

Epistemic communities in knowledge organization: an analysis of research trends in the Knowledge Organization journal

José Augusto Guimarães; Daniel Martínez-Ávila; and Bruno Henrique Alves
(São Paulo State University – UNESP – Brazil)

Abstract

Considering knowledge organization as a domain in a continuous process of theoretical-methodological consolidation, it becomes important to identify its epistemological configuration and “epistemic communities” in order to measure its impact on society and scholarship. As a reflection of the ISKO and knowledge organization activities, the Knowledge Organization (KO) journal was analysed for the period 1994-2014 in order to identify and characterise the core of researchers that the knowledge organization community consider as central and more impactful. In addition, we analysed the impact of this literature on the LIS scientific domain as a whole, by means of the presence of such literature also in scholarly journals other than KO. The results reveal that the consolidation process of the KO domain and the epistemic communities’ progress occur in a dynamic and well-balanced way with a strong and widespread impact on the LIS scientific context as a whole. The dynamic and evolving nature of these groups, with citations growing in number and new authors slowly emerging for each period, makes it possible to conclude that the ISKO epistemic communities and their impact are not only changing but also expanding.

Keywords: Knowledge organization; Citation analysis; Domain analysis; Epistemic communities.

1. Introduction

Knowledge organization, as a domain, can be considered a scientific area whose theoretical foundations are still being developed in a continuous process of theoretical-methodological consolidation. The recent institutionalization process of knowledge organization as a domain, as well as the epistemological inquiry of the concepts and authors that have meaningful theoretical frameworks, are contributing to the development and construction of scientific knowledge.

In this paper, we worked with scholarly journals to study the knowledge organization domain, and how this domain is formed and structured especially in the context of Information Science. In this sense, the scholarly journal is considered not only the main channel for scientific communication between researchers, but also one of the main objects capable of improving the impact of the scientific knowledge on society and on progress (both scientific progress and progress in society by the use and application of the results of research). Publications, i.e. articles that are published in scholarly journals, disseminate and make available the results of research in a given area of knowledge, as well as making the validation and legitimation of scientific knowledge possible. Scientific knowledge is only

valid when it is published, available, and socialized so that it can be evaluated and replicated. In this vein, as Lara states, scientific knowledge “is based on the validation of the merit and of the scientific method by the scientific community, that is, only what is reviewed and approved by peers must be published” (Lara 2006, p.405). As Viera (1997, p.41) puts it: “the scholarly journal is the channel for the dissemination of scientific knowledge in Humanities and in other areas, [...] through it, the researcher communicates the result of his/her work and establishes the priority of his/her findings.” Therefore, according to Mueller, journals and articles can be used as “indicators of the scientific development of a country or region, or of the state of development in an area of knowledge” (Mueller 1999, p.1).

In our research, we primarily worked with the journal *Knowledge Organization* (KO), a journal directly linked to the International Society for Knowledge Organization (ISKO), and which states that its research scope is to analyse the impact of knowledge organization on society. Although the scope of the journal was broadened during the years to include aspects such as concept theory, systematic terminology, organization of knowledge, classification, indexing, knowledge representation and more, it also kept a characteristic identity that might be linked to a specific domain (the knowledge organization domain).

For Esteban Navarro and García Marco (1995, p. 149), knowledge organization is “the discipline devoted to the study and developing of the fundamentals and techniques of planning, construction, management, use, and evaluation of document description, cataloguing, arrangement, classification, storage, communication, and retrieval systems created by people to testify, preserve and communicate their knowledge and acts, from their content, seeking to ensure their change into information that is able to generate new knowledge.” In this sense, the study of the impact of knowledge and knowledge organization on society can also be justified by the study of the developing process of the field itself. The bigger/more relevant the impact is, the greater the capability of generating new knowledge. Therefore, we believe that a good visualization of the most cited researchers, the impact of their work, and how they interact with other researchers can more so contribute to the development of scientific knowledge in the context of Information Science.

For this, and considering the importance of identifying the epistemological configuration of knowledge organization (Gnoli 2008; Hjørland 2008; López-Huertas 2008; Tennis 2008), our study aims to analyse the researchers and authors that contribute to the development of the field by the analysis of citations and co-citations for the period 1994-2013. More specifically, we aim to identify, by means of citation and co-citation analyses, the “epistemic communities” (Meyer and Molyneux-Hodgson 2010) within the domain of the

researchers that constitute a scientific community. The theoretical background of our study also draws from the concept of the scientific community as it is used in Sociology and the History of Science. For Weber (1946), a scientific community includes diverse points of view.

The sociological concept of community depends on forces that group the individuals of the community: economic forces, social forces and prestige forces. However, according to Kuhn (1970) a scientific community is composed of individuals that, in a collective way, are concerned with the development of science. This author also states that “competition between segments of the scientific community is the only historical process that ever actually results in the rejection of one previously accepted theory or in the adoption of another” (Kuhn 1970, p. 8). On the other hand, for Merton (1973), a scientific community is a social institution ruled by values that guide the scientific practice. As a substitute for the Mertonian concept of scientific community, Bourdieu (e.g. 1975) also introduces the concept of scientific field, a denomination that we will follow in our work.

The KO journal, for the period 1994-2014, was analysed with the aim to identify and characterise the core of researchers that the KO community considered as central, the main subjects that they dealt with, and the scientific dialogues that are established among them and their impact on the scientific field. In addition, we analysed the impact of this literature on the LIS scientific domain as a whole, by means of the presence of such literature in other scholarly journals than KO.

The final goal is to identify the core of researchers that the scientific community recognizes as fundamental (i.e. more impactful) in knowledge organization and their research topics. For this, domain-analysis was used in order to characterize and evaluate knowledge organization as a scientific field, by means of the identification of the necessary conditions for the construction and socialization of scientific knowledge (Hjørland 2002, 2004; Tennis 2003; Smiraglia 2011). Following this, co-citation analysis was applied in order to evaluate the relationships and scientific dialogues between researchers, as well as the impact of authors on scholarship and epistemic communities.

