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Bibliometric Analysis of the Links between Knowledge Management and Competitive Advantage

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Abstract: *Knowledge management and competitive advantage are two important topics in research world. The purpose of this article is to establish the connection between those two concepts in order to identify new research directions starting from the analysis of the literature. The research methodology involves a bibliometric analysis based on mapping and clustering of keywords. The paper presents the analysis of 1083 articles and reviews related to the topic of knowledge management and competitive advantage, published between 2000 and 2018 and indexed in the Scopus database. The main results underline how the number of papers in the topic analyzed evolved during the selected period, how these papers are geographically distributed, which are the most productive journals that published papers on the subject of knowledge management and competitive advantage, who are the authors with the most contributions in the subject, which are the most cited articles of the selected ones. Furthermore, the results present a mapping and clustering of keywords reported in the selected and analyzed papers, which allows the analysis of the links between them.*

Keywords: *bibliometric analysis; competitive advantage; knowledge management; VOSviewer.*

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I. Introduction

Over the time, knowledge management and competitive advantage concepts started to be increasingly debated in the literature. Given the quick changes taking place in society, in the context of an environment in a dynamic and rapid evolution, knowledge becomes a key element for any organization. In the context of the management orientation towards the organizational knowledge exploitation, knowledge management has to be implemented in order to use as efficiently as possible the available information and to encourage the process of new knowledge creation.[1] In this regard, the knowledge management concept becomes a determinant in ensuring the organizational performance.

On the other side, the competitive advantage can be reflected as the creation of superior products or services than other similar articles offered by the majority of the competitors[2]. On this line, creating competitive advantage become the every organization's preoccupation. In order to obtain a competitive advantage the organizations have to understand how can create and use the knowledge in the organizational process. Moreover, at organization`s level they have to identify what type of knowledge should be searched to improve the activities and to obtain competitive advantage. Given the aspects presented above, it can be easily observed that there is connection between the concepts of knowledge management and competitive advantage. These two concepts have now become important for every organization.

Starting with two recent studies in which the knowledge management problem is thorough in the health area, more precisely starting with a study that analyse, by using the structural equation modeling, the relationship between the three facets of the notion of knowledge management (knowledge sharing, knowledge acquisition, and knowledge utilization) and job satisfaction[3] and alongside with another study whose purpose was highlighting the contribution of the knowledge management process to

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[1] E. Burduş, I. Popa, *Fundamentele managementului* organizaţiei, 3rd ed. (Bucharest: ProUniversitaria, 2013).

[2] O. Nicolescu, I. Verboncu, *Management* (Bucharest: Economică, 1999).

[3] I. Popa, S.C. Ştefan, C. Morărescu, C. Cicea, "Research regarding the Influence of Knowledge Management Practices on Employee Satisfaction in the Romanian Healthcare System," *Amfiteatru Econo*mic 20(49) (2018): 553-566, doi: 10.24818/EA/2018/49/553.

the social and economic related outcomes[4], the intention to continue with the research in the knowledge management topics was only strengthen.

A preliminary analysis of the existing literature will be performed with the purpose to identify the existent relationship between the concept of knowledge management and another important concept from the management area – the competitive advantage, and also the connection between these two concepts and others. This analysis will only allow for a deeper study of the subjects area in which these terms are used and the identification of new research directions.

Therefore, this paper uses bibliometric methods to analyse and to present the relationship between knowledge management and competitive advantage in order to offer information regarding the knowledge existent in the literature and to create a mapping and a clustering of items of interest to understand the trends of this topics in a particular field.

II. Literature review

According to Andrés[5], the main objective of bibliometrics is to evaluate the scientific literature in a given topic. Waltman, Van Eck and Noyons[6] suggest that in bibliometric and scientometric research the attention is paid to the analysis of networks of documents, authors, journal or keywords and the mapping and clustering techniques are most frequently used to study such networks.

Thus, over time, researchers from different fields have performed bibliometric analyzes on different subject areas.

In a recent article, Marinescu, Cicea and Coleasca[7] studied the relationship between biofuels and innovation concepts with the help of bibliometric technique, analysing 478 articles extracted from Scopus database. Through their paper they highlight the impact of selected articles over time, identify the most productive journals and the most involved authors in the field and then they develop a co-occurrence analysis of keywords and an analysis of patents evolution in the biofuels field. In another study, Cicea et al.[8] underline the relationship between biomass and innovation and perform a bibliometric analysis based on mapping and clustering of the keywords. They analyse 950 articles indexed in Scopus, from 1994-2018 and carry

[4] I. Popa, S.C. Ştefan, "Modeling the Pathways of Knowledge Management Towards Social and Economic Outcomes of Health Organizations," *International Journal of Environmental Research and Public Health* 16(7) (2019): 1114, doi:10.3390/ijerph16071114.

