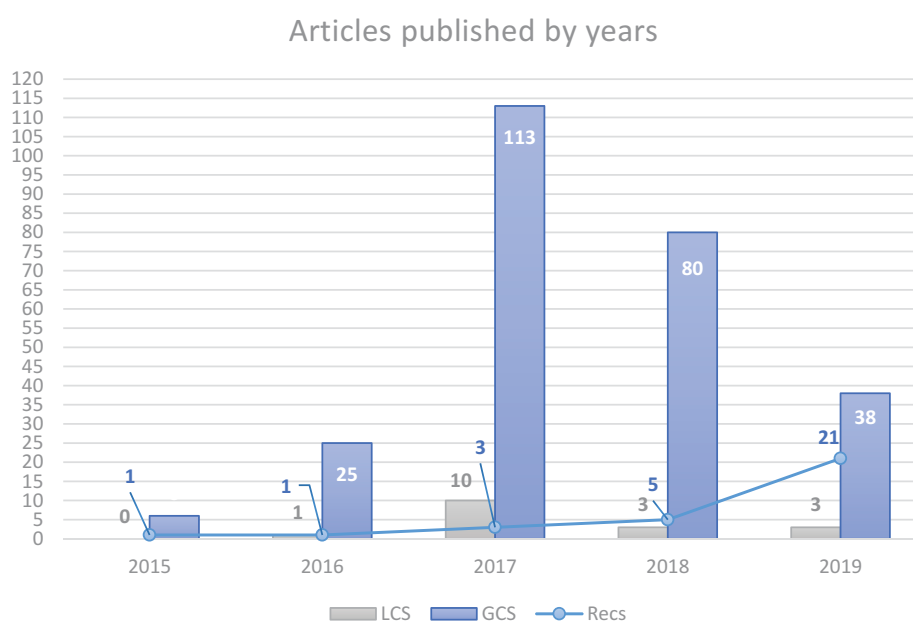


Figure 1. Chronological evolution of articles published about entrepreneurial ecosystems and knowledge spillovers, TLCS and TGCS.

Recs-Number of published articles; TLCS-Total Local Citation Score; TGCS-Total Global Citation Score

3.1.2. Authors

A total of 73 researchers who have published a specific article on this subject. Regarding those who have published the most articles, as can be observed in Table 1, Belitski is in the first position with three articles published, followed by Meoli, Vismara and Vonortas, with two articles published. Regarding the other researchers, they have only published one article on this subject in this database.

As for the author who has received more citations highlights, Belitski has 10 citations within the search made (LCS) and 97 citations throughout the WoS (LCS), followed by Audretsch, with eight citations within the search made and 77 citations throughout the WoS. Table 2 shows the researchers who have published the most articles and have received the most citations.

3.1.3. Institutions

A total of 53 institutions have researchers who have published an article on this subject. Institutions or universities are represented by means of authors' affiliation. In relation to the universities that have presented the highest number of publications on this subject, Augsburg University is in the top spot (see Table 3). Additionally, the George Washington University, National Research University Higher School of Economics, University of Bergamo, University Estadual Campinas, University of Minnesota, University of Reading and Utrecht University stand out, all of them

Table 1. Authors with more publications and number of citations (LCS & GCS) about entrepreneurial ecosystems and knowledge spillovers.

Authors	Institution	Country	Recs	LCS	GCS
Belitski M	Henley Business School	UK	3	10	98
Meoli M	Università degli Studi di Bergamo	Italy	2	0	3
Vismara S	Università degli Studi di Bergamo	Italy	2	0	3
Vonortas NS	George Washington University	USA	2	0	1

Recs-Number of published articles; LCS-Total Local Citation Score; GCS-Total Global Citation Score

Table 2. Authors with a higher number of citations in the WOS (GCS) about entrepreneurial ecosystems and knowledge spillovers.

Authors	Institution	Country	Recs	LCS	GCS
Belitski M	Henley Business School	UK	3	10	98
Audretsch DB	School of Public and Environmental Analysis, Indiana University	USA	1	8	78
Autio E	Imperial College Business School	UK	1	2	61
Nambisan	Weatherhead School of Management	USA	1	2	61
Thomas LDW	LaSalle Universitat Ramon Llull	UK	1	2	61
Wright M	Imperial College Business School	UK	1	2	61

Recs-Number of published articles; LCS-Total Local Citation Score; GCS-Total Global Citation Score

Table 3. Universities with a higher number of publications and citations (LCS & GCS) about entrepreneurial ecosystems and knowledge spillovers.

University	Recs	LCS	GCS	LCS/Recs	GCS/Recs
Augsburg University	3	0	14	0	4.67
George Washington University	2	0	1	0	0.50
National Research University Higher School of Economics	2	0	1	0	0.50
University of Bergamo	2	0	2	0	1
University Estadual Campinas	2	0	1	0	0.50
University of Minnesota	2	0	5	0	2.50
University of Reading	2	9	90	4.50	45
Utrecht University	2	0	3	0	1.50

Recs-Number of published articles; TLCS-Total Local Citation Score; TGCS-Total Global Citation Score

with two articles published. However, the university that has the highest number of citations throughout the WoS for articles on this subject is Reading University (GCS = 90).

3.1.4. Country

At the country level, researchers from 20 different countries have published articles on this subject. The countries are related to the authors' affiliation (see Table 4). Thus, with regard to the countries that have published the greatest numbers of articles, with eleven articles published, the USA is the country with the highest number of articles published, followed by Germany, Italy and the UK with five publications each, the Netherlands and Spain with four each, and Brazil and Russia with two each. In relation to the country with the highest number of citations received in articles on this subject throughout the WoS, the UK (GCS = 179) stands out in first place, followed by the USA in second place (GCS = 157) and the Netherlands in third place (GCS = 64).

3.1.5. Journals

A total of 18 journals have published an article on this subject. (see Table 5). The journal that has published the largest number of articles on this subject has been the "Small Business Economics", the "Journal of Technology Transfer" and the "Technological Forecasting and Social Change" with seven, five and three articles, respectively,

Table 4. Countries with a higher number of publications and citations (LCS & GCS) about entrepreneurial ecosystems and knowledge spillovers.

Country	Recs	LCS	GCS	LCS/Rec	GCS/Recs
USA	11	10	157	0.91	14.27
Germany	5	0	14	0	2.80
Italy	5	1	8	0.20	1.60
UK	5	13	179	2.60	35.80
Netherlands	4	2	64	0.50	16
Spain	4	2	26	0.50	6.50
Brazil	2	0	2	0	1
Russia	2	0	2	0	1

Recs-Number of published articles; TLCS-Total Local Citation Score; TGCS-Total Global Citation Score

Table 5. Journals that have published articles on about entrepreneurial ecosystems and knowledge spillovers.

Journal	No	LCS	GCS	LCS/ No	GCS/ No
Small Business Economics	7	1	18	0.14	2.57
Journal of Technology Transfer	5	9	96	1.80	19.20
Technological Forecasting and Social Change	3	2	26	0.67	8.67
Industrial and Corporate Change	2	0	3	0	1.50
Foresight and Sti Governance	1	0	0	0	0
Industry and Innovation	1	1	25	1	25
International Journal of Innovation and Technology Management	1	0	6	0	6
International Journal of Technology Management	1	0	0	0	0
International Small Business Journal- Researching Entrepreneurship	1	0	3	0	3
Journal of Management Development	1	1	13	1	13
Knowledge Management Research & Practice	1	0	0	0	0
Management and Organisation Review	1	0	0	0	0
Oeconomia Copernicana	1	0	6	0	6
Rae-Revista de Administracao de Empresas	1	0	0	0	0
Regional Studies Regional Science	1	0	0	0	0
Research Policy	1	1	7	1	7
Strategic Entrepreneurship Journal	1	2	61	2	61
Strategic Management Journal	1	0	1	0	1

followed by the journal “Industrial and Corporate Change” with two articles. The other 13 journals have published only one article.