2. Domain Analysis (DA) and co-citation analysis

Although the term domain analysis had been previously used in computer science (e.g. in Neighbors 1980) to describe the activity of identifying the objects and operations of a class of similar systems in a particular problem domain, in Information Science, the concept was

coined by Birger Hjórland and Hanne Albrechtsen (1995) to describe a new methodological and theoretical perspective.

Following Hjórland and Albrechtsen's concept of domain analysis, Joe Tennis (2003) proposed two axes to delineate an operationalized definition of domain. For Tennis, axis one would be areas of modulation, setting the parameters on the names and the extension of the domain; axis two would be the degrees of specialization, qualifying and setting the intension of a domain. In our study, we follow the two axes proposed by Tennis. We also consider that axis one, the extension of the domain, can be characterized as the analysis of the researchers that contribute to the development of the domain "knowledge organization," by means of citations and co-citations; while axis two, specialization and depth, can be used to identify, by citation and co-citation analysis, the domain of the researchers that constitute the scientific community in order to characterize the core of researchers that the community recognizes as fundamental, or more impactful, in knowledge organization and its main areas of research. We aim to build a co-citation network to analyse the degrees of the density and centrality of the researchers in the network. In this vein, we also draw on Jens-Erik Mai when he states that a domain can also be understood as "an area of expertise, a body of literature, or a group of people working together in an organization" (Mai 2005, p.605).

From a historical point of view, also in relation to the concept of domain, Lloyd (1993) claims that the concepts used as references and the general theories that the advanced sciences employ belong to what some philosophers of science call the domains of knowledge. According to this author, these domains are thematic bodies that outline how the entities, the forces and the systems of the world have been theorized and found as naturally designed and interrelated. He also claims that what makes scientific a scientific discourse, i.e. its scientific validation, is not its logic alone, but the combination of rationality (the reasoning structure), external availability, and its practical application.

In the context of Information Science, Smiraglia states that "domain analysis is one way of generating new knowledge about the interaction of communities of scholars with information. Domain analysis of international research communities brings the promise of new comprehension of how people interact with information in different places" (2011 p.1). For Oliveira and Grácio (2009 p.2042), "Domain Analysis (DA) is one of the methodological tools that is used to analyse the behaviour of science in a given field." Hjórland (2002), lists diverse approaches to domain analysis: producing literature guides and subject gateways;

producing special classifications and thesauri; research on indexing and retrieving specialities; empirical user studies; bibliometrical studies; historical studies; document and genre studies; epistemological and critical studies; terminological studies, LSP (languages for special purposes), discourse studies; studies of structures and institutions in scientific communication; and domain analysis in professional cognition and artificial intelligence. In this vein, Hjörland also suggests (p. 451) that the combination of more than one of these approaches strengthens the arguments and adds consistency to the domain analysis. In our research, we combined bibliometrical studies, historical studies, and epistemological and critical studies (three of the eleven approaches to knowledge organization listed by Hjörland) to conduct the analysis of the discursive communities. As for the bibliometrical studies approach, the main approach in our method, Hjörland highlights (pp. 432-436) the contribution of citation and co-citation analysis to study a given scientific community, that can be visualized by bibliometric maps.

The list of bibliographic references (citations) that are used for the composition of a document can be regarded as a reflection of a discursive community (that can be composed of researchers and their subjects), and can be used to constitute a scientific domain. Its study consists in the analysis of the frequency of citations, mainly to authors, and the frequency of the co-occurrences (co-citations) among them. In the words of Grácio and Oliveira (2013, p.199), “a citation is taken as a clear and objective indicator of the scientific community, allowing the identification of groups of researchers and their publications in order to reveal the most impactful researchers of an area.” The connection between scientific communities and impact is clear. As Vanz and Caregnato (2003, p.251) highlight, citation analysis aims to “measure the impact and visibility of certain authors in a scientific community, showing which 'schools' of thought prevail within them.”

Leydesdorff (1998) states that citations establish a relationship between the citing texts and the cited texts. This author reinforces the multidimensionality of citations arguing that “citations are the result of the interaction between networks of authors and between networks of their communications. [...] it can function in scientific practices by indicating both the cognitive and the social contexts of a knowledge claim. At a generalized level, citations, as potentially repeated operations, sustain communication in the sciences by drawing upon cognitive and social contexts” (Leydesdorff, 1998, p. 6). For Leydesdorff, citation analysis is one of the most relevant tools in scientometrics and in the evaluation of science for particular

areas of scientific knowledge. This use of citation analysis can help to recognize research interests and research fronts as well as to identify the potential of journals and authors in a given area of scientific knowledge.

According to Liu and Wang (2005), citation analysis can also be used to explore the intellectual structure of a field of knowledge by studying the references and the analysis of co-citations. Miguel, Moya-Anegón and Herrero-Solana (2008) have also pointed out that the first studies analysing the co-citation of authors also analysed the intellectual structure of an area of knowledge. The fundamental premise of co-citation analysis here is that when two or more documents, authors or journals are cited together in a posterior work, there is, at least from the point of view of the citing author, a topic similarity between the cited works (Oliveira and Grácio, 2011), which therefore contribute to the development of the area of knowledge. Henry Small, one of the pioneers in co-citation analyses, also studied the incidence of cited documents in posterior literature (i.e. in the citing documents), and according to this author, “when scientists agree on what constitutes prior relevant literature, including what is significant in that literature, they are in fact defining the structures of their communities” (Small 2004, p.72). Small also states that: "the structure of science is generated by patterns of co-recognition" (p. 71). Thus, "when documents are co-cited, citing authors are awarding co-recognition as well as creating an association of meanings" (p. 76).

Following this, and according to Spinak (1996), groupings of co-citations can represent either cognitive networks or social networks of researchers. In this sense, co-citation networks can be translated into maps representing the documents and the co-citation relationships. In our paper, we study the formation groups that are represented in the social network and, more specifically, the co-citation networks and the strength of the ties between the authors. To represent this, we draw on Social Network Analysis (SNA), that, as Otte and Rousseau (2002) point out, constitutes an element of graphic visualization for the comprehension of a group (researchers, institutions, subjects, countries, etc.), that in our case belongs to the knowledge organization domain.

