Theoretical Referents in Knowledge Organization: A Domain Analysis of the Knowledge Organization Journal

Abstract
Aiming at contributing to the epistemological characterization of the area of knowledge organization, our goal is to analyze the KO journal, since its creation in 1993, as a knowledge domain, from a nuclear community of the most productive and greater impact authors, analyzing the dialogue among citing authors and cited ones, and also the co-citations established by the citing authors. We worked with a corpus of 310 articles published between 1993 and 2011 produced by a total of 360 authors. The relatively more productive authors, a group geographically concentrated in Europe (37%), North America (44%) and Asia (19%), is clearly explained by the historical European origin of the ISKO and by an increasing North American presence along the years. Of the 33 most cited authors, 22 were co-cited in at least 6 works, which suggests that they are the theoretical referential nucleus of the area, in the studied journal. Finally, we observe that the area reveals theme cohesion and coherence in its production, enabling us to clearly visualize its theoretical referential nucleus and to confirm the role performed by the KO magazine as a catalyzing agent of international theoretical construction in the area.

Introduction
Placed among Cognitive Science, Information Science, Communication Science, Math and Computer Science, Knowledge Organization can be characterized by its social and scientific nature, revealing itself as an inter and trans disciplinary field (Garcia Marco, 1995, 1997; Miranda, 1999) and evidencing an “integration platform of the documentary sciences” (Esteban Navarro, 1995, p.66).

Therefore, Knowledge Organization aims at investigating how knowledge can be understood, organized and represented, so that it is available and can be retrieved by the greatest number of people. To do so, it presents a tridimensional nature, centering itself on principles, methods and tools to manage human knowledge from its representation, organization and documentary communication (Esteban Navarro, 1995; Dahlberg, 2006).

In this sense, the International Society for Knowledge Organization – ISKO has a special contribution since it is considered a space for scientific discussions about knowledge organization as well as by the study of different methods and approaches in order to facilitate access to knowledge by the society. To do so, ISKO has Knowledge Organization journal – KO as its main socialization vehicle for scientific production.

Willing to contribute to the epistemological characterization of the knowledge organization area, our goal is to characterize the KO journal, since its creation in 1993, as a knowledge domain, from a nuclear community of the most productive authors. More specifically, from these authors and their citations, we intend to visualize the researchers of greater insertion and impact, analyzing the dialogue between citing authors and cited ones, as well as the co-citations established by the citing authors.

Domain analysis, the object of this work, has been discussed in the ISKO scientific environment on several occasions. Smiraglia (2011) has presented a critical synthesis of the previous works related to knowledge organization as a domain, in different periods and bibliographic sources. In subject approach, McI1lwaine (2003), Saumure & Shir1 (2008) and Ibekwe-Sanjuan & San Juan (2010) have studied output in different periods involving journals and proceedings. Regarding the ISKO international congresses, Smiraglia (2006, 2008, 2011c) analyzes the international congresses of Vienna, Montreal and Rome,
respectively. Within regions, we have an analysis of the North American context from the 
NASKO congresses (Smiraglia, 2007, 2009), of the Spanish context (López-Huertas e 
Jiménez-Contreras, 2004) and of the Latin American context (Smiraglia, 2011b).

This current work assumes the whole collection of KO journal as a knowledge domain in 
itself and presents it as a differential, in that it reveals a crystallized international space for 
scientific publishing with the seal of ISKO, thus representing the research tendencies in the 
area. Thus, the specific analysis of the theoretical referents coming from the predominant 
citations in such knowledge domain intends to identify, in a diachronic study, to which 
extent this scientific community bases itself on and interacts in the construction of this 
specialized knowledge.

