Scientific Relevance in Doctoral Research: A Practical Methodology Using Zotero and Scimago

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Abstract

Bibliography and references are fundamental pillars in any scientific research, since they validate its relevance through the typology, quality and timeliness of the resources used. This article proposes a practical and simple methodology to descriptively demonstrate the relevance of the bibliography used in a doctoral thesis, taking advantage of the functionalities of Zotero and Scimago. The results of this study demonstrate that proper management of references in Zotero facilitates their export. This makes it possible to migrate them to Scimago Grafica to generate graphical and interactive visualizations of the relevance of sources in an academic or scientific research, taking advantage of the catalog of available visualizations. In addition, this methodology has made it possible to demonstrate the relevance of the bibliographic sources used in a doctoral thesis, analyzing their typology, temporality, SJR index and H-index. This corroborates the construct that postulates: "a study is more relevant the more current its sources are and these correspond to resources published in high impact journals".

Keywords

Zotero, Scimago, Scimago Graph, Bibliographic relevance.

1. Introduction

The elaboration of a doctoral thesis not only requires a rigorous research methodology, but also a meticulous justification of the relevance and quality of the bibliographic sources [1]. In the current academic environment, where the volume of available information, especially on digital platforms, grows exponentially, demonstrating the scientific relevance of references has become crucial. This validates the soundness of the theoretical framework and the state of the art of any research. Referencing correctly and responsibly not only positions the work in the proper context of knowledge, but also supports its originality, value and visibility. This makes it easier for other researchers to identify its relevance and track the development of ideas in the field [2, 3]. In addition, the quality and timeliness of the references reinforce the credibility of the study and demonstrate the author's mastery of the existing literature [4][4].

Reference analysis is crucial for understanding historical roots, measuring interdisciplinarity, and assessing research impact [5]. The quality and timeliness of references correlate directly with the impact of articles and journals, underscoring that a thorough literature review in indexed, high-impact databases is key to the scientific influence of any study [6]. Given the complexity of the interaction between theory, empirical evidence and socio-productive dynamics in the economic sciences, the selection of high-impact academic literature must be meticulously documented. Therefore, this article proposes a practical, replicable and efficient methodology based on two complementary tools: Zotero,

an opensource reference manager, and Scimago, a platform for visualizing the quality and impact of indexed scientific journals (such as Scopus), complemented by Scimago Graph for data visualization [7, 8].

The integration of Zotero and Scimago represents an innovative methodological proposal to transform bibliographic management in doctoral work. This combination not only facilitates the organization, classification and export of references through Zotero, but also makes it possible to objectively visualize and evaluate the impact of the sources used through Scimago Graph. The goal is to transcend traditional management, often limited to formal aspects, to provide reviewers and readers with a clear understanding of the scholarly rigor underlying citation decisions, thus improving the transparency and robustness of research.

Combining Zotero, a bibliographic reference manager, with Scimago Journal & Country Rank (SJR), which provides journal impact and relevance metrics, allows for the generation of valuable graphs. These graphs can illustrate the average impact of cited journals by subject area or the distribution of sources by quartile. Although the process is not fully automated and requires manual steps such as ISSN identification and searching for SJR or H-index indicators, the synergy of both tools is an accessible and effective solution to visualize the quality and relevance of cited sources. This is particularly useful in academia, where transparency and bibliometric analysis are crucial for doctoral studies, as demonstrated by Mendoza, Moscoso- Zea and Morgan [9, 10].

This approach was applied in a practical way in the doctoral thesis "Relational capital in collaborative strategies: its role in the value-at-risk structure of MSMEs", successfully defended in March 2025 at the Faculty of Economics of the University of Havana, as part of the PhD program in Economic Sciences. For the evaluation, Scimago Journal Rank was used, recognized for its reliability in measuring the impact of scientific journals indexed in Scopus, especially relevant in Latin America due to its challenges of access to international databases. In addition, Zotero was used, valued in the academic community for its ease of use, compatibility with word processors and web browsers, and its efficiency in the management of bibliographic information during scientific writing [8, 9, 10].

The methodological innovation of this article lies in its pedagogical and replicable approach, which, unlike traditional techniques, promotes a source validation model that integrates document management with bibliometric measurement. Recent literature, such as that of highlights the importance of incorporating digital information management tools and equipping researchers, especially at the doctoral level, with skills to evaluate scientific production, this not only substantiates their studies, but also contributes to building stronger and more transparent academic communities. Thus, this work responds to the need to establish transparent and reproducible criteria for the validation of bibliographic sources in academic evaluation processes, particularly in the elaboration of doctoral theses, where the absence of explicit justifications on the relevance of the sources can undermine the perception of research depth [11].