3. Methodology

We conducted a domain analysis and followed the bibliometric approach (Hjørland, 2002), by applying citation analysis to 220 papers published in the “Knowledge Organization” journal during the period 1994-2013. We conducted a diachronic analysis of five-year periods (1994-1998, 1999-2003, 2004-2008, and 2009-2013) as a five-year period is

considered to be an adequate range to characterize scientific production. We chose the range 1994-2013 because the data was retrieved from the Scopus database on the 10th of June of 2014, and 1994 was the earliest year of the journal that was indexed by this database at the time.

For each article, we collected and cleaned up the list of references: multiple authorships were extracted and references were arranged alphabetically in order to verify the most cited authors. In total, we analysed 4,543 cited authors from a total of 6,248 references, which makes an average of 28 references per article and 3,508 authors ($\approx 77\%$) that were cited only once. Provided the large amount of data, we only considered those authors that were cited at least in 11 articles (using the annual average of articles for the studied period, i.e. of the 220 papers in 20 years), resulting in 20 authors. With this selection of the 20 most cited authors, a 220X20 asymmetric matrix was built (representing the occurrences of the citing authors and cited authors) as a basis for the development of a new 20X20 square symmetric matrix representing the absolute co-citation frequencies among the most cited authors. Self-citation was discarded for being considered controversial. Ucinet software was used to map and visualise the network of dialogs established by the researchers (authors) and to calculate aspects such as degrees of density and centrality.

In the second stage, we researched the SCOPUS database to identify the papers that cite the KO articles for the period studied in order to verify the impact of knowledge organization on scholarship.

4. Results

4.1. Characterization of the domain and the core of KO researchers

Table 1 shows the 10 most cited authors in at least 5 of the 66 analysed articles ($\approx 7.6\%$), for the period 1994-1998. Dahlberg (in 18 citing articles), Ranganathan (in 10 citing articles), Kuhn (in 8 citing articles), and Lancaster (in 8 citing articles) appear as the main cited authors in the mentioned universe. Therefore, it is possible to observe the core of the most impactful researchers that the community recognized as fundamental for the development of the domain knowledge organization, for the period 1994-1998, in topics such as concept theory, structures and systematisation of concepts, classification in Library Science (Dahlberg); classification and communication, and Library Science theory (Ranganathan);

Table 2 shows the 7 researchers that are cited in at least 5 of the 39 analysed articles ($\approx 12.8\%$), for the period 1999-2003. Birger Hjørland emerges as the most cited author, working in topics such as classification, domain analysis and knowledge organization, among others. Hanne Albrechtsen worked with topics such as classification systems, domain analysis and knowledge organization, among others. Hope Olson worked with topics such as knowledge organization and ethical aspects in authority control, among others. Shiyali Ramamrita Ranganathan still appears as one of the most cited authors (the only one from the previous list that repeats) in topics such as elements of Library Science and classification, among others.

Table 2 - Researchers and number of articles in which they were cited for the period 1999-2003.

Most cited authors	Number of articles in which the author was cited
Hjørland, B.	10
Albrechtsen, H.	9
Olson, H.	6
Ranganathan, S.R.	6
Chan, L.M.	5
Salton, G.	5
Williamson, N.	5

Figure 2 shows the co-citation network of the absolute frequencies for the period 1999-2003. Again, Gerard Salton is not shown in the network because he was not co-cited during this period. In this network, the greatest co-citation frequencies are 6, 3, 3, and 3, being the greatest one (6) between Hjørland and Albrechtsen, represented by the thickest line in the network. Following this, 3 occurrences of 3 co-citations include Albrechtsen and Olson; Hjørland and Olson; and Hjørland and Ranganathan.

Figure 2 – Network of co-citations of the 6 authors for the period 1999-2003.

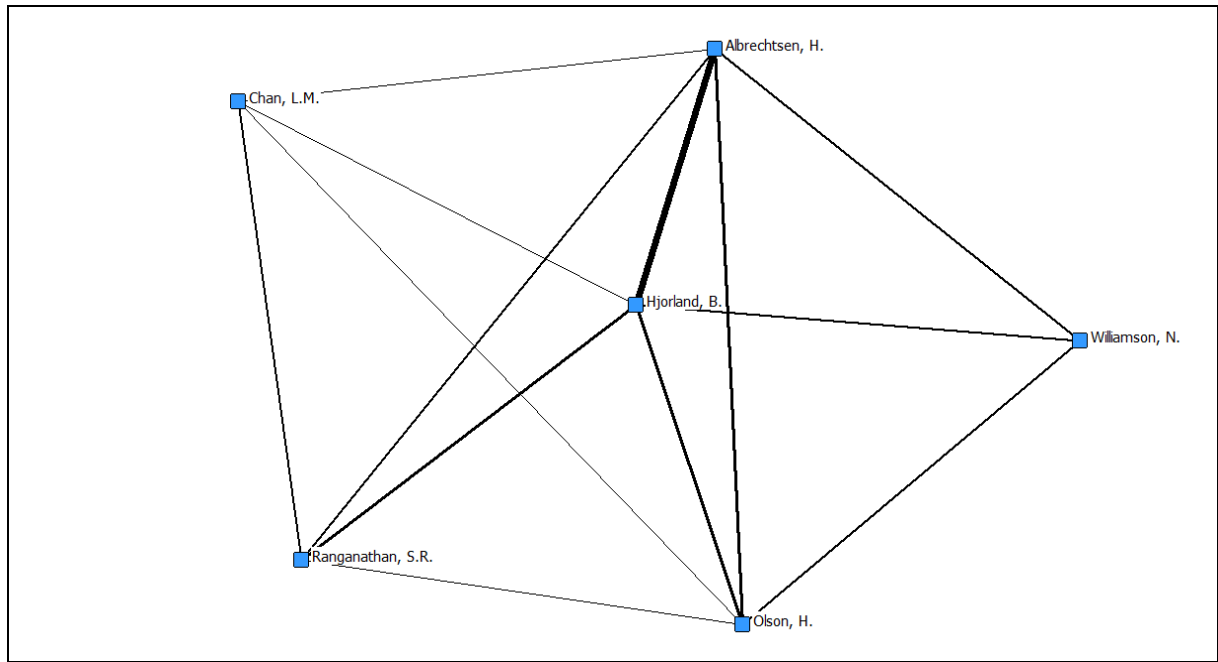


Table 3 shows the 16 researchers that are cited in at least 5 of the 41 analysed articles ($\approx 12.2\%$), for the period 2004-2008. Birger Hjørland appears as the most cited author for the second consecutive period, working in topics such as theory in knowledge organization, information retrieval and fundamentals of knowledge organization, among others. Shiyali Ramamrita Ranganathan not only appears as one of the most cited authors for the consecutive third time, but he also ranks second in the list, with topics such as classification and communication, among others. Traugott Koch worked with topics such as new application of knowledge organization systems, and terminological and technological services, among others. Ingetraut Dahlberg re-enters the list of most cited authors with topics such as universal classification and knowledge organization, among others. Dagobert Soergel worked with topics such as ontologies, indexing language and thesauri. Vanda Broughton worked with topics such as classification and knowledge organization.