[5] A. Andrés, *Measuring Academic Research: How to Undertake a Bibliometric Study* (Oxford: Chandos Publishing, 2009).

[6] L. Waltman, N. J. Van Eck, E.C.M. Noyons, "A unified approach to mapping and clustering of bibliometric networks," *Journal of Informetrics* 4(4) (2010): 629-635, doi: 10.1016/j.joi.2010.07.002.

[7] C. Marinescu, C. Cicea, S.E. Colesca, "Tracking biofuels-innovation relationship through scientific and technological advances," *Management Research and Practice* 11(2) (2019): 31-44.

[8] C. Cicea, C. Marinescu, C.F. Albu, D.P. Bălan, "Applying Bibliometric Mapping and Clustering on Research Regarding Biomass related Innovation," in *Proceedings of the 33rd International Business Information Management Association Conference (IBIMA)*, 11-12 April 2019, Granda, Spain, 2404-2419.

out 3 types of analyses: (1) the analysis of selected papers (the evolution in time of the papers, their geographical distribution, the distribution of the selected works by areas, etc.), (2) the analysis of citations received by selected articles and (3) the analysis of keywords to identify possible links between these keywords and to formed clusters and a map of keywords.

Ali, Malik and Raza[9], conducted a bibliometric analysis of the literature on knowledge sharing based on data downloaded from Web of Science (WoS) and their main results suggest that was an increasing trend in annual production during 1990-2016, the most productive journal in the field is Journal of Knowledge Management and USA is the country that contributed with the more papers in the field. Moreover, Kumar and Mohindra[10] realized a bibliometric analysis on knowledge management research and they analysed 5127 articles extracted from Web of Science and published in the period 2000-2014. In their study they present the research trends in terms of growth of literature, the most productive journals, the top authors with contributions in the field, highly cited papers, etc.

Taking as its starting point the analysis of other studies that use bibliometric techniques, this paper aims to provide an overview of the connection between the two concepts mentioned - knowledge management and competitive advantage- and to highlight the trends of these topics. The following section describes in detail all the steps followed in order to carry out the analysis proposed through this article.

III. Methodology

The main objective of this study is to establish how the relationship between the concepts knowledge management and competitive advantage is reflected in the literature, as well as the connection of these two concepts with others, using the bibliometric technique. In order to select the articles for carrying out the proposed bibliometric analysis we have chosen a search by keywords in the Scopus database. This database was chosen in view of the quality of the information provided.

Starting from the information provided by the Scopus database, the aim was to provide answers, by using bibliometric techniques, to the following research objectives:

- Analysis of the number of papers per year in order to identify the growth rate of articles in literature and their geographical distribution;
- Identification of the most productive journals that publish on the topic knowledge management and competitive advantage;
- Making a top of authors and institutions with contributions related to the topic;
- Analysis of the main subject area that deals with these two concepts;
- Analysis of citations received by these articles;

[9] Ali, P.M.N., Malik, B.A. & Raza, A. (2018), Bibliometric analysis of literature on knowledge sharing, *Annals of Library and Information Studies*, 65(4), 217-227.

[10] Kumar, A. and Mohindra, R. Bibliometric Analysis on Knowledge Management Research, *International Journal of Information Dissemination and Technology*, 5(2), 106-113.

- Analysis of keywords and their representation in the form of a map of keywords, grouped into clusters.

Thus, in order to select the articles, to carry out the analysis and to respond to the research objectives, the following steps have been taken in this research paper:[11] [12] [13] [14]

1. The first step was to search for two main keywords chosen for analysis, "knowledge management" and "competitive advantage" in the Scopus database, using the connector `and` between them. The search was done in September 2019, the Article title, Abstract, Keywords section of the Scopus database was used and was limited to the period 2000 – 2018. In the search, depending on the two keywords, the inverted comma signs were added to find records containing the exact phrase knowledge management and competitive advantage. As a result of this search, 2477 documents were obtained.
2. The second step involved a filtering of the initial list of papers, choosing only the article and the review type documents. Thus, 1220 documents remained.
3. The third step was to select only papers written in English. There were obtained 1148 papers with this feature.
4. The last step involved a filtering according to the subject area of the papers. In this respect, the fields with less than 20 papers were excluded. After this filtering, there were finally 1083 documents that were analysed in this research.