Knowledge Organization Journal: A Domain Analysis

Although authors like Dahlberg (1993, p.214) have pointed out the individual concept of 
knowledge as “subjective certainty or objective conclusion of the existence of a fact or state 
of a case, not being transferrable and only acquired by means of reflection”, knowledge 
organization, within Information Science, focuses mainly on socialized, recorded and 
published knowledge, whose organization and representation will be developed in a way 
that, new knowledge may be generated from it (Miranda, 1999; Barité, 2001; Guimarães, 
2001). Such aspect reveals a *helicoidal* concept – not cyclical as it was used to say until 
some years ago – of knowledge organization. Thus, knowledge acts as a product, need and 
social dynamo, which occurs from the information, and while being socialized, turns into it 
again (Dahlberg, 2006; Guimarães, 2008).

Hjørland (2003) warns that knowledge organization, within Information Science, takes a 
deeper and stricter focus, having the semantic relations between concepts as its basic 
unit, and not the concepts themselves.

Intending to congregate knowledge organization researchers worldwide, ISKO has tried to 
improve, since its creation in 1989, philosophical, psychological and semantic approaches 
to knowledge organization, also acting as a bond among national and international societies 
and institutions, about issues related to conceptual nature of knowledge organization and 
processing. In this context, Knowledge Organization journal, created in 1993 (continuing 
International Classification, created in 1974) can be considered the main scientific 
publishing vehicle of the researches made in the area.

ISK0, in the last decade, has notably revealed certain concern by the scientific community 
about the epistemological construction of the area, that led to the publication of a KO 
special number, in 2008, about this theme, having the contribution of Ingetract Dahlber, 
Claudio Gnoji, Rebeca Green, Birger Hjørland, Maria José Lopéz-Huertas, Ia Mcllwaine, 
Joan Mitchell, Joseph Tennis and Marcia Zeng, adding to other studies of Smiraglia 
Jaenecke (1994), Barité (2001) and Smiraglia (2002) as for the need to dedicate greater 
efforts to mapping the area, its structure and limits, as it’s thought, many times, dependent 
on the progress of information and communication technologies rather than on its own 
thoretical research.

To do so, the theoretical and methodological support of Domain Analysis is necessary a 
to identify, visualize and better understand the theoretical milestone universe which 
surrounds the area.

Hjørland (2002) highlights 11 approaches by which a domain can be analyzed. 
Bibliometric studies are one of them, and are specially focused on citation and co-citation 
as means to visualize the domain behavior in terms of its authors and the knowledge 
produced and socialized by them. Thus, the group of references of the scientific works, 
studied by means of citation and co-citation analysis of frequency, contributes to domain 
visualization as the reflection of a discursive community.
A citation is taken as an objective and clear indicator of scientific communication, which allows the identification of scientists and their publications, in order to evidence the researchers with greater impact in the area. It is also important to pointing out to their paradigms, methodological procedures, as well as to the “old school” researchers who build new knowledge in the area. This way, citation analysis contributes to the understanding of a scientific community as it identifies the researchers with greater impact in the area and gives visibility to their concepts, methods, objects and to the theoretical references that support such community (Oliveira, Gracio e Silva, 2010).

Therefore, “citation analysis maps the scientific communication” (Vanz, Caregnato, 2003, p.248) and provides indicators that contribute to the construction of networks, making the dialogue among researchers clearer. This way, it constitutes a special tool so that, from quali-quantitative analyses, we may better understand the epistemological universe of a certain domain.

The study of co-citations, which comes from the citation analysis, deals with the frequency with which two authors or documents are cited within a group in the scientific production of an area, producing valid representations of the intellectual structure of a scientific domain (Miguel, Moya Anegon and Herrero Solana, 2008). Still according to the referred authors, the main premise of the co-citation analysis is that if two or more documents, authors or journals are cited together in a third following work, there is, at least in the citing author’s perspective, a similarity of subjects among the cited ones. We point out that the greater the frequency of co-citations is, the closer the relationship among them. Not only the similarity, but also the opposition of ideas is detected by means of co-citation. According to Gmür (2003), the co-citation frequency between two authors also determines how the knowledge structure of an area is perceived by its researchers.