Table 3 – Researchers and number of articles in which they were cited for the period 2004-2008.

Most cited authors	Number of articles in which the author was cited
Hjørland, B.	10
Ranganathan, S.R.	10
Broughton, V.	8
Koch, T.	8
Soergel, D.	8
Beghtol, C.	7

Dahlberg, I.	6
Mai, J.-E.	6
Poli, R.	6
Vizine-Goetz, D.	6
Bliss, H.E.	5
Foskett, D.J.	5
Gnoli, C.	5
Lancaster, F.W.	5
Svenonius, E.	5
Vickery, B.C.	5

Figure 3 shows the co-citation network of the absolute frequencies for the period 2004-2008. In this network, the greatest co-citation frequencies are 7, 5, and 5. The greatest one (7) is between Ranganathan and Vizine-Goetz, represented by the thickest line in the network. Following this, 2 occurrences of 5 co-citations involve Hjørland and Beghtol; and Ranganathan and Poli.

Figure 3 – Network of co-citations of the 16 authors for the period 2004-2008.

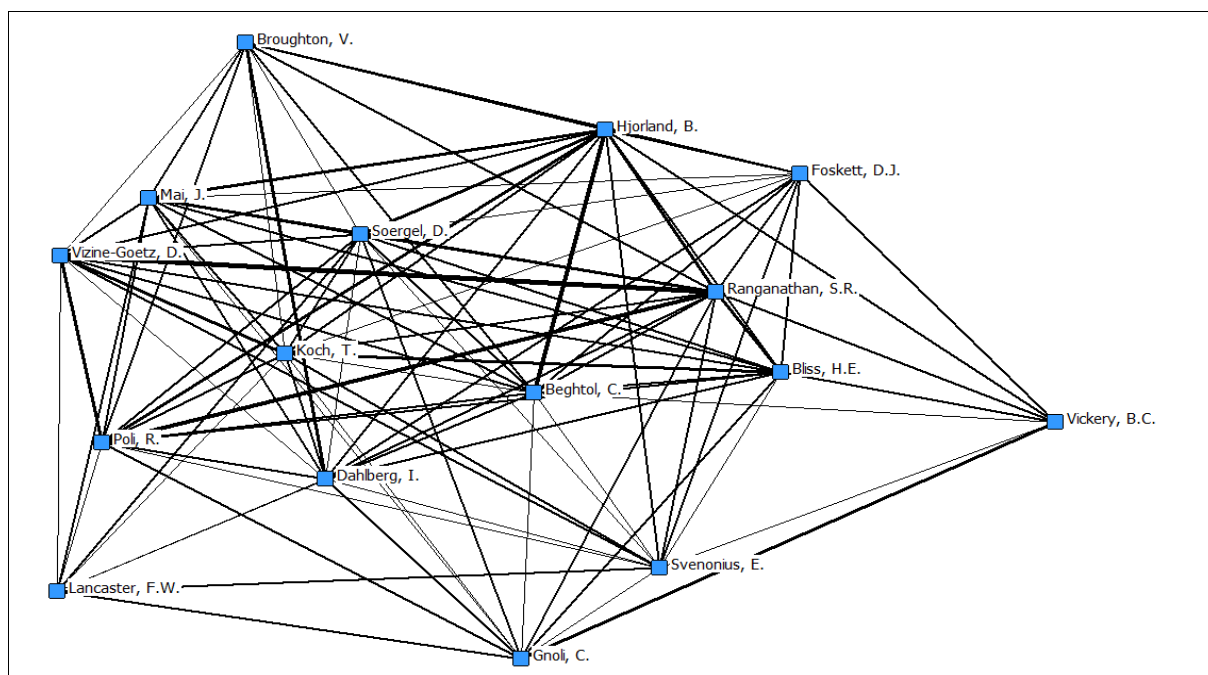


Table 4 shows the 35 researchers that are cited in at least 5 of the 74 analysed articles ($\approx 6.82\%$), for the period 2009-2013. Birger Hjørland, the most cited author, worked with topics such as documentation and information, domain analysis, knowledge organization, and theory and meta-theory of Information Science, among others. Elaine Svenonius worked with topics such as indexing and the intellectual foundation of information organization. Hanne

Albrechtsen worked with topics such as domain analysis, knowledge organization, and classification systems. Hope Olson worked with topics such as the ethical perspective in authority control, indexing, and cultural discourses of classification. Claire Beghtol worked with topics such as theory of classification, information retrieval and knowledge representation. Wilf Lancaster's topics were on indexing and abstracting, and controlled vocabularies for information retrieval.

Table 4 – Researchers and number of articles in which they were cited for the period 2009-2013.