In order to reach the proposed research objectives and to present the results, different research methods have been used. Thus, in order to analyse the evolution of documents over time, the productivity of the journals, the authors with contributions in the field, the subject area dealing with the two concepts, as well as the analysis of citations, the information provided by the Scopus database in the section "Analyse search results" and "View citation overview" was used. To achieve the last objective of the research, namely for the analysis of keywords and for the achievement of Keywords` map, the software VOSviewer[15] was used, a software tool developed by Nees Jan van Eck and Ludo Waltman[16]. VOSviewer is a computer program that can be used for creating, visualizing and exploring bibliometric maps

[11] *Ibidem.*
[12] Marinescu, C., Cicea, C. & Colesca, S.E., *Op.cit.*
[13] Cicea, C., Marinescu, C., Albu, C.F. & Bălan, D.P., *Op.cit.*
[14] Ali, P.M.N., Malik, B.A. & Raza, A., *Op.cit.*
[15] N.J. Van Eck, L. Waltman, *VOSviewer software version 1.6.11*, developed at Leiden University's Centre for Science and Technology Studies (CWTS), 2019. Available at https://www.vosviewer.com/.
[16] N.J. Van Eck, L. Waltman, "Text mining and visualization using VOSviewer," *ISSI Newsletter* 7(3) (2011): 50–54.

of science[17]. In order to build a visualisation maps of keywords, the software VOSviewer uses the VOS (visualisation of similarities) mapping technique[18].

IV. Data analysis and discussion

Within this session, it is presented the data analysis, illustrated by research objectives established in the research methodology section.

1. Analysis of the increase of papers in the literature and their geographic distribution

The 1083 articles and reviews which contain the words "knowledge management" and "competitive advantage" in the title, abstract of keywords are distributed in the 2000-2018 period, such as the data presented in the Table 1.

Table 1. Paper distribution between 2000 and 2018. Source: Created by authors after Scopus[19]

Year	Articles	Percentage of total	Cumulated no. of articles	Cumulative percentage
2000	21	1.94%	21	1.94%
2001	23	2.12%	44	4.06%
2002	39	3.60%	83	7.66%
2003	37	3.42%	120	11.08%
2004	42	3.88%	162	14.96%
2005	54	4.99%	216	19.94%
2006	53	4.89%	269	24.84%
2007	61	5.63%	330	30.47%
2008	92	8.49%	422	38.97%
2009	74	6.83%	496	45.80%
2010	85	7.85%	581	53.65%
2011	88	8.13%	669	61.77%
2012	65	6.00%	734	67.77%

[17] N.J. Van Eck, L. Waltman, "Software survey: VOSviewer, a computer program for bibliometric mapping," *Scientometric*s 84(2) (2010): 523-538, doi: 10.1007/s11192-009-0146-3.
[18] N.J. Van Eck, L. Waltman, "VOS: A new method for visualizing similarities between objects," in *Advances in data analysis: Proceedings of the 30th annual conference of the German Classification Society*, ed. J. Lenz & R. Decker (Heidelberg: Springer, 2007), 299–306.
[19] Scopus, 2019. 1083 selected documents – results` analysis. www.scopus.com (accessed on September 10, 2019).

Year	Articles	Percentage of total	Cumulated no. of articles	Cumulative percentage
2013	61	5.63%	795	73.41%
2014	64	5.91%	859	79.32%
2015	59	5.45%	918	84.76%
2016	53	4.89%	971	89.66%
2017	54	4.99%	1025	94.64%
2018	58	5.36%	1083	100.00%
Total	1083	100.00%	-	-

Analysing Table 1, it can be observed that the largest number of articles, meaning 92 (8.49%) were published in 2008, while the smallest number of articles 21 (1.94%) being published in 2000. It can also be observed that about 50% of the selected articles were published in the first period of the analysis and the rest in the second period. Moreover, until 2008, the research interest in this field has been increasing, and from 2016, also the number of contributions follows this trend.

The geographic distribution of the 1083 selected articles was illustrated in Fig. 1.