In relation with the journal that has received the highest number of citations in the WoS and in the search done, “Journal of Technology Transfer” (LCS = 9; GCS = 96), followed by the “Strategic Entrepreneurship Journal” (LCS = 2; GCS = 61), the “Technological Forecasting and Social Change” (LCS = 2; GCS = 26) and the “Industry and Innovation” journal (LCS = 1; GCS = 25), were those that received the highest number of citations.

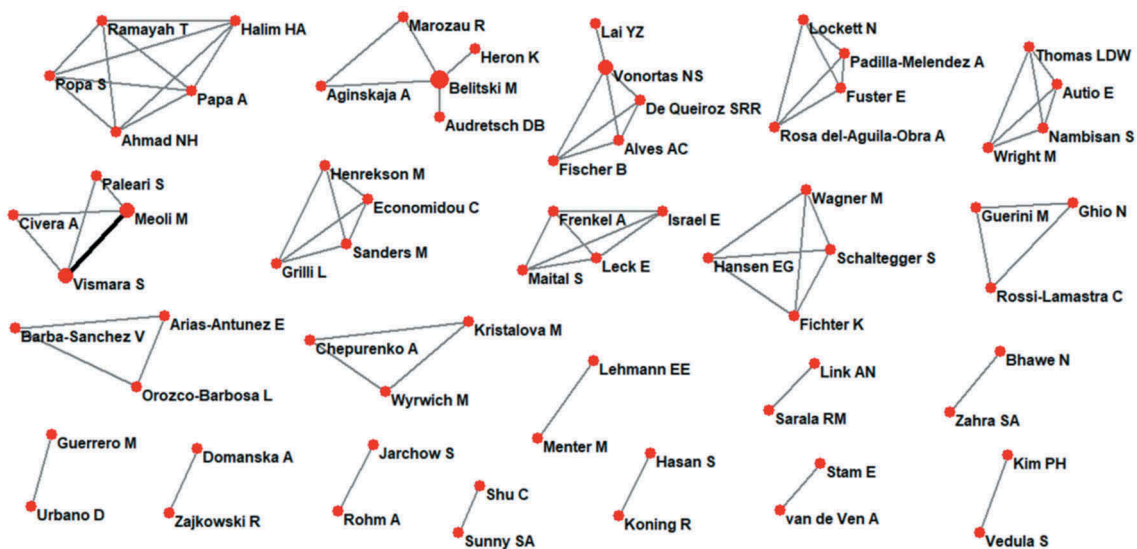
3.1.6. Co-authorship

Co-authorship networks are presented in Figure 2. As seen in the figure, there are 22 main co-authoring networks, three with five researchers, six with four researchers, three with three researchers and 10 with two researchers. The largest of these is made up of five researchers (Popa, Papa, Halim, Ramayah & Ahmad), with all thickness and all vertices of the same size. Then, there are five networks of co-authors of four authors: (1) Frenkel, Israel, Maital, and Leck; (2) De Queiroz, Fischer, Alves, and Vonortas; (3) Thomas, Wright, Nambisan, and Autio; and (4) Paleans, Vismara, Meoli, and Civera. In this last co-authoring network, the relationship between Vismara and Meoli stands out, as the thickness of their line indicates that they have collaborated the most among themselves, and the size of their vertices indicates that they have published a larger number of articles than the other researchers in the same network.

Finally, there are three networks of three researchers each: (1) Rosa del Aguila Obra, Fuster, Padilla-Melendez and Lockett; (2) Ghio, Rossi-Lamastra, and Guerini; and (3) Aginskaja, Belitski, and Marozau. In all of them, both the size of the vertices and the thickness of the lines are the same for all researchers who are part of this network.

3.1.7. Bibliographic coupling

As shown in Figure 3, the clusters are all interconnected, confirming the effectiveness of the search chain to investigate a coherent body of knowledge. Their boundaries are rather blurred, with borderline articles incorporating topics from more than one group. The results show five different yet interconnected topics within this field

**Figure 2.** Co-authored networks in the field of entrepreneurial ecosystems and knowledge spillovers.

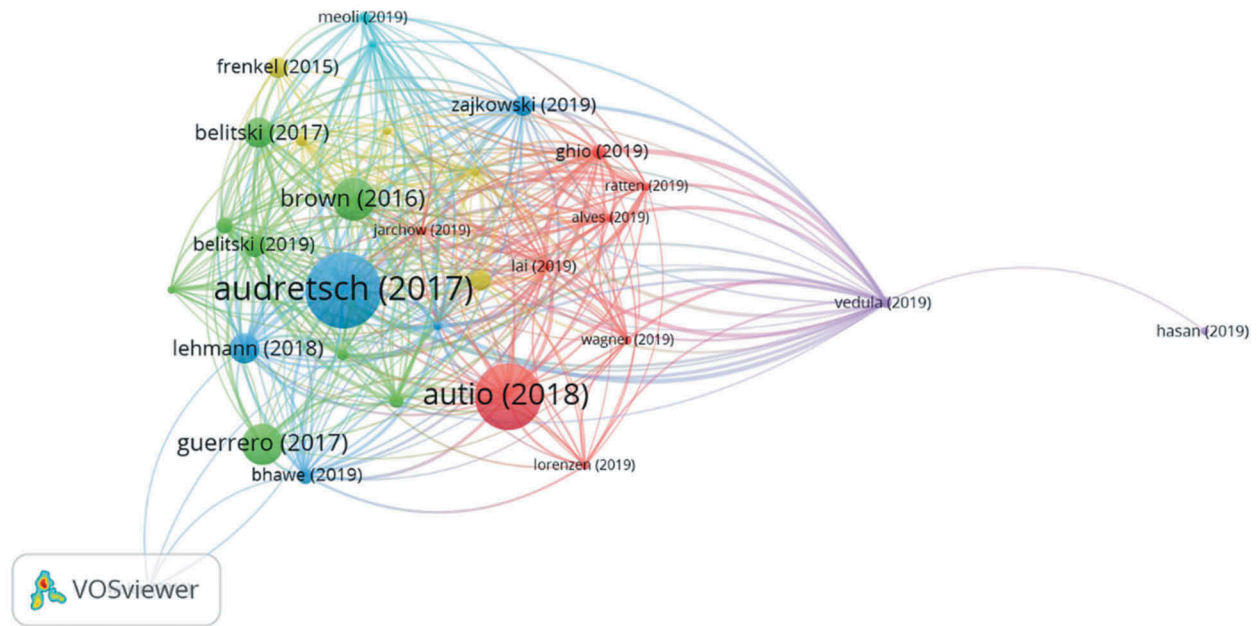


Figure 3. Bibliographic coupling of entrepreneurial ecosystems and knowledge spillovers clusters.

of study. All the articles in these clusters are shown in Table 6, and their contents will be analysed to identify the topics in each of them.