Most cited authors	Number of articles in which the author was cited
Hjørland, B.	19
Svenonius, E.	13
Albrechtsen, H.	11
Olson, H.	10
Beghtol, C.	9
Bowker, G.	8
Broughton, V.	8
Chan, L.M.	8
Lancaster, F.W.	8
Zeng, M.	8
Jacob, E.	7
Shirky, C.	7
Spiteri, L.	7
McCulloch, E.	7
Ranganathan, S.	7
Dahlberg, I.	6
Gnoli, C.	6
Golub, K.	6
Kwasnik, B.	6
Mai, J.-E.	6
Markey, K.	6
Mathes, A.	6
Miksa, F.	6
Star, S.L.	6
Tennis, J.	6
Vickery, B.	6
Aitchison, J.	5
Buckland, M.	5
Campbell, D.G.	5
Kipp, M.E.I.	5
Macgregor, G.	5
Shiri, A.	5
Smiraglia, R.P.	5
Smith, B.	5

Figure 4 shows the co-citation network of the absolute frequencies for the period 2009-2013. In this network, the greatest co-citation frequencies are 8, 6, 5, 5, 5, 5, 5, 5, and 5, being the greatest one (8) between Hjørland and Albrechtsen, represented by the thickest line in the network. Following this, there is 1 occurrence of 6 co-citations, Bowker and Star; and 7 occurrences of 5 co-citations: Hjørland and Olson; Hjørland and Mai; Hjørland and Bowker; Hjørland and Miksa; Svenonius and Beghtol; Olson and Bowker; and Olson and Star.

Figure 4 – Network of co-citations of the 5 authors for the period 2009-2013.

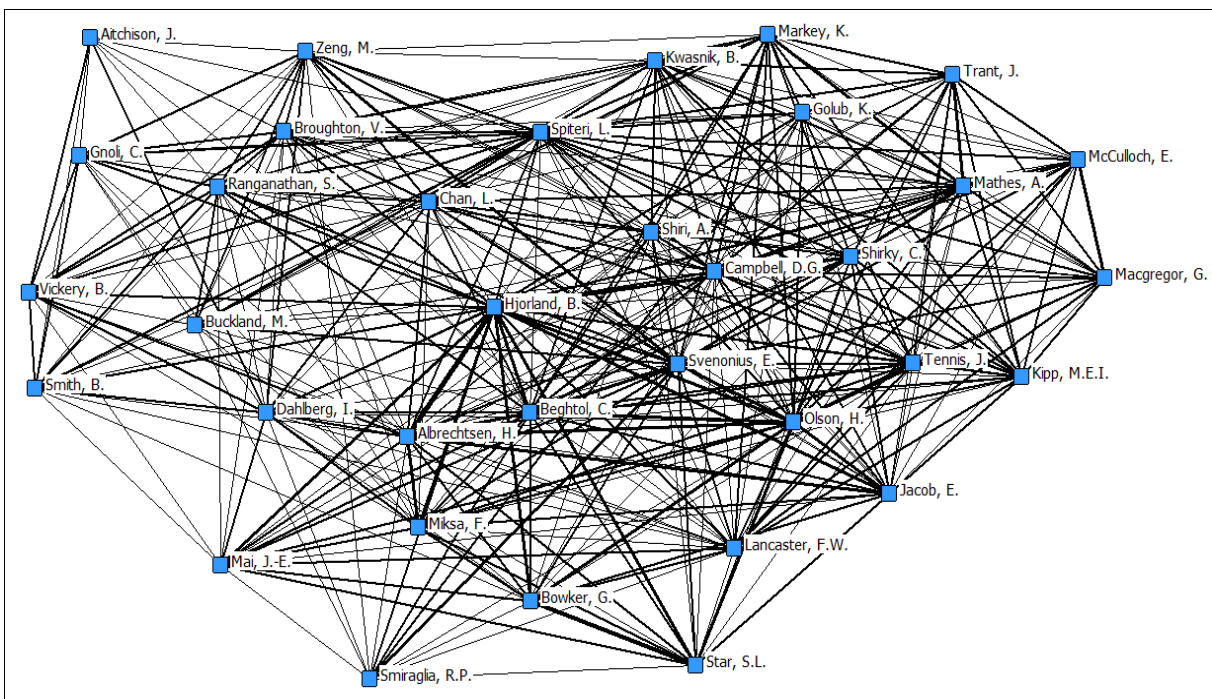


Table 5 shows the 20 authors that were cited in at least 11 of the 220 analysed articles. The most cited authors are Birger Hjørland (40), Shiyali Ramamrita Ranganathan (33), Ingetraut Dahlberg (31), Hanne Albrechtsen (26), and Wilf Lancaster (23). In this sense, table 5 represents the core of researchers that the community recognizes as fundamental for the development of the topic knowledge organization, for the period 1994-2013. The results showed a citation occurrence that varies between 40 and 11, excluding self-citations, where eight authors are responsible for more than half (56.8%) of the total amount of citations of this group. It was also possible to observe that the group of authors was well distributed, without large concentrations of citations, something that evidences a consistent theoretical basis of the

analysed area. A diachronic analysis of the four sets of 5 years each revealed that 17 of the 20 authors (85%) were cited in all over the two decades, what means a consistency in terms of epistemic communities, and a general rise in their number of citations and appearance of new authors that reveal a growth of the community