This procedure not only validates the relevance of references through bibliometric indicators, but also visualizes them in a comprehensible way through graphs generated with Scimago Graph algorithms. These graphs can be incorporated both in the annexes and in the main body of the thesis. The objective of this article is to present a clear, accessible and effective methodology to justify the scientific relevance of the bibliography in doctoral research, integrating Zotero and Scimago. It is hoped that this proposal will raise the quality standards in the writing of degree works, theses and scientific articles, and will be adopted by academic institutions as a good research practice.

2. Materials and Methods

Although the relevance of a study is often associated with the timeliness and high impact of its sources, it is essential to analyze this notion in greater depth. Citing recent sources from prestigious journals can increase the visibility, credibility, and novelty of a research, as these publications often reflect the most up-to-date knowledge and enjoy greater recognition in the scientific community [3]. However, the relevance of a source also encompasses its usefulness, applicability, and relevance to the topic at

hand, regardless of its publication date or the prestige of the journal. Therefore, although timeliness and impact are valuable criteria, a responsible and well-justified reference should prioritize the quality, relevance, and actual contribution of the source to the research topic.

A database of 168 bibliographic references was analyzed, initially compiled with Zotero for the doctoral thesis "Relational capital in collaborative strategies: its role in the value-at-risk structure of MSMEs", defended in March 2025 by Dr. Jessica Silvana Matute Petroche, at the Faculty of Economics of the University of Havana and available at https://accesoabierto.uh.cu/s/scriptorium/item/2195277. Subsequently, this database was enriched with key variables such as the "Scimago Quartile", the "SJR (Scimago Journal Rank)", the "H-Index (H-Index)" and the "Subject Area". The Scimago Quartile (Q1 to Q4) classifies journals by their impact within a thematic category, with Q1 being the most prestigious and Q4 the least, allowing comparison of their relevance [12, 13, 14]. For its part, the SJR evaluates the scientific influence of a journal considering both the number of citations received and the importance of the citing sources, giving greater weight to citations from high-impact publications [15, 16, 17].

The H-Index (H-Index) is a crucial metric that measures the productivity and impact of a journal or author, reflecting the number of articles that have received at least that many citations. This tool is valuable for comparing sustained influence over time [12, 13, 15, 16]. Complementarily, the "Subject Area" or thematic area organizes journals by their scientific discipline, which allows contextualizing these indicators and making fair comparisons between publications in similar fields [12, 14]. Taken together, these indicators are key tools that researchers should master, as they help to assess the quality, visibility and relevance of the sources used in international academia. Finally, for the descriptive analysis of the sources used in the dissertation, the metrics in Table 1 were used. These variables served as the basis for generating the corresponding images using the Scimago Graph software.

Table 1
Variables for Analysis of Bibliographic Sources

No.	Variable	Category	Type of Variable
1	Publication Year	Range	Date/time
2	Item Type	Bill BlogPost Book BookSection ConferencePaper JournalArticle MagazineArticle NewspaperArticle Report Thesis	String
3	Publication Title	Unique	String
4	ISSN	Unique	Number
5	Scimago Quartile	Q1 Q2 Q3 Q4	String
6	SJR	Range	Number
7	H Index	Range	Number
8	Subject Area *Scopus	Business, Management and Accounting Economics, Econometrics and Finance Computer Science Art and Humanities	String
9	Title	Unique	String
10	Author	Unique	String

Note: * The thematic areas are based on the Scopus classification.

Variables 1 and 2 were fundamental for the initial analysis, determining the temporality and typology of the resources used. Subsequently, variable 4 complemented the data of variables 5, 6, 7 and 8 obtained

from Scimago Journal & Country Rank. With the latter, together with variable 3, a second analysis was carried out to evaluate the relevance of the sources according to their impact. Finally, variables 9, 10 and 1 were used to identify each resource within the interactive images created with Scimago Gráfica.

2.1. Zotero: Efficient Bibliographic Reference Management

Zotero, available at www.zotero.org is a free, opensource tool designed to simplify bibliographic reference management for researchers. Initially developed as a Firefox add-on, Zotero has evolved into a standalone application and extension for modern browsers, compatible with Windows, Mac and Linux [10, 18, 19]. Its main utility lies in the automatic collection of references from various sources, such as databases and web pages, facilitating the organization, annotation and addition of files in research projects. In addition, Zotero supports thousands of citation styles, allowing bibliographies and citations to be generated easily in Word, LibreOffice and Google Docs documents after an initial configuration.