The importance of citation and co-citation analysis as an approach to characterize a domain is more clearly evidenced in that the repeated citation of certain works, by a given scientific community, reveals an agreement in this community about what to consider relevant a priori, characterizing a trait of that certain discursive community, once the structure of a certain scientific field is built from patterns of co-recognition, evidenced by means of co-citations, which establish meaningful associations (Small, 2004).

**Methodological Procedures**

To raise the data, we firstly searched in the *Web of Science* database, the group of articles published in *KO* journal. To this group of documents raised, we applied the filter “Articles” in “Document Types” acquiring a group of 310 articles published between 1993 and 2011 and produced by a total of 360 authors.

From this group, we identified the most productive authors, a total of 16 researchers (4.4% of the total of authors) who produced a total of 57 articles (18.3% of the published articles)\(^1\). The adopted criterion for the selection of such was the publication of at least 3 articles in the period, once the authors with two publications or fewer comprised a large, spread and less meaningful group.

To raise the references for the 57 articles, we used the digital collections of Ergon Verlag, available for ISKO members’ access and also the references of the articles in the *Scopus* base, since this base brings the references with all the authors, not just the first author as in the *Web of Science* base. We obtained a group of 1755 references and, after eliminating the references with institutional authorship, we obtained 1635 citations, referring to 1007 authors, from which 758 (75.3%) received only one citation.

As a criterion to include a name in the roll of most cited authors, we considered the ones with at least 6 citations (the same as being cited in at least 10% of the works in the corpus), which gave us a group of 37 most cited researchers. From these, we built a matrix of

\(^1\) Six articles were excluded from the work corpus because they didn’t bring bibliographic references.
16x37, related to the frequency of citations of the most productive citing authors (16) and the most cited ones (37).

From this matrix, we generated a squared and symmetrical matrix 22x22 with co-cited researchers in at least 6 works, corresponding to the co-citation in at least 10% of the articles. We built the co-citation network by means of the Ucinet software in order to map and visualize the communication network established among researchers in the citing works. After that, we calculated the centrality degree, which enables to analyze the individual position of each author, as well as the most meaningful and articulated authors in their group’s network.

Data Presentation and Analysis

Regarding the 16 most productive authors, we have, in decreasing order of production: Hjørland (06); Dahlberg (05); Fugmann, GnoI, Mai, Riggs, Tennis, Beghtol (04 each) and Albrechtsen, Chaudry, Green, McIlwaine, Olson, Pathak, Satija, Zins (03 each). This group is geographically represented by a scientific production coming from Europe (37%), North America (44%) and Asia (19%), what can be historically explained by the European origin of the ISKO and by an increasing North American presence along the years. This group of most productive authors signals a group that has contributed to the construction of knowledge in the area hereby studied in a more meaningful way.

Table 1: Most productive researchers’ works in which the most cited ones are shown

<table>
<thead>
<tr>
<th>Most productive researchers</th>
<th>Most cited authors</th>
</tr>
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<tbody>
<tr>
<td>Hjørland</td>
<td>0 3 0 1 1 2 0 2 0 2 3 0 3 0 0 0 6 0</td>
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<tr>
<td>Dahlberg</td>
<td>1 0 0 0 0 1 0 0 0 4 0 2 0 3 0 0 1 0</td>
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<td>Fugmann</td>
<td>1 1 1 0 2 0 0 0 0 1 0 0 0 4 0 3 2 0</td>
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<tr>
<td>GnoI</td>
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</tr>
<tr>
<td>Mai</td>
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</tr>
<tr>
<td>Riggs</td>
<td>0 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>Tennis</td>
<td>0 2 2 3 0 0 2 0 0 0 0 0 2 0 1 0 4 1</td>
</tr>
<tr>
<td>Beghtol</td>
<td>0 2 2 3 0 3 0 1 2 1 1 1 0 0 0 0 1 3</td>
</tr>
<tr>
<td>Pathak</td>
<td>0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>Albrechtsen</td>
<td>0 2 0 1 0 0 1 1 0 0 1 0 0 0 0 0 3 1</td>
</tr>
<tr>
<td>McIlwaine</td>
<td>0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0</td>
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<tr>
<td>Olson</td>
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</tr>
<tr>
<td>Green</td>
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</tr>
<tr>
<td>Zins</td>
<td>0 0 0 0 0 0 0 1 1 1 0 1 0 0 0 0 0 2</td>
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<tr>
<td>Chaudry</td>
<td>2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1</td>
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<td>Satija</td>
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<td>Dahlberg</td>
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<tr>
<td>Fugmann</td>
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<tr>
<td>GnoI</td>
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<tr>
<td>Mai</td>
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Most productive researchers