3.1.8. Cluster 1 (red)- Conceptualisation of entrepreneurial ecosystems and the mechanism that leads to its formation

This first cluster includes eight articles that emphasise the difference between entrepreneurial ecosystems and other types of clusters and innovation systems and analyse the factors that lead to the creation of entrepreneurial ecosystems. The articles often propose a theoretical analysis based on the analysis of the literature, but the majority of them are empirical.

The most cited article from this cluster is Autio et al. (2018) (64 citations). In this paper, the conceptual similarities and differences of entrepreneurial ecosystems relative to clusters, knowledge clusters, regional systems of innovation, and innovative milieus remain unclear. Finally, they suggest that entrepreneurial ecosystems differ from traditional clusters in different aspects and highlight how these distinctive characteristics set entrepreneurial ecosystems apart from other cluster types.

In the same vein, but from an empirical perspective, Alves et al. (2019) analyse the economic mechanisms that lead to the creation of entrepreneurial ecosystems through fsQCA techniques (specifically in Brazil) and focus on five dimensions of entrepreneurial ecosystems: Science and Technology, Human Capital, Market Dynamics, Business Dynamics, and Infrastructure. The results highlight the heterogeneous nature of ecosystems, highlighting that research universities, the intensity of knowledge-intensive jobs and the availability of credit are fundamental

conditions. The proximity of the main economic centre represents an important differential aspect between ecosystems. Lai and Vonortas (2019) work focuses on regional entrepreneurial ecosystems in China. They use a two-stage structural model distinguishing between factors that have a direct impact on entrepreneurial activities and those that have an indirect impact. They find that human capital, knowledge creation, and access to finance are the main factors that drive local entrepreneurial activity. New technology-based firms have a unique role in promoting sustainable growth in regional entrepreneurial ecosystems. The presence of research-intensive universities also has a positive impact on regional entrepreneurial ecosystems. Additionally, Ratten (2019) analyses the factors that create the entrepreneurial ecosystem but using a qualitative approach and focusing on sport factors. She explains how entrepreneurship is developed from a variety of factors related to knowledge spillovers resulting from sport (emotional attachment, cultural conditions, and societal attitudes).

Additionally, several articles in this cluster focus on the role of technology within entrepreneurial ecosystems. In the same vein, Ghio et al. (2019) investigate the interaction between three main elements of an entrepreneurial ecosystem: the local universities, the local financial system, and the individual attitudes of residents in the Italian context. The results showed that in provinces where residents tend to behave opportunistically, the relative presence of cooperative banks magnifies the positive effect of university knowledge on high-tech entrepreneurship. In contrast, this effect is negligible in provinces with less opportunistic residents. Finally, Lorenzen (2019) analyses how the emergence of a cluster in a global

Table 6. Articles, journals, and number of citations (TGCS) by clusters about entrepreneurial ecosystems and knowledge spillovers.

Year	Author (year)	Article title	Source	TGCS
Cluster 1 (red): 8 articles				65
2018	Autio E, Nambisan S, Thomas LDW & Wright M	Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems	Strategic Entrepreneurship Journal	61
2019	Ghio, N., Guerini, M. & Rossi-Lamastra, C.	The creation of high-tech ventures in entrepreneurial ecosystems: exploring the interactions among university knowledge, cooperative banks, and individual attitudes	Small Business Economics	3
2019	Alves, A.C., Fischer, B., Vonortas, N.S. & De Queiroz, S.R.R	Configurations of knowledge-intensive entrepreneurial ecosystems	Rae-revista de Administracao de Empresas.	0
2019	Jarchow, S. & Rohm, A.	Patent-based investment funds: from invention to innovation	Journal of Technology Transfer	0
2019	Lai, Y., & Vonortas, N. S.	Regional entrepreneurial ecosystems in China	<i>Industrial and Corporate Change</i>	1
2019	Lorenzen, M.	How early entrants impact cluster emergence: MNEs vs. local firms in the Bangalore digital creative industries.	<i>Management and Organisation Review</i>	0
2019	Wagner, M., Schaltegger, S., Hansen, E. G., & Fichter, K.	University-linked programmes for sustainable entrepreneurship and regional development: how and with what impact?	<i>Small Business Economics</i>	0
2019	Ratten	Sport entrepreneurial ecosystems and knowledge spillovers	<i>Knowledge Management Research & Practice</i>	0
Cluster 2 (green): 8 articles				78
2016	Brown, R.	Mission impossible? Entrepreneurial universities and peripheral regional innovation systems	Industry and Innovation	25
2017	Guerrero, M & Urbano, D	The impact of Triple Helix agents on entrepreneurial innovations' performance: An inside look at enterprises located in an emerging economy	Technological Forecasting and Social Change	24
2017	Belitski, M. & Heron, K.	Expanding entrepreneurship education ecosystems	Journal of Management Development	13
2018	Schillo RS	Research-based spin-offs as agents in the entrepreneurial ecosystem	Journal of Technology Transfer	4
2018	Ahmad NH, Halim HA, Ramayah T, Popa S & Papa A	The ecosystem of entrepreneurial university: the case of higher education in a developing country	International Journal of Technology Management	0
2019	Belitski, M., Aginskaja, A. & Marozau, R.	Commercialising university research in transition economies: Technology transfer offices or direct industrial funding?	Research Policy	7
2019	Link, A.N. & Sarala, R.M.	Advancing conceptualisation of university entrepreneurial ecosystems: The role of knowledge-intensive entrepreneurial firms	International Small Business Journal-Researching Entrepreneurship.	3
2019	Fuster, E., Padilla-Melendez, A., Lockett, N. & Rosa del-Aguila-Obra, A.	The emerging role of university spin-off companies in developing regional entrepreneurial university ecosystems: The case of Andalusia	Technological Forecasting and Social Change.	2
Cluster 3 (dark blue): 6 articles				102
2017	Audretsch, D. B., & Belitski, M.	Entrepreneurial ecosystems in cities: establishing the framework conditions.	<i>The Journal of, Technology Transfer</i>	78
2018	Lehmann EE & Menter M.	Public cluster policy and performance	Journal of Technology Transfer	13
2019	Zajkowski, R., & Domańska, A.	Differences in perception of regional pro-entrepreneurial policy: does obtaining support change a prospect?	<i>Oeconomia Copernicana</i>	6
2019	Bhawe, N., & Zahra, S. A.	Inducing heterogeneity in local entrepreneurial ecosystems: the role of MNEs	<i>Small Business Economics</i>	4
2019	Stam, E., & van de Ven, A.	Entrepreneurial ecosystem elements	<i>Small Business Economics</i>	1
2019	Wojan, T. R.	Geographical differences in intellectual property strategies and outcomes: establishment-level analysis across the American settlement hierarchy	<i>Regional Studies, Regional Science</i>	0
Cluster 4 (yellow): 5 articles				14
2015	Frenkel, A., Maital, S., Leck, E. & Israel, E.	Demand-Driven Innovation: An Integrative Systems-Based Review of the Literature	International Journal of Innovation and Technology Management	6
2018	Economidou C, Grilli L, Henrekson M & Sanders M	Financial and Institutional Reforms for an Entrepreneurial Society	Small Business Economics	2
2019	Sunny, S.A. & Shu, C.	Investments, incentives, and innovation: geographical clustering dynamics as drivers of sustainable entrepreneurship	Small Business Economics	6
2019	Barba-Sánchez, V., Arias-Antúnez, E., & Orozco-Barbosa, L.	Smart cities as a source for entrepreneurial opportunities: Evidence for Spain	<i>Technological Forecasting and Social Change</i>	0
2019	Chepurensko, A., & Kristalova, M.	Historical and Institutional Determinants of Universities' Role in Fostering Entrepreneurship	<i>Форсаїм, 13(4 (eng))</i> .	0
Cluster 5 (purple): 2 articles				3
2019	Vedula, S., & Kim, P. H.	Gimme shelter or fade away: the impact of regional entrepreneurial ecosystem quality on venture survival	<i>Industrial and Corporate Change</i>	2
2019	Hasan, S. & Koning, R.	Prior ties and the limits of peer effects on startup team performance	Strategic Management Journal	1
Cluster 6 (light blue): 2 articles				3
2019	Meoli, M., Paleari, S. & Vismara, S.	The governance of universities and the establishment of academic spin-offs	Small Business Economics	2
2019	Civera, A., Meoli, M., & Vismara, S.	Do academic spinoffs internationalise?	<i>The Journal of Technology Transfer, 44(2), 381–403.</i>	1