The use of Zotero is essential in scientific research because it minimizes errors in references, optimizes bibliographic management and ensures compliance with editorial standards, which raises the quality and acceptance of academic papers; for this reason, universities, scientific journals and digital libraries usually recommend it, highlighting its accessibility and its contribution to good practices in the organization and rigorous presentation of information sources.
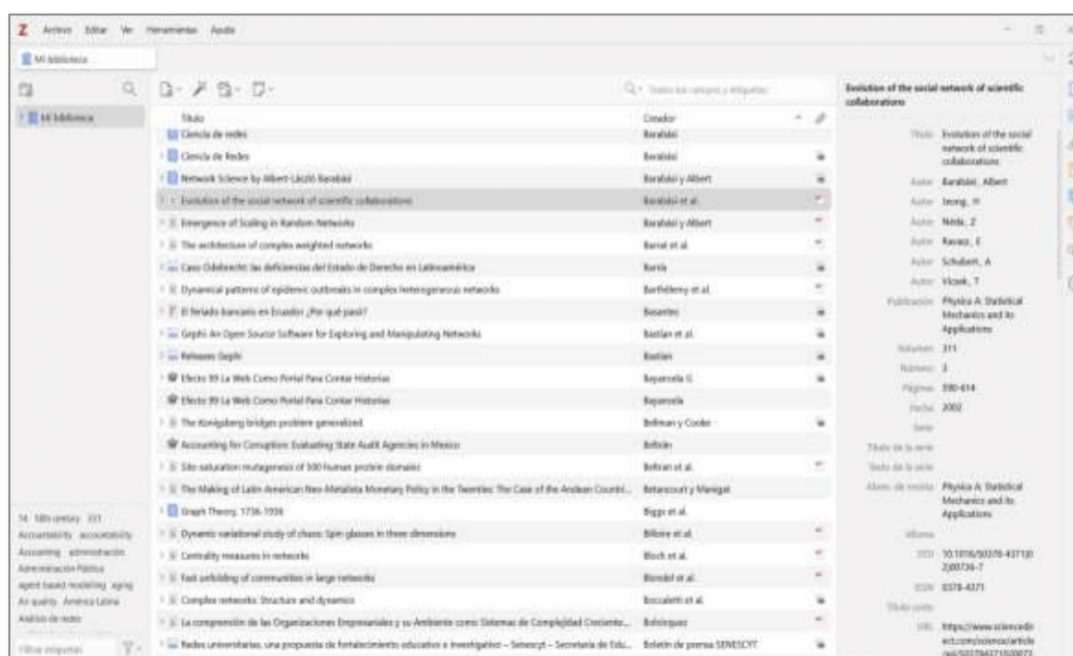

Figure 1: Zotero Main Interface

Once the database is created in Zotero, its information is easily extractable, migratable or exportable to various formats, which are constantly updated. For this analysis, it was decided to export the data using the "Export - Format - csv" option from the "File" tab. It is crucial to note that, if the library was generated in Spanish, it is necessary to additionally select the option "Character encoding (Unicode (UTF-8)". This ensures that special characters specific to Spanish, such as accents or the letter "ñ", are exported correctly and are not lost.

2.2. Scimago Platform: Evaluation and Visualization of Scientific Output

The Scimago platform, created by the research group of the same name, has established itself as a fundamental tool for evaluating and visualizing the impact of global scientific production. Its origin is centered on the development of the Scimago Journal Rank (SJR), a key indicator that measures the prestige of scientific journals by weighting both the quantity and quality of citations received [20].

In addition, Scimago has expanded its scope with tools such as the Scimago Institutions Rankings (SIR), which allows analyzing and comparing the performance of various research institutions and universities, calculating mainly on data from the Scopus database [21, 22]. The accessibility and usefulness of this platform are maximized through its website.www.scimagojr.com and complementary applications such as Scimago Graphica, which facilitates intuitive visualization of scientific data without requiring programming knowledge [17].

Figure 2: Catalog of Scimago Graphica visualizations

The platform is fundamental in scientific research because it allows an objective evaluation of the visibility, impact and quality of journals, institutions and countries. This capability directly influences crucial decisions such as the selection of where to publish, the allocation of resources and the design of academic development strategies. In addition, its use facilitates the identification of trends, as well as strengths and weaknesses in scientific production and investigations. However, it is important to recognize that the platform also presents technical challenges and of interpretation, so adequate training is required to maximize its usefulness [9].