<table>
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<th>Authors</th>
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<td>Lancaster, F. W.</td>
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<td>Mills, F. L.</td>
<td>1 0 0 0 0 0 0 1 0 0 0 1 0 0 1 2 3 0</td>
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<td>Olson, H.A.</td>
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<td>Pejtersen, A. M.</td>
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<td>Ranganathan, S. R</td>
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<td>Riggs, F.W.</td>
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<td>Williamson, N. J.</td>
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<tr>
<td>Wilson, P.</td>
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</tr>
</tbody>
</table>

*The total citation refers to the number of works where the author was quoted in the universe of 57 articles, disregarding the co-autorships.

This group of theoretical referents is confirmed by the fact that, of the 16 most productive authors, 12 (75%) are equally pictured as the most cited researchers.

Among the most productive researchers, Mai, Beghtol, Hjørland, Gnoli and Tennis stand out as the ones who establish greater dialogue with the group of 33 most cited authors, since they cite most of the authors, between 50% and 80%.

Hjørland stands out as the most productive and the most cited author, being mentioned in 40% of the analyzed articles, that shows his recognition and visibility among the highlighted researchers in the journal studied. Ranganathan is cited in 37% of the articles and Dahlberg in 30% of the articles. The other researchers were cited in between 26% and 11% of the articles, in decreasing order. We highlight the presence of the classical authors of the area, such as Bliss, Langridge, Vickery, Foskett and Dewey.

Hjørland and Ranganathan were cited by 56% of the most productive authors. Following them are Albrechtsen and Vickery, cited by 44% and Dahlberg, Beghtol and McIlwaine, cited by 38% of the researchers. We understand that these most cited authors constitute the focus of greater impact and prominence.

In all the cases, self-citations were not taken into account. Although present, they were not significant compared to the total of citations received, for most authors, who are the most productive and most cited ones altogether, not causing any interference in the analysis of insertion and impact of most cited authors.

Figure 1 presents the co-citation network among authors who were co-cited at least 6 times. So, 22 of the 33 most cited authors were co-cited in at least 6 works, what reveals that 67% of the most cited authors are part of this network suggesting that they constitute the core of theoretical referents in the area, in the journal studied.

We highlight Hjørland with the greatest centrality (71%), being co-cited with 15 of the authors present in the network. Ranganathan, with 39%, is co-cited with 8 authors and Albrechtsen and Beghtol, with 33%, is co-cited with 7 authors.
Conclusions

It is possible to conclude that there is a strong nucleus of 16 theoretical referents, whose origin reveals a balance between Europe and North America, historically considered as privileged spaces of knowledge organization research.

The presence of authors like Hjørland, Ranganathan and Dahlberg reveals a predominant theoretical approach, more tuned to the search for epistemological foundations of knowledge organization that confirms a tendency foreseen by Gnoli, 2008 and Lopéz-Huertas, 2008, among others. The referred results reveal a dialogue with the previous researches cited, in that authors, such as Hjørland, Ranganathan, Dahlberg, Begthol, Gnoli and Vickery are equally present in the studies carried out by Smiraglia, previously cited.

Finally, we observe that the knowledge organization arena, taking into account its scientific production, reveals balance and diversity concerning the geographical origin, as well as subject cohesion and coherence, allowing us to clearly visualize the nucleus of its theoretical referents and confirming the effective role performed by the KO journal as a catalyzing agent of the theoretical construction in the area worldwide.

References