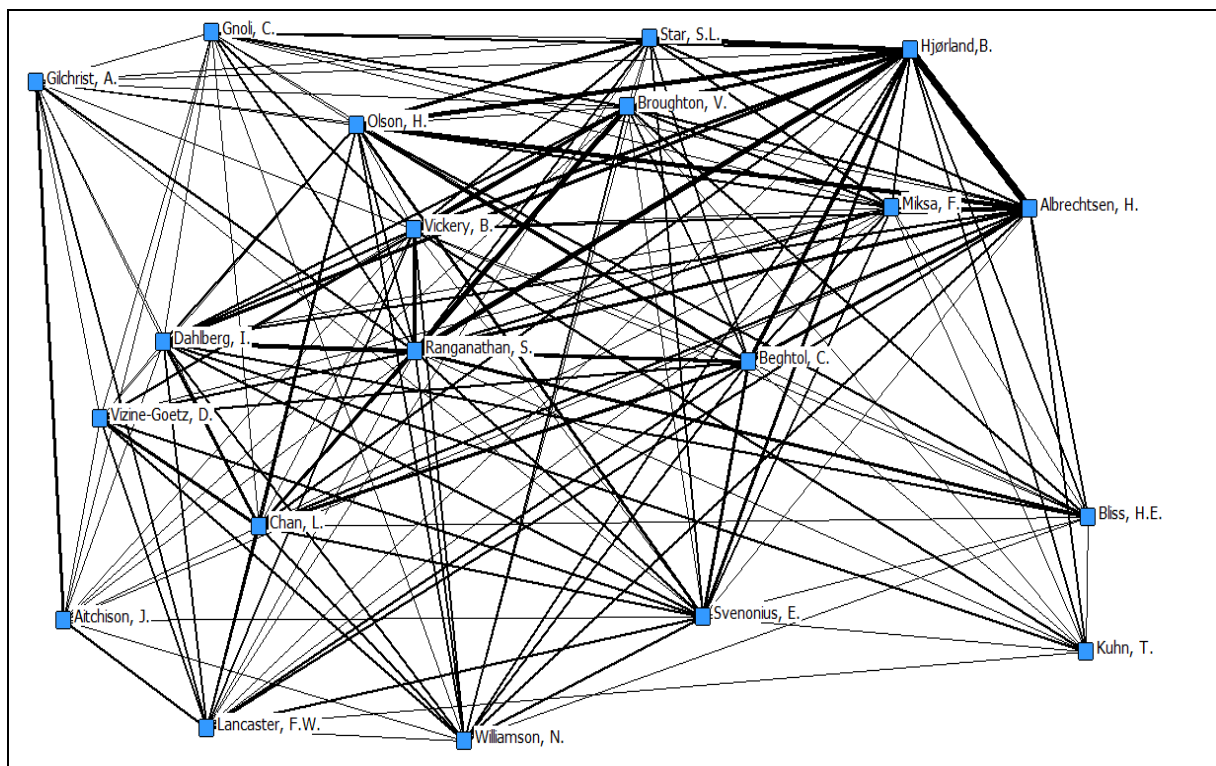
Considering the titles and the keywords of the articles, it is possible to observe that Hjørland, the most cited author, worked with the following topics: domain analysis in Information Science, fundamentals of knowledge organization, meta-theory and epistemology. The topic classification systems and ontologies was researched by Hanne Albrechtsen, Hope Olson, Claire Beghtol, S.R. Ranganathan, Vanda Broughton, Lois Mai Chan, and Brian Campbell Vickery. Wilf Lancaster worked with the topic indexing processes. Lancaster, Svenonius, and Beghtol, also worked with various topics such as interdisciplinary research, taxonomies, epistemologies, knowledge domains, and thesauri. Overall, it was possible to identify three research fronts: a) an epistemological approach, mostly related to the theory of KO, b) an applied approach, mostly related to Knowledge Organization Systems (KOS), and c) a cultural approach, with transversal studies, often connected to interdisciplinary questions.

Table 5 – Researchers and number of articles in which they were cited for the whole period (1994-2013).

Researchers	Number of articles in which the author was cited				
	1994-1998	1999-2003	2004-2008	2009-2013	Total
Hjørland, B.	1	10	10	19	40
Ranganathan, S.R.	10	6	10	7	33
Dahlberg, I.	18	1	6	6	31
Albrechtsen, H.	3	9	3	11	26
Lancaster, F.W.	8	2	5	8	23
Svenonius, E.	2	2	5	13	22
Beghtol, C.	2	3	7	9	21
Chan, L.	4	5	4	8	21
Olson, H.	2	6	2	10	20
Broughton, V.	2	1	8	8	19
Vickery, B.	4	4	5	6	19
Vizine-Goetz, D.	0	4	6	4	14
Kuhn, T.	8	1	2	2	13
Gilchrist, A.	3	1	4	4	12
Star, S.L.	0	4	2	6	12
Miksa, F.	1	3	1	6	12
Williamson, N.	1	5	2	3	11
Gnoli, C.	0	0	5	6	11
Bliss, H.E.	3	2	5	1	11
Aitchison, J.	3	1	2	5	11

Figure 5 shows the co-citation network of the absolute frequencies and the visualization of the proximity using Multidimensional Scaling (MDS). In this network, the greatest co-citation frequencies are 18, 11, and 11. The greatest one (18) is between Hjørland and Albrechtsen and it is represented by the thickest line in the network. This line represents the article “Toward a new horizon in information science: Domain analysis” published in the *Journal of the American Society for Information Science*, in 1995. Following this, there are 2 occurrences of 11 co-citations involving Ranganathan: Hjørland and Ranganathan; and Broughton and Ranganathan. As for the structure of the co-citation network, it is observed that the authors form a single component, as there are no disconnected subnetworks. This means that the set of co-cited researchers present an epistemological (theoretical) and methodological proximity (theoretical) in the topic knowledge organization.

Figure 5 – Network of co-citations of the 20 authors for the period 1994-2013.



4.2. Impact of the KO core research on scholarly journals.

In the second stage of our research, we wanted to study how the KO papers were also cited in other journals to verify the impact, or at least the perception through the database, of knowledge organization on society, scholarship and progress.

The search on the SCOPUS database for works that cite the 220 Knowledge Organization articles for the studied period showed a set of 578 articles with an average of 2.6 KO citations per paper in 160 different journals. The most cited journal was *Knowledge Organization* (23.7%), although this might suggest a certain degree of self-citation, in fact, reveals the existence of an effective discursive and epistemic community in the studied area that is also highly considered in a large amount of scientific publications (especially considering that 66.3% of the KO citations occur in other journals than KO). This epistemic community is highly represented by citations in a group of 12 LIS scholarly journals that correspond with 56.5% of the KO citations: *Knowledge Organization*, *Journal of Documentation*, *JASIST*, *Cataloging and Classification Quarterly*, *Information Research*, *Scire*, *Journal of Information Science*, *Information Processing and Management*, *Journal of Educational Media and Library Science*, *Journal of the Association for Information Science and Technology*, *Library and Information Science Research*, *Library Quarterly*, and *Library Trends*. It is worth noting the high degree of dispersion of the citations, where 60 journals (37.5% of the total) include only 1 citation each (summing up 60 citations, 10.3% of the total).

It was also possible to observe that English is the communication language *par excellence* in the studied field, since only 8.1% of the citing journals are non-English language publications (*Arqueologia Mexicana*, *Information-Wissenschaft und Praxis*, *Profesional de la Informacion*, *Revista Española de Documentacion Científica*, *Document Numerique*, *Transinformação*, *ACIMED*, *Ciencia da Informação*, *Informação e Sociedade*, *Investigacion Bibliotecologica*, *Revue Française de Linguistique Appliquee*, *Universitas Psychologica*, and *Document Electronique Dynamique*) published in languages such as Spanish, Portuguese, French and German. These non-English speaking journals include 30 citing articles (5.2 of the total citations), and, among them, Spanish seems to be the second most important language after English, including 56.6% of the citations of the non-English speaking journals. The overall predominance of English in the citations is consistent with the fact that English is not only the official language of ISKO, but also the language of the major and most impactful LIS scholarly journals.