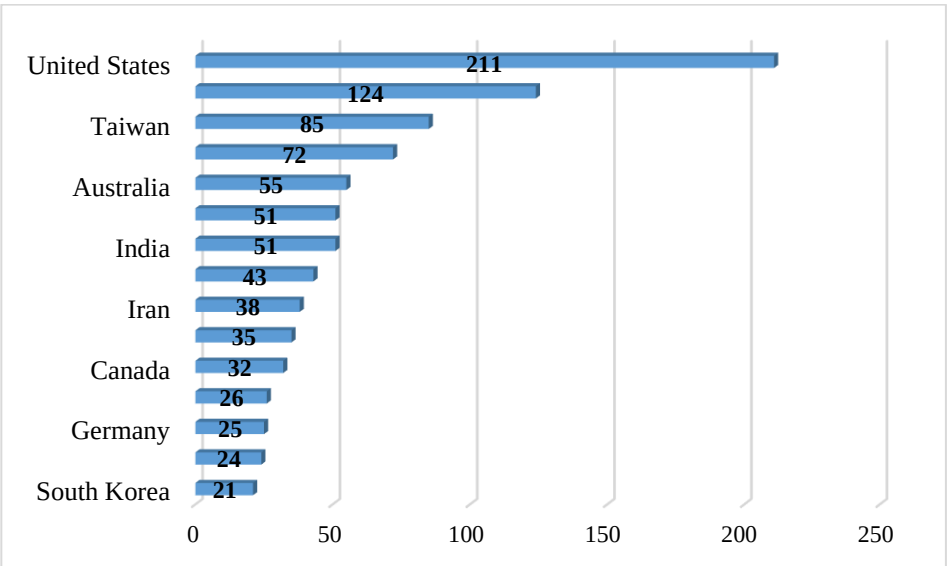

Fig. 1. Documents distribution by top 15 countries with contribution in the topics
Source: Created by authors after Scopus[20]

Starting from the information presented in Figure 1, it can be concluded that the first 5 countries cumulate a percentage of about 55% of the total number of articles

[20] Scopus, 2019, *Op.cit.*

related to the concepts of knowledge management and competitive advantage, these being found in title, abstract or keywords of the papers selected. Out of a total of 1083 articles, the top 15 countries contribute with 893 (82.46%) articles. The country with the highest number of articles is USA, with a total of 211 (19.48%) items, followed by the United Kingdom with a total of 124 (11.45%) articles. Regarding the situation in Romania, 7 of the 1083 selected articles are affiliated to our country.

2. *The most productive journals that published on the topics of knowledge management and competitive advantage*

The top 16 journals according to the number of articles published in each journal are presented in Table 2.

Table 2. Most productive Journals. Source: Created by authors after Scopus[21]

Journal	Documents
Journal Of Knowledge Management	70
Knowledge And Process Management	24
Expert Systems With Applications	20
International Journal Of Technology Management	20
Journal Of Information And Knowledge Management	19
Knowledge Management Research And Practice	18
International Journal Of Knowledge Management Studies	15
Learning Organization	15
Strategic Direction	12
International Journal Of Knowledge Management	11
Journal Of Intellectual Capital	11
Management Decision	11
Technovation	11
Vine	11
Measuring Business Excellence	10
World Academy Of Science Engineering And Technology	10

Thus, analysing Table 2, it can be observed that 288 of the documents selected for this analysis are found in the Top 16 journals (26.59%). The maximum number of articles published in a journal was 70, in "Journal of Knowledge Management", accounting for 6.46% of the total number of articles.

[21] Scopus, 2019, *Op.cit.*

3. Top institutions with contributions related to the topic

Regarding the top of universities whose authors have published an article or a review on the knowledge management and competitive advantage topics, this analysis is shown in Table 3.

Table 3. Documents counts for up to 11 affiliations. Source: Created by authors after Scopus[22]

Affiliation	Number of documents
Universidad de Oviedo	15
University of Tehran	12
National Cheng Kung University	10
Hong Kong Polytechnic University	9
Multimedia University	9
National Chiao Tung University Taiwan	8
Universiti Teknologi Malaysia	8
Universidad de Granada	8
Islamic Azad University	8
George Washington University	7
Universidad Complutense de Madrid	7

Analysing Table 3, the largest number of documents affiliated to a university, respectively the number of papers to which the authors or co-authors are affiliated, is 15 and belongs to Universidad de Oviedo, Spain. The next two universities that appear with many affiliate documents are University of Tehran and National Cheng Kung University with 12 and respectively, 10 papers. Overall, analysing the 11 top universities, according to the number of documents in which the authors or co-authors are affiliated, it can be observed that 3 of the institutions are from Spain.

4. Top authors with contributions related to the subject knowledge management and competitive advantage

Out of the total of the authors who contributed to the writing of the 1083 articles analysed, the top 14 of them, according to the individual contributions they had in the topic, and more precisely according to the number of scientific papers written in the topics knowledge management and competitive advantage, are presented in Figure 2.