3. Results and Analysis

For the doctoral dissertation, "Relational capital in collaborative strategies: its role in the value at-risk structure of MSMEs", 168 academic resources were managed with Zotero. These were exported to CSV format and analyzed with Scimago Graph software to visualize the relevance by type and temporality of the sources used.

Figure 3 shows that 68% of the sources are scientific journal articles, followed by books 11%, non-academic journal articles 8% and theses 4%. Other sources such as book sections, conference papers, reports, blogs, laws and newspapers represent 2% or less each. In terms of temporality, 51% of the publications date from the period 2011-2024, while 20% correspond to 2001-2010 and 47% to 1981-2000. A smaller percentage 1% covers 1951-1980 and 1817- 1950.

These data reflect a clear preference for recent sources, especially journal articles, which are essential for an up-to-date state of the art in a doctoral thesis. Nevertheless, the inclusion of classic works, such as David Ricardo's 1817 book on economics, demonstrates an enrichment and historical relevance in the study. According to the analysis in Figure 3, the "Journal Article" was identified as the most relevant
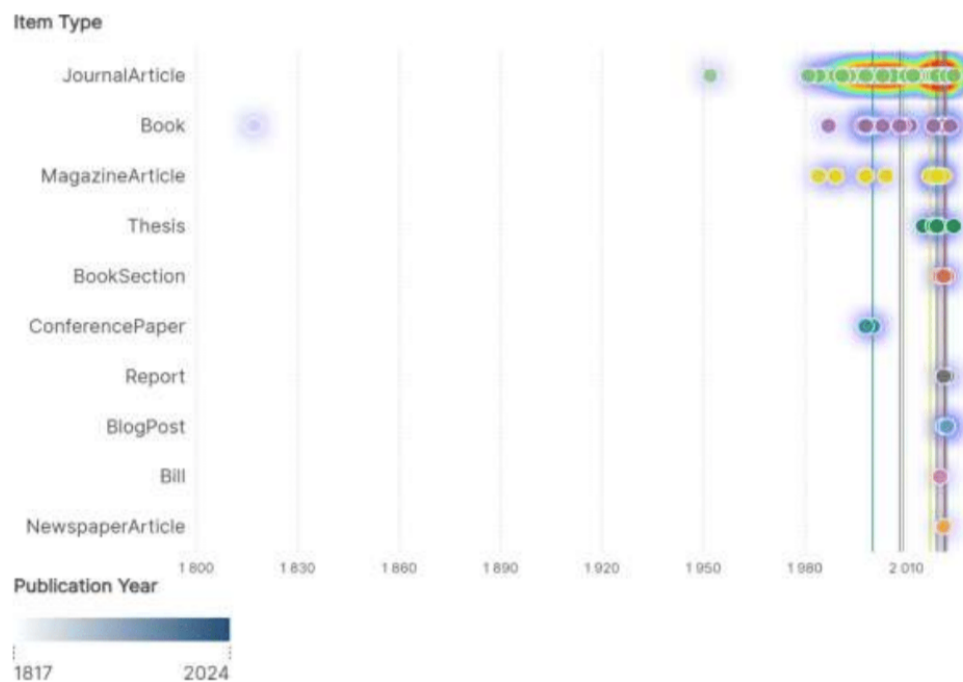
Figure 3: Relevance by Type of Sources and Timeliness of Publication