Table 6 – Journals and number of articles that cite the KO articles.

Journals	Articles	%
Knowledge Organization	137	23,7
Journal of Documentation	52	9,0

JASIST	40	6,9
Cataloging and Classification Quarterly	18	3,1
Information Research	16	2,7
Scire	13	2,2
Journal of Information Science	10	1,7
Information Processing and Management	7	1,2
Journal of Educational Media and Library Science	7	1,2
Journal of the Association for Information Science and Technology	7	1,2
Library and Information Science Research	7	1,2
Library Quarterly	7	1,2
Library Trends	7	1,2
ARIST	6	1,0
Journal of Library Metadata	6	1,0
Library and Information Science	6	1,0
Arqueologia Mexicana	5	0,8
DESIDOC Journal of Library and Information Technology	5	0,8
Information-Wissenschaft und Praxis	5	0,8
Lecture Notes in Computer Science	5	0,8
Perspectivas em Ciencia da Informacao	5	0,8
Profesional de la Informacion	5	0,8
Scientometrics	5	0,8

Regarding the citing authors, the results showed a group of 603 authors in 578 papers that cited the KO articles (including the KO journal). This universe was considerably disperse, where 74.4% of the papers present only 1 citation to KO articles. The application of Price's Elitism Law (Price, 1963), in such a way that the elite of a certain domain is represented by the square root of the total amount of authors or publications of the studied domain, revealed a set of 24 citing authors that were responsible for a minimum of 5 citations of Knowledge Organization articles in their papers: Hjørland; Szostak; Lopez-Huertas; Smiraglia; Gnoli; Martinez-Avila; Chaudhry; Olson; Chen; Khoo; Wang; Zins; Friedman; Park; Robinson; Albrechtsen; Bernard; Chen; Ke; Andersen; Markey; Satija; San Segundo; and Tennis.

Table 7 – Most citing authors from all journals.

Authors	Number of citations
Hjørland, B.	30
Szostak, R.	14
Lopez-Huertas, M.J.	12
Smiraglia, R.	11
Gnoli, C.	10
Martínez-Ávila, D.	10
Chaudhry, A.S.	9
Olson, H.A.	9
Chen, S.Y.	8

Khoo, C.S.G.	8
Wang, Z.	8
Zins, C.	8
Friedman, A.	7
Park, J.-R.	7
Robinson, L.	7
Albrechtsen, H.	6
Bernard, A.	6
Chen, Y.-N.	6
Ke, H.-R.	6
Andersen, J.	5
Markey, K.	5
San Segundo, R.	5
Satija, M.P.	5
Tennis, J.T.	5

When considering KO articles that are cited in other journals, excluding KO, it was possible to identify a group of 295 authors that received a total of 784 citations (with an average of 2.6 citations per author). The application of Price’s Elitism Law to this group results in a set of 17 authors that have received 4 or more citations each: Hjørland, Smiraglia, Chaudhry, Olson, Friedman, Khoo, Robinson, Wang, Chen, Ke, Andersen, Markey, Park, Szostak, Drabinski, Karamuftuoglu, and van den Heuvel, summing up 122 citations (15.5% of the total of citations). It is interesting to observe that, on the one hand, Hjørland appears as the most cited author (23 citations) with more of the double of citations than the second most cited author (Smiraglia, with 10 citations; and, on the other hand, there is a huge dispersion of citations, since 425 authors (54.2%) have received only 1 citation each. Although this dispersion of citations might suggest an apparent weakness in terms of epistemic communities, in fact, reveals that the literature published in the KO journal is widely cited, with such little concentration.

Table 8 – Most citing authors from journals other than KO.

Authors	Number of citations
Hjørland, B.	23
Smiraglia, R.	10
Chaudhry, A.S.	9
Olson, H.A.	8
Friedman, A.	7
Khoo, C.S.G.	7
Robinson, L.	7
Wang, Z.	7
Chen, Y.-N.	6

Ke, H.-R.	6
Andersen, J.	5
Markey, K.	5
Park, J.-R.	5
Szostak, R.	5
Drabinski, E.	4
Karamuftuoglu, M.	4
van den Heuvel, C.	4

Comparing the 10 most productive authors in KO with the citations that they received, it was possible to observe that Hjørland appears not only as the most productive author in the KO journal but also in other journals. Olson and Chaudhry also appear within the top ten most productive and cited authors. It was also possible to observe that although Smiraglia does not appear among the most productive authors in KO, he is among the most cited ones, especially in other journals than KO. Those results show an effective impact of KO articles and authors in the LIS scientific environment, especially in themes related to the epistemology of KO, domain-analysis and cultural issues of KO.

5. Conclusions

The results show that the KO journal, through its epistemic communities, presents two main research trends that interact with each other and makes it possible to observe, on one hand, an approach that is mostly influenced by the theoretical foundations of knowledge organization (theory of classification, concept theory, etc.); and, on the other hand, a social-cognitive approach that is closely linked to cultural studies. These research trends somehow resemble those listed by Hjørland as fundamentals of knowledge organization (2003) and also reaffirm the complex and interconnected nature of the KO field while showing the way to new interdisciplinary research perspectives in the future.

The results also reveal that the consolidation process of the KO domain and the epistemic communities' progress occur in a dynamic and well-balanced way with a strong and widespread impact on the LIS scientific context as a whole. The dynamic and evolving nature of these groups, with the number of citations generally growing and new authors slowly emerging for each period, make it possible to conclude that the ISKO epistemic communities are not only changing, but also expanding. This might also be a sign of a growing impact on society and scholarship, given the number of citations in other journals with even greater

impact factors. This situation shows that the KO community is not inward looking but causing effective impact on the LIS scientific literature and, as a consequence, making a difference.