[22] Scopus, 2019, *Op.cit.*

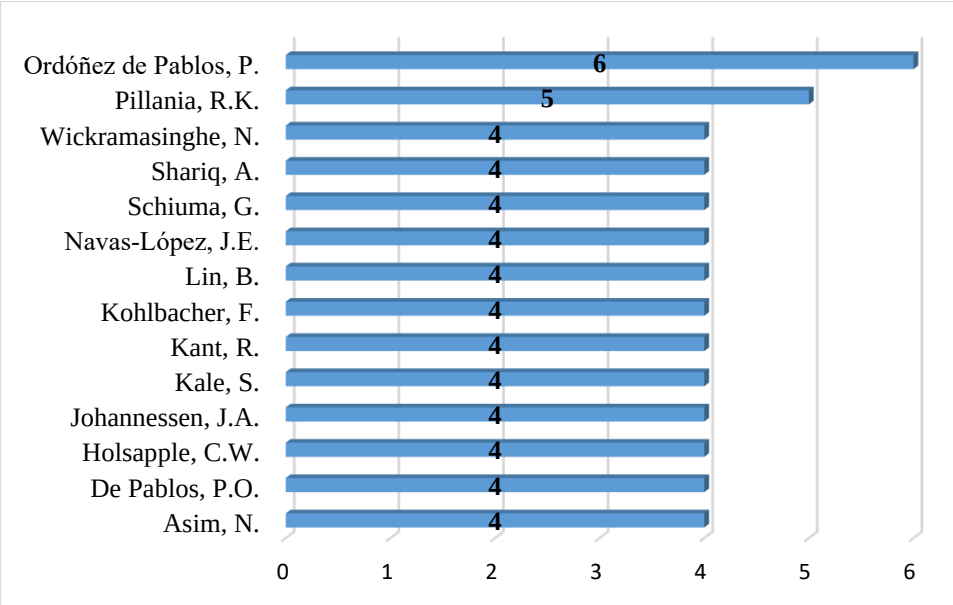

Fig. 2. Top 14 authors with contributions in the field
Source: Created by authors after Scopus[23]

From the analysis of Figure 2, it can be stated that most of the individual contributions in the subject, more specifically 6 of them, are performed by Ordóñez de Pablos, P., who is affiliated with the Universidad de Oviedo, an affiliated university, as shown in Table 2, the first place regarding the number of documents whose authors are affiliated. The next author is Pillania, R.K., who has 5 contributions or papers in the subject, being affiliated with the Management Development Institute, Gurgaon, Gurugram, India. The other top authors have 4 contributions in the topic.

5. Analysis of the main subject areas analysing these two concepts

Figure 3 illustrates the distribution of the papers by subject area. Analysing the information presented in this figure, there can be observed that the first two main areas are comprising more than half of the total number of articles (53.29%): Business, Management and Accounting and Computer Science.

[23] Scopus, 2019, *Op.cit.*

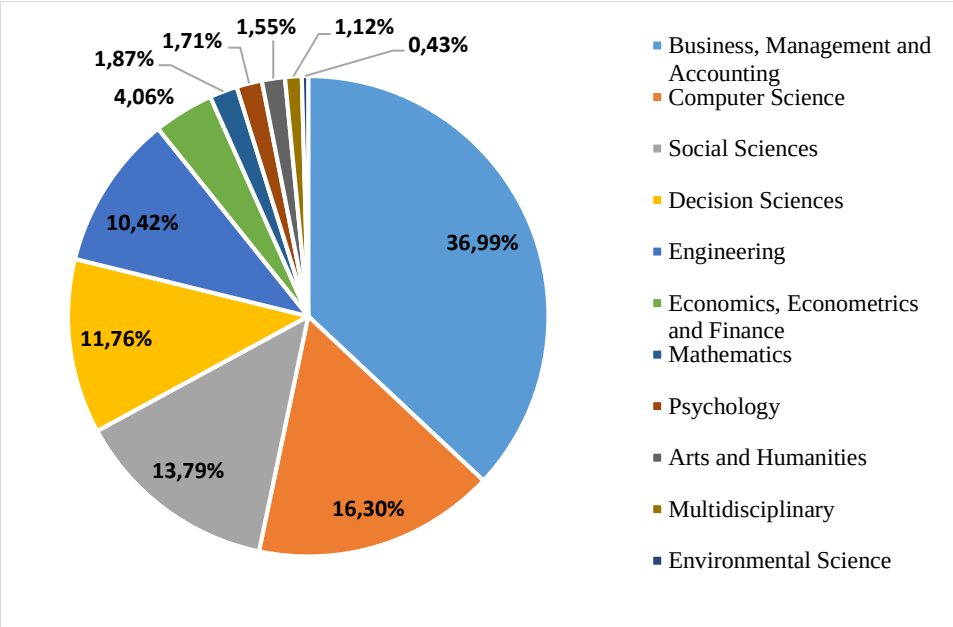

Fig. 3. Papers distribution by subject area
Source: Created by authors after Scopus[24]

6. Citation analysis

Another objective of the present research is to analyse the citations obtained from the 1083 selected articles, containing the "knowledge management" and "competitive advantage" concepts in title, abstract or keywords list. In this sense, , it can be stated that during the analysed period, not only the number of papers in the topic of knowledge management and competitive advantage increased, but also the number of citations received by these articles. Thus, starting with 2007, it can be observe that the 1083 articles selected for the analysis received more than 1000 citations, in 2018 the number of citations reaching 3847.

Regarding the top 10 most cited articles in the selected period, this analysis is presented in Table 4, which illustrates the number of citations accumulated by each article from the publication date until 2018.