innovation system is influenced by early entrants, focusing on the emerging digital creative industries cluster in Bangalore. He finds that multinational

enterprise entrants develop production and technological capabilities faster with limited spillovers to the cluster. However, local entrants develop such

capabilities slower but with higher spillovers of skills and knowledge, as well as in a more participative way to create a local entrepreneurial ecosystem.

Finally, a few articles from this cluster focus more on knowledge spillovers. For instance, Jarchow and Röhm (2019), based on the KST of entrepreneurship, analyse the phenomenon of patent-based investment funds as a new sort of intermediary in the knowledge spillover process that could facilitate the transformation from invention to innovation. Using a qualitative research design, they find common characteristics of funds' activities that reduce knowledge filters and fill the financing gap in the first stages of technology development. Understanding of the multifaceted aspects in such an ecosystem, Wagner et al. (2019) analyses university-linked support programmes for sustainable entrepreneurship and the effects on sustainable regional development in the German context (case study). The findings clarify the different roles universities have, how knowledge spillovers are created, and what outputs, outcomes, and effects are realised at different levels. They suggest that depending on the regional context, different configurations, pathways, and intervention points of universities could equally improve sustainable entrepreneurial ecosystems.

3.1.9. Cluster 2 (green)- The role entrepreneurial universities in the commercialisation of knowledge (spinoff, TTO, start-up, etc.)

The second cluster is also composed of eight articles encompassing several issues related to the role of the university in the commercialisation of knowledge. The most cited article (25 citations) from this cluster is Brown (2016), which highlights that universities play a key role in the regional innovation system because as part of their mission, they need to commercialise research and generate growth in the regional economy. This author is focused on the Scottish context, and he presents evidence that suggests that entrepreneurial spillovers from universities are not those expected. Thus, more emphasis should be placed on the creation of entrepreneurial universities to foster innovation in society. In the same vein, 2 years later, Schillo (2018) analyses research-based spinoff (RBSO) companies as agents in entrepreneurial ecosystems. The findings show that only about half of these companies indicate growth targets, although most of them are trying to position themselves for future growth. However, RBSOs are not a homogeneous group of actors, and they represent several avenues for the creation of economic growth and the use of knowledge.

Later, and in the same vein, Fuster et al. (2019), use the KTS conceptual lens in combination with a social networks approach to empirically explore one Spanish region, focusing on the regional entrepreneurial

university ecosystem and the role of the USOs (University Spin-Off companies). The results show that USOs are the main actors in the entrepreneurial university ecosystem and strengthen knowledge transfer by relating to other businesses beyond this ecosystem. Additionally, within this theme, Belitski et al. (2019) aimed to identify the role that technology transfer offices (TTOs) and direct industrial financing play in the commercialisation of university research in economies in transition (Azerbaijan, Belarus, and Kazakhstan). The results show that the commercialisation of research is not associated with the existence of TTOs or the establishment of commercialisation contracts through TTOs but with the industrial financing of university research.

From another perspective, some articles analyse the role of the university, government, and industry as agents that should work in an aligned manner to commercialise knowledge and create entrepreneurial education ecosystems. First, Guerrero and Urbano (2017) explain that during the past decades, the creation of new knowledge-intensive environments needs the creation of scenarios for innovative and entrepreneurial activities, with the triple helix model as the basis of them. An emerging economy was analysed, in this case, Mexico, using a cross-sectional dataset and interviews with Mexican enterprises. One year later, Ahmad et al. (2018) analyse the propensity to establish a reciprocal association between universities and industries through a growing interchange of knowledge. The main objective looks into the factors contributing to the advancement of entrepreneurial university paradigms in a developing country, Malaysia. The results show that their university contains strong elements of entrepreneurship and that the collaboration between triple helix agents (university, government, and industry) is different depending on the characteristics of the enterprises.

In this same vein, Belitski and Heron (2017) propose that the creation of start-ups using the knowledge provided by universities is an important source of knowledge spillover and regional economic development. Thus, they perform an in-depth synthesis of the literature focused on entrepreneurship ecosystems and knowledge spillover of entrepreneurship, examining the important success factors and facilitators of entrepreneurship ecosystems in education. Finally, they conclude that entrepreneurship education ecosystems are an alternative element of analysis when the role of university-industry-government collaboration is focused on knowledge commercialisation. Finally, Link and Sarala (2019) highlight that university entrepreneurial ecosystems are important in facilitating innovation and entrepreneurial opportunities in knowledge-based economies. Thus, they hypothesise that the use of university knowledge positively affects entrepreneurial firm performance and that the firm's entrepreneurial resources and capabilities enable it to

create value from university knowledge. They collected data from 10 European countries and found the role of firm resources and capabilities as moderators of value in university entrepreneurial ecosystems.

3.1.10. Cluster 3 (dark blue cluster)-Evaluation of entrepreneurial ecosystems' effectiveness

This cluster is composed of six articles dealing with the evaluation of factors that affect the effectiveness of entrepreneurial ecosystems by using different indexes and indicators, as well as analysing specific aspects or measures carried out. They investigate, in a broad sense, what factors are related to the effectiveness measure of entrepreneurial ecosystems with some different outcomes.

The article by Audretsch and Belitski (2017) is the most cited of this cluster (78 citations) and focuses on regional business ecosystems and offers a complex model of start-ups, the Regional Business Development Index (REDI) and six areas of the business ecosystem (culture, formal institutions, infrastructure, and services, IT, melting pot and demand). Together, they capture the contextual characteristics of the socioeconomic, institutional, and information environment in cities. To explain variations in entrepreneurship in a representative sample of 70 European cities, they use the Eurostat and REDI individual perception surveys. In the same vein, Lehmann and Menter (2018) analyse the performance evaluation of public cluster policy and investigate the promotion of "leading-edge clusters" by the German federal government. The results present the effect of an active public cluster policy measured by regional GDP growth, highlighting the importance of robust evaluation approaches and techniques. Additionally, some years later, E. Stam and Van de Ven (2019) take a systems view of the context of entrepreneurship: understanding entrepreneurial economies from a systems perspective. They use a systems framework for studying entrepreneurial ecosystems to develop a measurement instrument of its elements and to use it to compose an entrepreneurial ecosystem index to examine the quality of entrepreneurial ecosystems in the Netherlands context. They find that the prevalence of high-growth firms in a region is strongly related to the quality of its entrepreneurial ecosystem.