type of article. After supplementing the data of variables 5, 6, 7 and 8 in Table 1 for each ISSN code.
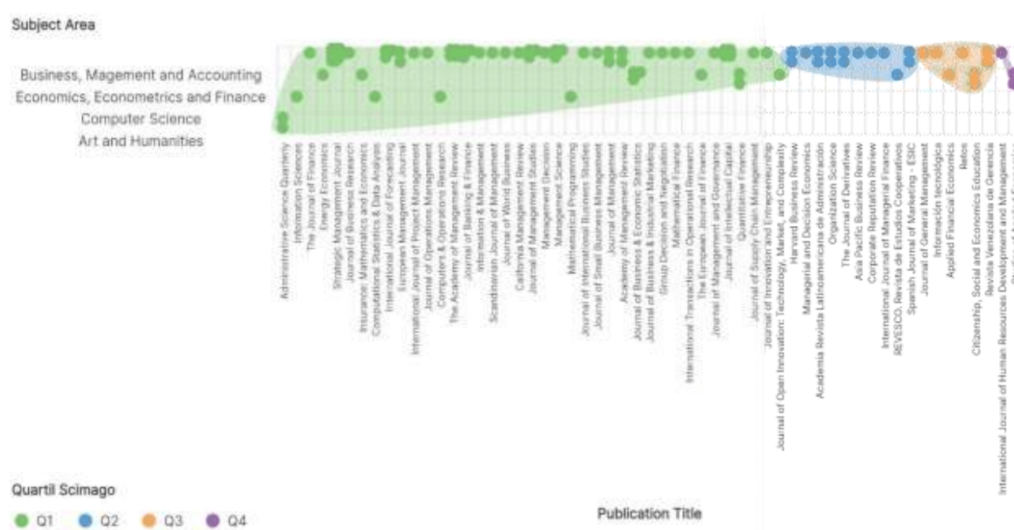

Figure 4: Relevance by Subject Area and Consulted Journal

Figure 4 shows that 78% of the resources belong to the area of Business, Management and Accounting. This is followed by Economics, Econometrics and Finance with 16%, Computer Science with 4%, and Arts and Humanities with 2%. Within these thematic areas, it is noteworthy that 73% of the journals consulted are in Quartile 1 (Q1), which indicates high prestige. Sixteen percent correspond to Quartile 2 (Q2), 8% to Quartile 3 (Q3) and 3% to Quartile 4 (Q4).

Figure 5 illustrates conclusively the solidity and high scientific influence of the bibliographic resources used in the study. This analysis is based on the consultation of high impact journals, characterized by a high SJR Index (Scimago Journal Rank).

A high SJR indicates that the publications consulted are not only widely cited, but also come from

Figure 5: Resource Relevance by SJR and H-Index

sources of great prestige within their respective fields. Likewise, the presence of a high Hirsch Index, either at the journal or author level, reinforces the quality and relevance of the bibliographic material.

This is because the H-Index reflects the productivity and impact of the research, demonstrating that the articles consulted have received a significant number of citations, which in turn endorses the selection of rigorous sources of information with a recognized impact on the academic community.

4. Conclusions and recommendations

The exhaustive analysis of the academic sources used in this doctoral thesis has confirmed the soundness and high quality of the research. The inclusion of academic journals classified in the Q1 and Q2 quartiles has been strongly prioritized, which guarantees access to cutting-edge literature with high impact in the scientific field. In addition, the selection has been based on high SJR (Scimago Journal Rank) and H-Index indexes, metrics that corroborate the excellence and influence of the publications and authors cited. This rigorous curation of the bibliography, focused mainly on the thematic areas of Business, Management and Accounting and Economics, Econometrics and Finance, not only validates the theoretical basis of the study, but also significantly reinforces its scientific rigor and validity, positioning it as a robust contribution to knowledge in these disciplines.

The results allow us to conclude that a doctoral study must be based on scientific relevance, which requires a demanding search for relevant information. One of the sources, but not the only one, is precisely the Scopus database analyzed. However, this analysis is not limited exclusively to this database, as this methodology can be applied to demonstrate the relevance of sources such as Web of Science, PubMed, Google Scholar, etc.

The results of this study open the door to implementing new methodologies to demonstrate the relevance of reference sources in higher education studies such as doctorates, as well as in scientific research studies where the state of the art or state of the art plays a fundamental role based on the type of sources and bibliographies used. Methodologies such as complex networks, for example [23], can methodologically show the importance of certain nodes (seminal articles or books; relevant authors; relevant publications, etc.); as well as the importance of their relationships, thus allowing the researcher to have a broad overview of the correlational network that revolves around their research topic.

It is imperative to suggest the incorporation of a methodological analysis of sources of this nature in the relevance section of all doctoral research. The methodology employed and the results obtained

offer an enriching framework that enhances the credibility and impact of scientific production in higher academia.

5. Data availability

To foster transparency and collaboration, students and researchers interested in verifying the data, as well as using the models and interactive designs generated in this article, can access the resources free of charge through the following repository[1].

This free access seeks not only to facilitate replicability and learning, but also to drive future research based on solid empirical evidence. If you have any problems downloading or have any additional questions, please send an email to: *jessica.matute@cu.ucsg.edu.ec* o *credrobano@ecotec.edu.ec*

Declaration on Generative AI

The authors have not employed any Generative AI tools.

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