[24] Scopus, 2019, *Op.cit.*

Table 4. Top 10 highly cited articles. Source: created by authors after Scopus[25]

Rank	Title	Authors	Citations
1	Creating and managing a high-performance knowledge-sharing network: The Toyota case	Dyer & Nobeoka (2000)[26]	1812
2	Knowledge management enablers, processes, and organizational performance: An integrative view and empirical examination	Lee & Choi (2003)[27]	989
3	Human capital and learning as a source of sustainable competitive advantage	Hatch & Dyer (2004)[28]	559
4	Strategies for Managing Knowledge Assets: The Role of Firm Structure and Industrial Context	Teece (2000)[29]	532
5	Imitation of complex strategies	Rivkin (2000)[30]	531
6	Knowledge management in organizations: Examining the interaction between technologies, techniques, and people	Bhatt (2001)[31]	530
7	Relation-specific capabilities and barriers to knowledge transfers: Creating advantage through network relationships	Dyer & Hatch (2006)[32]	454

[25] Scopus, 2019. 1083 selected documents – citations` analysis. www.scopus.com (accessed September 11, 2019).
[26] J.H. Dyer, K. Nobeoka, "Creating and managing a high-performance knowledge-sharing network: The Toyota case," *Strategic Management Journal* 21(3) (2000): 345-367.
[27] H. Lee, B. Choi, "Knowledge management enablers, processes, and organizational performance: An integrative view and empirical examination," *Journal of Management Information Systems* 20(1) (2003): 179-228.
[28] N.W. Hatch, J.H. Dyer, "Human capital and learning as a source of sustainable competitive advantage," *Strategic Management Journal* 25(12) (2004): 1155-1178.
[29] D.J. Teece, "Strategies for Managing Knowledge Assets: The Role of Firm Structure and Industrial Context," *Long Range Planning* 33(1) (2000): 35-54.
[30] Rivkin, J.W., (2000), Imitation of complex strategies, *Management Science*, 46(6), 824-844.
[31] G.D. Bhatt, "Knowledge management in organizations: Examining the interaction between technologies, techniques, and people," *Journal of Knowledge Management* 5(1) (2001): 68-75.
[32] J.H. Dyer, N.W. Hatch, "Relation-specific capabilities and barriers to knowledge transfers: Creating advantage through network relationships," *Strategic Management Journal* 27(8) (2006): 701-719.

Rank	Title	Authors	Citations
8	Absorbing the concept of absorptive capacity: How to realize its potential in the organization field	Volberda & Foss (2010)[33]	429
9	Managing effective knowledge transfer: An integrative framework and some practice implications	Goh (2002)[34]	412
10	Measuring the Strategic Readiness of Intangible Assets	Kaplan & Norton (2004)[35]	394

According to Table 4, it can be affirmed that the largest number of citations accumulated by an article from the publication date until 2018 is the article of Dyer and Nobeoka[36], having a number of 1812 citations, even though these authors are not in the top authors with the most contributions in the topic. This article is also in present (September 2019) in the top of the most cited articles related to the two topics, with a number of citations of 1902. In addition to these results, 3 of the 10 articles from the top cited articles in the field have Dyer as author, these 3 articles being his 3 individual contributions in the subject. The most recent article from the top cited papers selected for analysis is Volberda and Foss's article (2010)[37], accumulating 429 citations.

It can also be noted that two of the top 10 most cited articles (item 6 and item 9) are published in the "Journal of Knowledge Management", the journal with the most numerous articles in the topics, as shown in Table 2. Furthermore, another 3 of the articles presented in Table 4 (articles from heading 1, 3, 7) are published in the "Strategic Management Journal", including the most cited article, in this journal being published less than 10 articles in the field, according to Table 2.

7. Keyword analysis and visualisation map

In order to realize the keywords' analysis and to create the visualization map of keywords based on bibliographic data, with the help of VOSviewer software, version 1.6.11[38], firstly, a database with specific information on the 1083 selected articles was created. Thus, from Scopus platform were extracted a series of information regarding

[33] H.W. Volberda, N.J. Foss, "Absorbing the concept of absorptive capacity: How to realize its potential in the organization field," *Organization Science* 21(4) (2010): 931-951.
[34] S.C. Goh, "Managing effective knowledge transfer: An integrative framework and some practice implications," *Journal of Knowledge Management* 6(1) (2002): 23-30.
[35] R.S. Kaplan, D.P. Norton, "Measuring the Strategic Readiness of Intangible Assets," *Harvard Business Review* 82(2) (2004): 52-63.
[36] J.H. Dyer, K. Nobeoka, *Op.cit.*
[37] H.W. Volberda, N.J. Foss, *Op.cit.*
[38] N.J. Van Eck, L. Waltman (2019), *Op.cit.*

the selected articles and more precisely information about the title of the document, the authors' names, the year of publication, the abstract and the keywords of each selected article. Subsequently, this information was entered into the VOSviewer software[39] and it was possible to perform a co-occurrence analysis of the keywords contained in each article.