Additionally, few studies analyse the effectiveness of concrete measures carried out for the development of entrepreneurial ecosystems. From this perspective, Bhawe and Zahra (2019) state that to develop ecosystems, numerous countries have provided significant incentives to multinational enterprises (MNEs) to attract them to locate their operations within their boundaries. However, despite the rise in MNEs' entry, evidence on their efficacy in stimulating local

entrepreneurial systems is not clear. Finally, these authors highlight key sources of heterogeneity in the sort of new firms that might appear in a local ecosystem and how they might develop over time as a result of MNEs' entry, in this way creating wealth. Additionally, in the same year, Zajkowski and Domańska (2019) investigate the perceptions of different regional pro-entrepreneurial institutions between businesses that obtained or did not obtain support from business support institutions (BSIs) in Poland. The results show nine statistically significant relationships involving the perception of regional BSIs' impact on the regional entrepreneurial ecosystem depending on whether particular enterprises received or did not receive support from the BSIs. Moreover, supported enterprises perceived a positive influence on enterprises' innovativeness and are more convinced that BSIs are available for a broad group of companies. Finally, in the same vein but from other perspectives, Wojan (2019) exposes that the wealth of utility patent data has made this form of intellectual property (IP) protection the main focus of the economics and geography of innovation. However, in addition to utility patents, the IP expressed in a firm's products or processes may also be protected via design patents, trademarks, or copyright. Thus, this author examines how protection is combined into IP strategies, how these strategies vary, how the different strategies are associated with different economic outcomes, and how these strategic orientations could differentiate entrepreneurial ecosystems across space.

3.1.11. Cluster 4 (yellow)- The role of universities in fostering innovation in transition economies

This fourth cluster is composed of five articles that are related to the role of universities in fostering innovation in general and in transition economies. Within this cluster, there are some theoretical articles and empirical articles.

Frenkel et al. (2015) is one of the most cited articles from these clusters (6 citations). These authors provide a comprehensive review of the literature on demand-driven innovation using the national innovation ecosystem framework. The results highlight the enormous innovative potential of universities. Finally, they propose some pro-innovation policies. Additionally, in the same vein, the article by Sunny and Shu (2019) is one of the most cited from this cluster (6 citations). In this article, using recent theories, they try to extend their understanding of environmental innovation by entrepreneurial start-ups by using a sample of clean energy start-up ventures in the USA. They highlight that the enormous innovative potential of universities should be directed towards the development of more effective instruments for public-private cooperation.

On the other hand, there is a group of articles that analyse the conditions to generate entrepreneurial ecosystems and knowledge in transition contexts. Economidou et al. (2018) introduce the special issue on Financial and Institutional Reforms for an Entrepreneurial Society in Europe. They argue that fundamental reforms are necessary to improve the entrepreneurial ecosystem and bring about this transition. In the same vein, Chepurensko and Kristalova (2019) analyse the institutional conditions for the development of scientific and entrepreneurial activities at universities in the specific context of the transition to a market economy. The findings highlight the potential of universities for the development of entrepreneurship in countries with a transition economy. Finally, Barba-Sánchez et al. (2019) analyse the generation of knowledge and entrepreneurial activity in the context of a smart city in Spain based on the KST of entrepreneurship. The results show that the smart city label has positively influenced the effective creation of new businesses. The results confirm the relation between the smart city label and the entrepreneurship rate.

3.1.12. Cluster 5 (purple) – Factors affecting performance and venture survival

This fifth cluster is composed of only two articles that analyse the factors that affect performance and venture survival. Both articles were published very recently (in 2019), and they are both empirical articles.

In this cluster, the article by Vedula and Kim (2019) is the most cited article, which analyses the influence of the quality of a region's entrepreneurial ecosystem on venture survival. To achieve this aim, the authors create a regional entrepreneurial ecosystem quality index, and they analyse USA Metropolitan Statistical Areas. The findings show that higher-quality ecosystems shelter ventures, while ventures in weaker ecosystems are more likely to fail. However, in the case of serial entrepreneurs, ecosystem quality has a smaller impact on venture survival. In a second article, Hasan and Koning (2019) report a field experiment conducted at an entrepreneurship boot camp to analyse whether interaction with proximate peers shapes a nascent start-up team's performance. The findings highlight that prior social connections can limit new interactions and hence the ability of organisations to benefit from peer effects to enhance the performance of their members.

3.1.13. Cluster 6 (light blue) – Creation and internationalisation of spinoffs in the Italian context

The sixth and last cluster is also composed of two articles that were also published very recently (both in 2019) that are related to the university structure that facilitates academic spinoffs and spinoff characteristics that foster internationalisation in the Italian context. Both articles are empirical.

The most cited article of this cluster is Meoli et al. (2019), with 2 citations in which the governance structure of universities and their capacity to foster the establishment of academic spinoffs in the Italian context are analysed. The authors find that, while half of the universities appoint the minimum required number of lay members, others appoint more, including creating boards of directors where only the rector is not external. The rate of establishment of technology spinoffs increases more when more entrepreneurs are appointed. Local stakeholders on the university's board of directors are associated with increased establishments of service-oriented spinoffs. In the same vein, but from the internationalisation approach, Civera et al. (2019) analyse the post-entry internationalisation of academic spinoffs in terms of international sales in established Italian academic spinoffs vs. non-academic innovative start-ups. They found that university spinoffs are more likely to internationalise than their non-academic counterparts. This result is intrinsic to their affiliation with universities, but it is also related to the degree of internationalisation of the university of origin.

3.2. Sport entrepreneurial ecosystems and knowledge spillovers

Following the presentation of the results of the general search on entrepreneurial ecosystems and knowledge spillovers, the results of the search within the field of study of sport are presented. Considering the same topics presented in the first section of the results, the search only yields one result. This result was the article by Ratten (2019), a qualitative study that analyses stakeholders' perceptions of entrepreneurial ecosystems and knowledge spillovers in the Australian context by providing an analysis of how city amenities, internationalisation, and culture affect development. The results highlight how entrepreneurship is developed from a diversity of factors exclusively related to knowledge spillovers resulting from sport (cultural conditions, emotional attachment, and societal attitudes). The results provide insights into the role sport plays in creating entrepreneurial ecosystems and will enable guidelines for future sport policies.

The author of this article belongs to the Department of Entrepreneurship, Innovation, and Marketing from La Trobe University, which is located in Melbourne, Australia. Since it is a very recent article, it has not yet received any citations, but as it is the first in this field, it is expected to be a reference article on this topic. Therefore, it was decided to analyse, on the one hand the articles focused only on entrepreneurial ecosystems in sport, and by the other hand, the others focused on knowledge spillovers in sport, not considering the article of Ratten (2019), because she considers both terms.

3.3. Sport entrepreneurial ecosystems vs sport knowledge spillovers

3.3.1. Years, authors, institutions, countries, and journals

On the one hand, focusing specifically on the topic of entrepreneurial ecosystems and sport, four articles were found with the first article published on 2015, the second one on 2016, the third one on 2018 and the last one published in 2019 (see [Table 7](#)). Seven researchers have published articles about this topic, but none of the researchers have published more than one article. Kenny, who is the most cited researcher, is from the Cork Institute of Technology (Ireland); Ferreira and De Souza Chimenti belong to the Federal University of Rio de Janeiro (Brazil); Potts and Thomas belong to the University College of Business of Melbourne (Australia); McLeod belongs to Texas Tech University (USA); and Nite belongs to the University of North Texas (USA). Thus, the institutions with the highest number of articles published about this topic are the Federal University of Rio de Janeiro and the University College of Business of Melbourne. Finally, the countries (according to the researchers' institution) that have published one article are Ireland, Brazil, Australia, and the USA.