In terms of impact, it would be of interest to further research aspects such as the h index of the researchers, the specific characteristics of the citing journals, and their differences with the KO journal (regarding aspects such as the impact factor of the journals and the citations received by the citing articles from other journals). In addition, the correspondence between the KO literature and the way KO is practised also deserves further research, as well as the real impact of specific scholarly KO forums on society at large.

References

Bourdieu, Pierre. 1975. La spécificité du champ scientifique et les conditions sociaux du propre de la raison. *Sociologie et sociétés*, 7(1), 91-118.

Esteban Navarro, Miguel Angel, and García Marco, Francisco Javier. 1995. Las primeras jornadas sobre organización del conocimiento: organización del conocimiento e información científica. *Scire*, 1(1), 149-157.

Gnoli, Claudio. 2008. Ten long-term research questions in knowledge organization. *Knowledge organization*, 35(2/3): 137-149.

Grácio, Maria Cláudia Cabrini, and Oliveira, Ely Francina Tannuri de. 2013. Análise de cocitação de autores: um estudo teórico-metodológico dos indicadores de proximidade, aplicados ao GT7 da ANCIB. *Liinc em revista*, 9(1), 196-213.

Hjørland, Birger. 2002. Domain analysis in Information science: eleven approaches-traditional as well as innovative. *Journal of documentation*, 58(4), 422-462.

Hjørland, Birger. 2003. Fundamentals of Knowledge organization. *Knowledge organization*, 30(2), 87-111.

Hjørland, Birger. 2004. Domain analysis: a socio-cognitive orientation for Information Science research. *Bulletin of the American Society for Information Science and Technology*, 30(3). Available at <<http://www.asis.org/Bulletin/Feb-04/hjorland.html>>.

Hjørland, Birger. 2008. What is knowledge organization.(KO)? *Knowledge organization*, 35(2/3), 86-101.

Hjørland, Birger, and Albrechtsen, Hanne. 1995. Toward a new horizon in information science: domain-analysis. *Journal of the American Society for Information Science*, 46(6), 400-25.

Kuhn, Thomas S. 1970. *The structure of scientific revolutions*. Chicago: University of Chicago Press, 1970.

Lara, Marilda Lopes Ginez. 2006. Termos e conceitos da área de comunicação e produção científica. In *Comunicação & produção científica*. São Paulo: Angellara, 387-414.

Leydesdorff, Loet. 1998. Theories of citation? *Scientometrics*, 43(1), 5-25.

Liu, Zao, and Wang, Chengzhi. 2005. Mapping interdisciplinary in demography: a journal network analysis. *Journal of information Science*, 31(4), 308-316.

Lloyd, Christopher. 1993. *The structures of history*. Oxford, UK; Cambridge, Mass., USA: Blackwell.

López-Huertas, María José. 2008. Some current research questions in the field of knowledge organization. *Knowledge organization*, 35(2/3), 113-136.

Mai, Jens-Erik. 2005. Analysis in indexing: document and domain centered approaches. *Information Processing and Management*, 41(3), 599-611.

Merton, Robert King. 1973. *The sociology of science: theoretical and empirical investigations*. Chicago: University of Chicago Press.

Meyer, Morgan, and Molyneux-Hodgson, Susan. 2010. Introduction: the dynamics of epistemic communities. *Sociological Research Online*, 15(2), 14.

Miguel, Sandra Edith, Moya-Anegón, Felix, and Herrero-Solana, Víctor. 2008. A new approach to institutional domain analysis: multilevel research fronts structure. *Scientometrics*, 74(3), 331-344.

Mueller, Suzana P. M. 1999. O círculo vicioso que prende os periódicos nacionais. *DataGramaZero*. Available at <http://www.dgz.org.br/dez99/Art_04.htm>.

Neighbors, James Milne. 1980. *Software construction using components*. Doctoral dissertation. University of California, Irvine.

Oliveira, Ely Francina Tannuri de, and Grácio, Maria Cláudia Cabrini. 2009. A produção científica e organização e representação do conhecimento no Brasil: uma análise bibliométrica do GT-2 da ANCIB. In *Encontro Nacional de Pesquisa em Ciência da Informação*, 10, 2009, João Pessoa. Anais. João Pessoa: ANCIB, 2037-2056.

Oliveira, Ely Francina Tannuri de, and Grácio, Maria Cláudia Cabrini. 2011. Visibilidade dos pesquisadores no GT7 da ANCIB: um estudo de cocitações. In: *Encontro Nacional de Pesquisa em Ciência da Informação*, 12, 2011, Brasília, DF. Anais. Brasília, DF: ANCIB.

Otte, Evelien, and Rousseau, Ronald. 2002. Social network analysis: a powerful strategy, also for the information sciences. *Journal of information science*, 28(6), 441-453.

Price, Derek John de Solla. 1963. *Little science, big science*. New York: Columbia University Press.

Small, Henry. 2004. On the shoulders of Robert Merton: towards a normative theory of citation. *Scientometrics*, 60(1), 71-79.

Smiraglia, Richard P. 2011. Domain coherence within knowledge organization: people, interacting theoretically, across geopolitical and cultural boundaries. In *Exploring interactions of people, places and information, Proceedings of the 39th Annual CAIS/ACSI Conference, University of New Brunswick, Fredericton, Canada, June 2-4, 2011*.

Spinak, Ernesto. 1996. Diccionario enciclopédico de bibliometría, cienciometria e informetria. Caracas: UNESCO-CII/II.

Tennis, Joseph. T. 2003. Two axes of domains for domain analysis. *Knowledge organization*, 30(3/4), 191-195.

Tennis, Joseph. T. 2008. Epistemology, theory, and methodology in knowledge organization: toward a classification, metatheory and research framework. *Knowledge organization*, 35(2/3), 102-112.

Vanz, Samile Andréa de Souza, and Caregnato, Sônia Elisa. 2003. Estudos de citação: uma ferramenta para entender a comunicação científica. *Em Questão*, 9(2), 295-307.

Vieira, Kátia C. 1997. Temas enfocados em Transinformação de 1989 a 1996. In *Produção científica*. Campinas: Átomos, 41-54.

Weber, Max, Gerth, Hans Heinrich, and Mills, C Wright. 1946. *From Max Weber: Essays in sociology*. New York: Oxford University Press.