After entering the data in the VOSviewer software[40] it counted a total of 2201 keywords reported in the 1083 articles selected for analysis and only 27 keywords were kept for analysis, taking into account a minimum number of their occurrence (where occurrence means the number of documents in which a keyword occurs). Thus, a minimum number of 15 occurrence was selected and for all the 27 keywords obtained the total strength of the co-occurrence links with other keywords (co-occurrence) was calculated. Table 5 presents the 27 keywords together with their occurrence, the links between them and the co-occurrence (or the total strength between them), sorted by their occurrence.

Table 5. The keywords` occurrences, co-occurrences and links. Source: Created by authors with VOSviewer[41]

Keyword	Occurrences	Links	Co-occurrences
knowledge management	577	25	520
competitive advantage	158	26	227
innovation	74	22	110
knowledge sharing	72	15	72
intellectual capital	65	16	83
knowledge transfer	55	21	75
tacit knowledge	44	17	76
knowledge	42	18	52
organizational learning	35	16	49
knowledge creation	32	19	56
performance	26	13	41
knowledge management system	24	11	36
knowledge management (km)	23	9	21
human capital	22	13	48
organisational learning	22	12	31
strategy	21	16	42
dynamic capabilities	21	13	33

[39] Ibidem.
[40] Ibidem.
[41] Ibidem.

Keyword	Occurrences	Links	Co-occurrences
organizational performance	21	10	27
information technology	20	15	36
absorptive capacity	19	11	30
human resource management	18	11	29
strategic management	17	10	29
resource-based view	17	11	28
learning	17	10	23
case study	16	11	20
explicit knowledge	15	13	38
learning organizations	15	10	23

Analysing table 5 it can be seen that, out of the total of 1083 documents selected, the word "knowledge management" was found as a keyword in only 577 documents, while the word "competitive advantage" was found as a keyword in 158 articles. This shows that in the rest of the documents the two concepts were found in the title or abstract and were not part of the authors` keyword list.

For the mapping of keywords and their grouping into clusters, the VOS clustering technique was used, described in detail by Waltman, Van Eck and Noyons[42]. VOS clustering, as explained in other studies[43] uses the number of nodes, the links between them, the total number of links and the total strength between them (the co-occurrence). More precisely, starting from these elements, for each node is calculated the distance from other nodes, and each node is positioned in a two-dimensional space (a representation called mapping). In the end, the positive integer number obtained after positioning a node represents the cluster that the node belongs to. The visualization map of that 27 keywords selected according to a minimum number of 15 occurrences is presented in the Figure 5.

Looking at the information presented in the map in Figure 4 it can be observed that the 27 keywords (selected based on a minimum number of 15 occurrences or more precisely based on the minimum number of 15 documents in which the respectively word appears) were grouped in 6 clusters presented with different colours. Analysing the six clusters obtained it can be seen that in the red and green clusters there are 6 nodes (where node is understood as every keyword represented on the map), in the blue and yellow clusters there are 5 nodes, in the purple cluster there are 3 nodes and in the light blue cluster exist only 2 nodes. The links between the nodes are presented as curved lines that are thicker or thinner depending on the link strength.

[42] L. Waltman, N.J. Van Eck, E.C.M. Noyons, *Op.cit.*

[43] C. Cicea, C. Marinescu, C.F. Albu, D.P. Bălan, *Op.cit;* C. Marinescu, C. Cicea, S.E. Colesca, *Op.cit.*