Specifically, four journals have published articles on this subject: "International Journal of Entrepreneurial Behavior & Research", "Podium Sport, Leisure and Tourism Review", "Sport, Business and Management: An International Journal" and "Journal of Sport Management", with the latter being the first to receive the highest number of citations in the entire WoS (GCS = 2).

On the other hand, focusing on the topic of knowledge spillovers and sport, only one article was found, which was published in 2018 (see [Table 7](#)). Fukugawa is the only author-researcher who has published an article on this topic. He is from Tohoku University in Japan. The journal "Applied Economics" was the only one that has published an article about this topic. The following [Table 7](#) shows the contents of the articles for each of the topics.

3.3.2. Co-authorship

In the field of sport entrepreneurial ecosystems, there are three main networks with two researchers each. One of the networks is that of Ferreira and De Souza Chimenti, another is that of Potts and Thomas, and the third network is composed of McLeod and Nite. However, they have published only one article together; thus, this does not represent a consolidated co-authorship network. In the field of sport knowledge spillover, there is no co-authorship network because the only article published about this topic was published by only one author, Fukugawa.

4. Discussion

Increasingly, the analysis of the context in the field of entrepreneurship study is capturing the attention of researchers and academics around the world, and already, instead of focusing on internal aspects of entrepreneurs such as personality traits, researchers have begun to incorporate other external or contextual variables. As a result, the concepts of entrepreneurial ecosystems and knowledge spillovers have begun to be the object of study in recent years (Qian, 2018), with no bibliometric analysis to study these terms as a whole, let alone analyse them within the context of sport.

4.1. Discussion related to the bibliographic results

The results of this study show that the field of knowledge spillovers and entrepreneurial ecosystems truly is an emerging field of study (first article published in 2015), but one that is in a state of full development and growth (by 2019, there were already 21 articles). This finding is in line with the findings of the bibliometric study by Ferreira et al. (2019) on the field of entrepreneurship, who found that knowledge spillover theory is one of the theories that emerged later with respect to other theories in this field, and with those of Roundy et al. (2018), who highlighted that entrepreneurial ecosystems are receiving special increased attention from scholars and practitioners.

In relation to other specific fields of study on entrepreneurship, such as sustainable entrepreneurship, it can also be observed that although the number of articles published is considerably higher and the first publication was in 1992, this is still an emerging field of study that has greatly increased in recent years (since 2015) (Sarango-Lalangui et al., 2018). Along the same lines, the field of social entrepreneurship study is also emerging, and the number of publications has increased greatly in recent years (Rey-Martí et al., 2016). Likewise, the field of entrepreneurship and women is also an older field of study (first article in 1989), but it is also in an emerging state, with the largest number of publications being produced in recent years (Parmar & Gahlawat, 2020). Additionally, the field of entrepreneurial education (EE) is a young field of study (first EE article in 1987), but it should be noted that from 2015 onwards is when there has been an exponential increase in the number of articles published (Aparicio et al., 2019). Therefore, the field of study of knowledge spillovers and entrepreneurial ecosystems is younger than all of them, having emerged as a result of the increased interest in entrepreneurship from 2015 onwards.

In just 4 years, the number of articles in this field has increased exponentially, with numerous co-authoring

Table 7. Content analysis of articles about sport and entrepreneurial ecosystems vs sport and knowledge spillovers with LCS and GCS.

Year	Authors	Title	Journal	LCS	GCS
Sport and entrepreneurial ecosystems					
2015	Kenny, B.	Meeting the entrepreneurial learning needs of professional athletes in career transition.	<i>International Journal of Entrepreneurial Behaviour & Research.</i>	0	2
This article explores the entrepreneurial learning needs of professional rugby players (Ireland) who are preparing for a career transition from the world of sport to the world of work, adopting an interpretative philosophical point of view. The results highlight the entrepreneurial learning needs of professional athletes in career transition and identify the key elements to be considered when designing an entrepreneurship programme to meet these needs. This model is based on the player's social identity, social networks and the use of existing entrepreneurship ecosystems in higher education institutions.					
2016	Ferreira, D. A., & de Souza Chimenti, P. C. P.	Esporte Interativo and The Content Distribution Dilemma: A Case Study.	<i>Podium Sport, Leisure and Tourism Review,</i>	0	0
This article describes the history of the Brazilian media group Esporte Interativo (EI), a company created by three young entrepreneurs, and dedicated to producing and distributing sports content on multiple platforms, which is undergoing a major change after its company beat the Turner Group, a company that will be in business by the end of 2014. This clash of business models poses challenges for the company's management, which must decide on the future strategic direction. The authors suggest that this case can be used by graduate students in Business Strategy disciplines. One of their objectives, among many others, is the analysis of entrepreneurial ecosystems and the reconfiguration of industries based on the changes generated by the development of information and communication technologies.					
2018	Potts, J., & Thomas, S.	Towards a new (evolutionary) economics of sports.	<i>Sport, Business and Management: An International Journal.</i>	0	1
This article establishes a theoretical basis for a "New Sport Economy", presenting some key aspects for an evolutionary vision of sport economy research and, separately, an institutional vision of sport economy research. To this end, they develop an analytical framework combining evolutionary economics and the new institutional economics. The authors observe that sports and sports industries show dynamic qualities, but in the study of sports there is no analogy of "industrial dynamics" as in economics. To construct this, the authors frame a new evolutionary approach to the study of sports economics and industries by examining the evolution of sports, their industries, and the complex business ecosystems in which they operate through the lens of institutional and evolutionary economics.					
2019	McLeod, C. M., & Nite, C.	Human Capital Ecosystem Construction in an Emerging Rugby Market.	<i>Journal of Sport Management</i>	0	0
This article develops a theory of human capital ecosystems by arguing that sports markets are human capital ecosystems. They analysed the emerging rugby market in USA, showing that league executives conceived of the rugby market as an ecosystem organised around the investment and value capture of athletes' human capital. However, while the league executives agreed on the need for a human capital ecosystem, they had different visions of how the ecosystem should be created, and each league followed a different strategy and had different objectives. The authors argue that all sports markets are human capital ecosystems and use the theory to distinguish between emerging and established sports markets.					
Sport and knowledge spillovers					
2018	Fukugawa, N.	The contingent effect of social capital on performance of professional athletes: life cycle stages and changes in regulation as moderators	<i>Applied Economics</i>	0	0
This study focuses on motorboat racing in Japan, since it is a sport organised as a public gambling in this country. This author points out that in addition to physical strength and driving technique, the ability to adjust the equipment is fundamental for riders to win a race. Based on the theory of contingency of social capital, he analysed the exhaustive panel data of motorcycle racers. The results showed that social capital linkage and bridging had different impacts on performance depending on the stages of the rider's life cycle and changes in regulation.					

networks (22) and some relationships between already consolidated authors (Vismara & Meoli). In fact, it has been found that some researchers have published two or three articles on this subject. The USA tops the list of countries with the highest number of bibliometric articles on entrepreneurship (e.g., González-Serrano et al., 2019; Sarango-Lalangui et al., 2018), followed by Italy and the UK. However, although entrepreneurial ecosystems have captured increasing attention from policymakers, academics, and practitioners, this phenomenon remains undertheorized (Autio et al., 2018; E. Stam & Van de Ven, 2019). In relation to collaborative networks between researchers, these are scarce and small (two or four researchers), none of the researchers have published more than one article on this subject, and the USA is the country with the highest number of publications, although the quantity is small (2). Therefore, this is a very novel area of research, in which even more time is needed to consolidate relationships between researchers.

With regard to the study of this subject in the sport context, it is a very young field of study in which the

first and only article was published in 2019 by Ratten. She is also the author with the highest number of publications on the topic of sport entrepreneurship (González-Serrano et al., 2019). Regarding articles related to entrepreneurial ecosystems and sport, four articles were found, with the first article published in 2015 and the last published in 2019. Because the papers are about different topics, one is not able to establish in a clear and concise way a base for the study and development of this field of research. The authors' networks were small, composed of only two researchers, and the researchers were not the same as those in the general search.

In relation to the articles related to knowledge spillovers and sport, only one article has been found. This article was published in 2018 by Fukugawa, with no studies published on the subject in 2019. Thus, although sport entrepreneurship is a new field of research that has been attracting the interest of researchers in recent years (González-Serrano et al., 2019), only a small number of studies that focused on sport entrepreneurial ecosystems or sport knowledge

spillovers have been found, capturing more attention than the first study. This may be because interest in the KSTE was still low until a few years ago (Ferreira et al., 2019; Ghio et al., 2015), and this is the basis of this research area.

Finally, comparing the results of the general research field on knowledge spillovers and entrepreneurial ecosystems and those of the sport knowledge spillovers and entrepreneurial ecosystems research field, it can be observed that the first article published in the latter field was very recent (2019), 4 years later than that in the general field (2015). Thus, this topic has only recently attracted the interest of researchers from the entrepreneurship field of research. As far as countries are concerned, the USA is the country with the highest number of articles published on this subject in the general field, but the sport article on this subject was published by one Australian university. In the field of sport entrepreneurial ecosystems, researchers whose institutions are in Ireland, Brazil, Australia, and the USA have published one article each, while in the field of sport knowledge spillovers, the only article came from a Japanese institution. Thus, there is still no leading institution in these sport research fields.

4.2. Discussion related to the literature review results

Finally, in relation to the contents, five clusters were identified in the field of entrepreneurial ecosystems and knowledge spillovers. The first cluster is related to the conceptualisation of entrepreneurial ecosystems and the factors that give rise to their generation. From the results of this cluster, it can be deduced that exact definitions of entrepreneurial ecosystems are scarce and often inconsistent (Audretsch et al., 2019; E. Stam & Van de Ven, 2019) and that the similarities and differences of entrepreneurial ecosystems relative to clusters, knowledge clusters, regional systems of innovation, and innovative milieus remain unclear (Autio et al., 2018). Regarding the mechanisms that lead to the creation of entrepreneurial ecosystems, the results highlight the heterogeneous nature of ecosystems, indicating that the presence of research universities and access to finance are fundamental conditions in the majority of investigations (Alves et al., 2019; Ghio et al., 2019; Lai & Vonortas, 2019).

The second cluster focuses on the role of entrepreneurial universities and ecosystems in the commercialisation of knowledge to society, especially through spinoffs and start-ups. This line of research was also found in the bibliometric analysis of entrepreneurial education by Aparicio et al. (2019), who identified a cluster on higher education, entrepreneurial knowledge and technology transfer. This cluster pointed out that the work of the university in the generation and

transfer of knowledge is still limited (Brown, 2016) and that the creation of entrepreneurial universities is necessary to foster innovation in society (Ahmad et al., 2018; Brown, 2016). Regarding this topic, the majority of articles have focused on the relations between government, university, and business (triple helix model) (Ahmad et al., 2018; Belitski & Heron, 2017; Guerrero & Urbano, 2017), with spinoffs standing out as important agents in entrepreneurial university ecosystems (Fuster et al., 2019; Schillo, 2018). Finally, it is important to highlight that this is a popular topic because it is the second cluster with the highest number of citations.

The third cluster focuses on the analysis of the effectiveness of entrepreneurial ecosystems, taking into account different indices, being that this is the most popular topic because it is the cluster with the highest number of citations. This cluster does not focus as much on the factors that generate entrepreneurial ecosystems but rather on those aspects that ensure that these entrepreneurial ecosystems are effective. Different articles from these clusters have focused on the use of different indicators to explain differences in entrepreneurship activity (Audretsch & Belitski, 2017; Lehmann & Menter, 2018), while others have focused on the analysis of certain measures that have been carried out (Bhawe & Zahra, 2019; Wojan, 2019; Zajkowski & Domańska, 2019). However, there is still a need to continue in this line and to discover how to measure the effectiveness of these, since E. Stam and Van de Ven (2019) highlights that entrepreneurial ecosystems remain loosely measured.

The fourth cluster is related to the role of universities in fostering innovation in transition economies. In this cluster, the potential of universities as a source of innovation has been recognised (Chepurensko & Kristalova, 2019; Frenkel et al., 2015; Sunny & Shu, 2019), and it has been analysed in different contexts (Barba-Sánchez et al., 2019; Chepurensko & Kristalova, 2019). However, reforms are still needed to improve entrepreneurial ecosystems and bring about this transition, as Economidou et al. (2018) stated.

The fifth cluster addresses factors affecting performance and venture survival and is the cluster that is most distinct from all the others, with only two articles. The findings of these articles make clear that higher-quality ecosystems shelter ventures, while ventures in weaker ecosystems are more likely to fail (Vedula & Kim, 2019) and that prior social connections between peers can limit interactions with other peers and thus limit nascent start-up team performance (Hasan & Koning, 2019). Therefore, the quality of business ecosystems has to be taken into account if the survival of companies is to be guaranteed and if employees are to interact with other employees they did not know before to improve the performance of companies.

The sixth cluster was identified as the creation and internationalisation of start-ups in the Italian context, showing that the governance structure of universities affect their capacity to foster the establishment of academic spinoffs (Meoli et al., 2019) and that university spinoffs are more likely to internationalise than their non-academic counterparts (Civera et al., 2019). Therefore, the characteristics of both the university governance and the spinoffs will affect their development and internationalisation.

On the other hand, in relation to the specific field of sport, only one article was found that is classified within the first cluster; in this article, the sport-related factors that give rise to the generation of entrepreneurial ecosystems in a specific city, Melbourne, are analysed. Regarding the field of study of knowledge spillovers and sport, the only article found deals with how social capital linkage and bridging had different impacts on motorboat riders' performance depending on the stages of the rider's lifecycle and changes in regulations. This is in line with some studies that have highlighted the role of social networks (Hasan & Koning, 2019). In the case of the field of study of entrepreneurial ecosystems and sport, four articles were found. The first article published analyses the transition of athletes from their sport career to their professional career and the need for entrepreneurial ecosystems at the university level for this purpose, which is in line with the necessity of entrepreneurial universities (Ahmad et al., 2018; Brown, 2016). The second article proposes a case study of a sport company that is sold to a large multinational, so that the different components of the entrepreneurial ecosystem should be analysed as previous studies in other fields have analysed them before (e.g., Alves et al., 2019; Ghio et al., 2019). The third article is conceptual and proposes a new systemic approach to analysing sport based on ecosystems, which is in line with E. Stam and Van de Ven (2019) who take a systems view to analyse the context of entrepreneurship. Finally, the last article analyses the rugby market as an ecosystem organised around the investment and value capture of athletes' human capital. Hence, it can be observed how the literature on these topics is fragmented but related to some of the topics of the clusters of the general search.