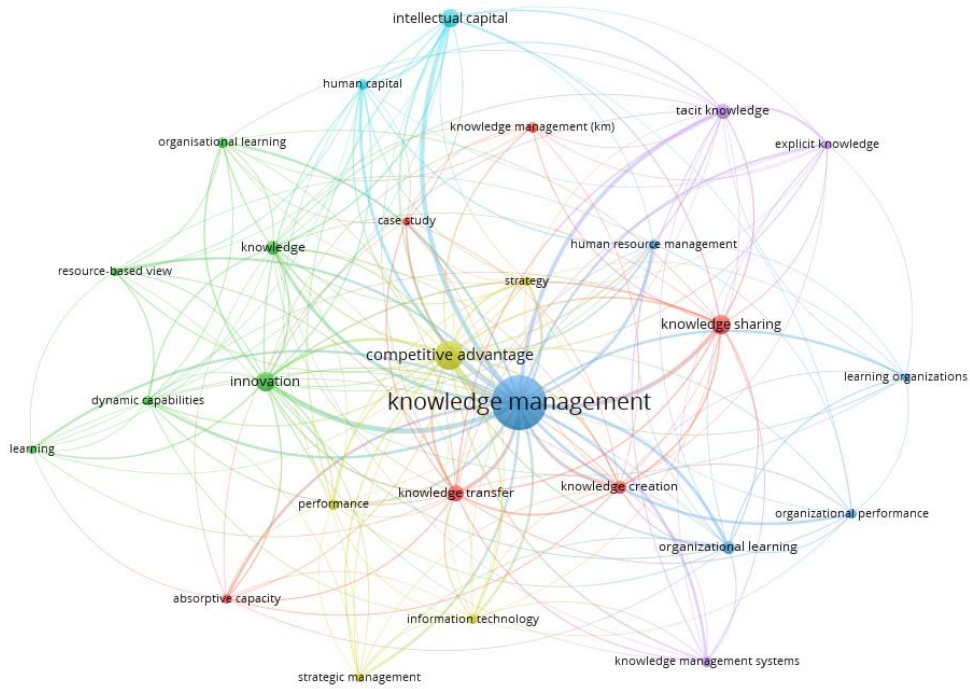

Fig. 4. Keywords map. Source: Created by the authors with VOSviewer[44]

Analysing the keywords` map it can be seen that the strongest co-occurrence link between keywords is formed between the words "knowledge management" and "competitive advantage". Also it can be observed a strong co-occurrence link and between the following keywords: "knowledge management" – "innovation"; "knowledge management" – "intellectual capital"; "knowledge management" – "tacit knowledge"; "knowledge management" - "organizational learning"; "knowledge management" – "knowledge sharing"; "knowledge management" – "human capital".

In terms of node size, this is given by the number of the keyword's occurrences or more precisely by the number of documents in which a word is found as a keyword. Both from Table 5, from the occurrence column and from Figure 4 depending on the size of a node it can be seen which keywords appear in the largest number of documents.

The distance between two keywords represented on the map indicates the relationship between the two words based on co-occurrence links. Therefore, this shows that the closer the two words are to each other, the stronger are the relatedness between them. Thus, it can be observed that the smallest distance between the keywords represented on the map is between knowledge management and

[44] N.J. Van Eck, L. Waltman (2019), *Op.cit.*

competitive advantage, which underlines the strong connection between these two words.

V. Conclusions

Through this study the research trends in knowledge management and competitive advantage topics were evaluated by using the bibliometric techniques. Therefore the main results illustrated that in the period 2000-2018 there was an increase of the published articles on the knowledge management and competitive advantage theme. The selected and analysed papers are part of different subject areas (the most important areas are Business, Management and Accounting and Computer Science with a total of 53.29% of the entire amount of articles). According to the classification that was realized, Journal of Knowledge Management is the most productive journal from the perspective of number of articles published on the analysed topics, summing with a number of 70 papers, representing 6.46% from the total of 1083 papers. USA is the country that has the most significant contribution with articles in this area (19.48%) and the publisher with the highest number on individual contributions is Ordóñez de Pablos, P (6 papers). The highest number of documents affiliated to a university (more exactly papers to which the authors are affiliated) is 15 and belongs to Universidad de Oviedo, from Spain.

Concerning the results of the citation analysis, it can be concluded that in the analysed period not only the number of papers on the knowledge management and competitive advantage subject grew, but also the number of citations received by this papers. The most cited paper cumulative from the time of occurrence until 2018 is the article of Dyer and Nobeoka[45] from 2000 with an amount of 1812 citations.

Regarding the analysis of the keywords, it has been noticed that from the total of 1083 documents selected, the word "knowledge management" was found as keyword only in 577 papers, while the concept of "competitive advantage" was found as keyword in 158 papers. This thing shows that for the rest of the papers, these concepts were found in the title or in the abstract and they weren`t part from the list of keywords used by the authors. Moreover, the results of this analysis show that the strongest co-occurrence link between keywords is formed between the concepts of "knowledge management" and "competitive advantage", existing a strong co-occurrence link and between the following keywords: "knowledge management" – "innovation"; "knowledge management" – "intellectual capital"; "knowledge management" – "tacit knowledge"; "knowledge management"- "organizational learning"; "knowledge management" – "knowledge sharing"; "knowledge management" – "human capital".

Therefore, this study illustrated its utility through the fact that it helps to identify the current situation of the researches done on the knowledge management and competitive advantage topics, it shows in which directions further studies can be continued starting from the literature review and it opens the possibility to realize new connections between the keywords between which it exists a strong co-

[45] J.H. Dyer, K. Nobeoka, *Op.cit.*

occurrence link, based on the information presented in the keywords` map. Regarding the research limitations, the analysis focused only on documents type articles and review, extracted only from the Scopus database which could exclude important papers in the knowledge management and competitive advantage topics.

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