Therefore, it can be observed that the evolution of these fields of study has been different and that the sport field is in an incipient state, so more research is needed both theoretically and empirically in this area of study to establish the basis for its future development. Moreover, comparing the topics of entrepreneurial ecosystems and knowledge spillovers, more articles have been published about the first topic, with the second having an underdeveloped interest or no research yet within the sport field. Thus, the data found in this study are in line with those of Ratten

(2017b), who highlights that sport management research needs to go further than its focus on community and professional sport organisation to concentrate more on an entrepreneurial ecosystem approach. Therefore, more research focusing on sport entrepreneurial ecosystems and knowledge spillovers is necessary to advance the field of knowledge of sport entrepreneurship, ensuring the necessary conditions for the promotion of entrepreneurship and innovation.

Hence, although this area of research is increasing in popularity, the entrepreneurial ecosystem concept remains loosely defined and measured (E. Stam & Van de Ven, 2019), as does the knowledge spillover concept. Moreover, the results of this study focusing on the sport field highlight that few studies have focused specifically on sport entrepreneurial ecosystems and knowledge spillovers (Ratten, 2019), having carried out more studies on the subject of entrepreneurial ecosystems and sport than on knowledge spillovers and sport. Finally, it should be highlighted that, with the inclusion of innovation system research (Rakas & Hain, 2019), these research fields are characterised by an overall growing tendency towards increasing diversity in knowledge, guided by a decreasing coherence of collective research efforts.

5. Conclusions and future avenues for entrepreneurial ecosystems and knowledge spillovers in general and in the sport field

These two research topics are relatively new in terms of academic research compared to other research topics related to entrepreneurship. However, the topics of study of knowledge spillovers and entrepreneurial ecosystems have captured the interest of both researchers and different social agents from all over the world in recent years. This is due to the capacity of knowledge spillovers and entrepreneurial ecosystems to maintain and improve the levels of innovation of regions or countries, and thus allow regions or countries to maintain their competitiveness by improving their economic performance. However, despite the growth this area of research has been experiencing in recent years, it remains a novel field of study, in which there is still much to be done and known.

In relation to the studies carried out in the general field of study, six main lines have been identified. The three most popular clusters or topics based on the number of citations have been (1) the evaluation of entrepreneurial ecosystems' effectiveness, followed by (2) the role of entrepreneurial universities and ecosystems in the commercialisation of knowledge (spinoff, TTO, start-up, etc.), (3) the conceptualisation of entrepreneurial ecosystems and the mechanism that leads its formation. All of these lines of study have been investigated with

theoretical and empirical studies, though there is not yet an established theoretical framework or theory for their study. However, it is important to note that KSTE has been the most widely used theory in these studies. Furthermore, the factors that contribute to the creation of entrepreneurial ecosystems and knowledge spillovers still seem to be unclear, and no clear methodology exists for their study.

On the other hand, regarding the study of this phenomenon in sport, no common points can be established since only one article was found, which focused on how sport can contribute to the creation of entrepreneurial ecosystems in a specific city. With regard to knowledge spillovers and sport, only one article was found, while four articles about the entrepreneurial ecosystems were found. Therefore, this is a field of study that is still in its infancy, and there is a need to further explore the role of knowledge spillovers as well as that of entrepreneurial ecosystems to develop a field of study that involves both and improves the understanding of these phenomena in sport.

Hence, further research is therefore needed to develop this field of study. First, much more theoretical research is necessary to conceptualise the entrepreneurial ecosystems and knowledge spillovers and to distinguish these concepts from similar ones (business ecosystems, clusters, etc.). Second, the factors that lead to the creation of entrepreneurial ecosystems and the role that knowledge spillovers have in them seem to be unclear, so more empirical studies are needed to analyse these factors to deepen the understanding of them. To do so, it is recommended to take into account some indexes established by international bodies such as the OECD, Eurostat, GEM. It is especially interesting to analyse the roles that technology development, access to financing and investment in research play in them, among other factors. Additionally, comparisons between different contexts could be interesting.

Third, it is also necessary to carry out more empirical research to evaluate the effectiveness of entrepreneurial ecosystems and knowledge spillovers and to establish clear indices that can indicate their quality and how they affect the local, regional and national economy. Fourth, because the university is considered a key element for knowledge spillovers, research that analyses how that knowledge can be more easily transferred to society through the creation of start-ups and spinoffs should be developed. Additionally, research on how this knowledge acquired at universities is transferred to companies already established should be further developed to see how this knowledge transfer can be improved.

Moreover, it is also necessary to analyse how to contribute to the creation of entrepreneurial

universities or entrepreneurial university ecosystems due to the role they play in the transfer of knowledge to society. To do this, using the triple helix model approach (university, business and government) as previous studies have done can be a good basis for this. Finally, it is also important to highlight the need to use theories that allow a deeper understanding of this field of study, with KSTE being an appropriate theory for this purpose.

From the sport perspective, it is also necessary to develop research to conceptualise this phenomenon specifically in the sport field because this will be the first step to establish the basis for this line of study. Therefore, just as sport entrepreneurship has its own specific definition, it is necessary to develop a concise definition of what this phenomenon means within the sport industry. In addition, a theory or theoretical basis must be established that will be useful for the study of this phenomenon in the sport sector, with the KSTE being a possible theory for it.

Furthermore, it should be borne in mind that the analysis of this phenomenon, taking the sport into consideration, can be approached from two perspectives: (1) how sport contributes to the creation of entrepreneurial ecosystems and knowledge spillovers and (2) what factors lead to the creation of entrepreneurial ecosystems and knowledge spillovers in the sport sector. In the first case, it is necessary to use sport-specific indicators, but in the second case, universal indicators as in the case of the general field can also be used (GEM, OECD, Eurostat, etc.). Furthermore, the comparison of entrepreneurial ecosystems and knowledge spillovers from the sport with that of other sectors can also be an interesting approach. The next step would be to evaluate the quality of this type of ecosystem and knowledge spillover within the sport industry to prove if these indicators are the same or different from those of other industries. Additionally, analysing how entrepreneurial universities contribute to the creation of sport spinoffs and start-ups could be interesting due to its increase in recent years.

Moreover, for both of the fields, according to the most appropriate methodologies for the study of these phenomena, although systematic or conceptual reviews, as well as interviews, can be good tools for the study of this field, to advance the knowledge of this field, the use of fsQCA is recommended. This is a novel methodology that will allow us to better understand these phenomena since it has been considered suitable for the study of complex phenomena such as entrepreneurship (Kraus et al., 2018).

Finally, regarding the study of these phenomena specifically in the sport sector, it is an emerging field and is still in an incipient state. Therefore, this article points out the lack of attention on sport within the entrepreneurial ecosystems and knowledge spillovers

literature. Hence, measures must be created for the development of this field of study as a sub-area within sport entrepreneurship due to its importance if the competitiveness of the sport sector is to be maintained and improved.

Despite its contributions, it is necessary to point out that this study presents some limitations. First, the data were retrieved from the WoS to ensure the quality and reliability of the studies. However, there are other sources that have been growing in recent years and are not indexed by the WoS. Thus, future studies should address this search within other databases, such as Scopus or Google Scholar, to obtain a broad overview of the phenomena. In addition, the search was limited to articles, so future research could extend the search to other types of documents, such as book chapters, abstract books, or conference proceedings.

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