Repositório ISCTE-IUL

Using Quantitative Methodologies to Conduct a Systematic Review in Social Sciences

Proknowk-C and Ordinatio Method in the theme "Financialization in Corporate Governance"

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Abstract: **The work presented here arises in the context of a larger work, which is related to the need of carrying out a survey of possible gaps in the literature on the subject of financialization within the scope of Corporate Governance, followed by a Systematic Review of the topic.**

Thus, using the Vos Viewer tool and two scientific methodologies, that have gained prominence in recent years - ProKnow-C Method and Ordinatio Methodi - a set of protocols based on bibliometric indexes (number of citations, age of the article and journal impact factor) was initiated in order to define the final base portfolio for the intended systematic review that would lead to the identification of gaps in the literature and thus identify possible new lines of research. The purpose of this paper is not at all to present the empirical results and gaps that the systematic review itself allowed to identify, but rather to present the methodology used for the construction of the systematic review carried out a posteriori.

Keywords **– Systematic Review; ProKnow-C Method; Methodi Ordinatio**

1. INTRODUCTION

The systematic review process arises to ensure and contribute to a transparent, scientific, and replicable analysis of evidence based on the literature. This process initially arose in the medical sciences [1], however, the potential contributions that systematic reviews can have in other areas of research are increasingly understood and recognized [2]. Like other review studies, a systematic review is a form of research that uses the existing literature in a particular area as its primary source of information. By applying explicit and systematized methods of searching, critically appraising and synthesizing the selected information, the systematic review provides a summary of the evidence related to a specific intervention strategy.

According to [3] when compared to other research areas and in particular the medical field, management research is relatively recent and therefore has a lower degree of development in terms of agenda and formulation of research questions and less consensus on research questions, so:

*"… it is unlikely that aggregative approaches to research synthesis, such as meta-analysis will be appropriate in management research as the heterogeneity of studies prevents the pooling of results and the measurement of the net effectiveness of interventions"*p.212 [1]

Systematic literature reviews in medical sciences usually involves exhaustive literature search processes, strict and rigorous criteria for selection of publications, and the use of meta-analysis to help highlight the outcomes of medical treatments [4]. On the other hand, systematic literature reviews in social sciences may involve other aspects beyond the sum of the evidence found, such as: understanding the literature through the lens of specific frameworks; identifying research; understanding the evolution of a topic over time; synthesizing seminal flows or even identifying emerging topics, among others [3].

This paper proposes to present, in more detail, the use of two methodologies - the ProKnow-C Method [16][17] and the Methodi Ordinatio [18][19] - that address the issue of scientific production evaluation and propose guidelines based on bibliometric indexes to identify and select relevant publications. Throughout the paper, the methodological steps carried out to define the final portfolio, which served as the basis for a systematic review, will be explained, and a brief comparison of the final output of both and a brief characterization of the final sample will be presented.

2. EVALUATION OF SCIENTIFIC PRODUCTION

The selection of relevant literature is a critical step in any systematic review and may involve qualitative and/or quantitative criteria [5]. An increase in the worldwide scientific literature available in various bibliographic databases [6] [7] has required the researcher(s) to work carefully to select the publications that make significant and relevant contributions and that will be part of the final research portfolio [8].

The concern with the identification of relevant scientific works is not recent. There are proposals to evaluate the quality of scientific papers using the impact they have on the scientific

community, for example, [9] cite pioneering works in the approach of the dimension of the quality of the papers evaluated by the impact factor and the number of citations [10] [11] [12] [13]. On the other hand, other authors propose the selection of papers using a process of elimination of contents that are not aligned with the theme or, that do not present scientific recognition - [14] cited in [9].

The ProKnow-C Method [15][16] and the Methodi Ordinatio [17][18] address this issue and propose guidelines based on bibliometric indices to identify and select relevant publications for a systematic literature review. Both methods have been widely used to support systematic reviews (*ProKnow-C Method* = 179 citations; *Methodi Ordinatio* = 161 citations)[1]

3. BRIEF COMPARISON BETWEEN THE PROKNOW-C METHOD AND METHODI ORDINATIO

[19] explain that the different phases of both methodologies can be grouped into two main sequences: the Preliminary Investigation, which corresponds to the identification of a large initial set of publications, and the Portfolio Filtering, which concerns the phase of selecting aligned and relevant publications.

Regarding the Preliminary Research phase, although there is no direct equivalence regarding the sequence of tasks of each of the methods, both produce similar results in the gross compilation of publications [19]. In the preliminary phase of the ProKnow-C method, the keywords considered relevant for the research and that it will be used in the databases chosen according to the area of study are defined. From the output of this initial search, it is advisable to perform an adherence test to the defined keywords, since it may be necessary to introduce new ones, thus being necessary to restart the whole sequence of the preliminary search explained here.

In Methodi Ordinatio the preliminary phase begins first with the definition of the intentions or objectives of the search. Only then, a preliminary exploratory search is performed in the databases, with keywords that will help, not only to define the definitive keywords, but also to choose the respective databases. This first phase ends with the final search itself.

The way each of these methodologies performs its filtering process and final selection of the portfolio is different. ProKnow-C begins its filtering sequence by eliminating duplicate publications and those whose titles - after reading and analysis by at least two independent researchers - are not aligned with the research topic. Methodi Ordinatio, on the other hand, eliminates not only duplicate publications, but also publications whose titles, abstracts, and keywords are not aligned with the theme. This is the first filtering and the one that involves the greatest degree of subjectivity, because the following filtering already includes bibliometric indexes that allow filtering the remaining aligned publications [19]. Let us look at the Portfolio Filtering phase separately.

The ProKnow-C Method selects the publications with scientific recognition and the most recent ones, to do so, it resorts to the publications with the highest number of citations and those witch come from authors with scientific recognition, as well as publications from the last two years [20][16][5]. To this end, the publications are sorted in descending order of their number of citations and according to the representativeness criterion defined by the researcher, the scientifically relevant publications are identified. This method performs a re-selection of recent publications (2 years old) and publications by relevant authors (i.e., authors who have previously considered relevant publications according to the representativeness criterion).

Regarding Methodi Ordinatio, the ranking of relevant publications is obtained through the Index Ordinatio, an index that includes the number of citations, the age of publication and the impact factor of the journals. This index is equal to the sum of the number of citations, plus the journal impact factor, plus ten times a constant alpha (α), minus alpha times the age of the publication:

InOrdinatio = Number of Citation + Journal Impact Factor + α (10 – Publication Age)

According to [21] and [18] the constant alpha (α) is a value to be assigned by the researcher depending on his objectives: it should assume a value of 1 if he intends to include less recent publications and a value of 10, for more recent publications. That is, alpha is a weighting factor that favour more or less recent papers [5]. Figure 1 and Figure 2 schematically demonstrate the distinct phases of both methods.

After the classification and selection of the publications that give rise to the final bibliographic portfolio, we can see that both methods end in a similar way: the ProKnow-C performs a filtering process by reading the abstracts and then reading the full texts, whereas the Methodi Ordinatio, after finding the full texts, proceeds to their systematic analysis.

4. THE APPLICATION OF THE METHODS TO THE SELECTED THEME

A. *Phase I - The Preliminary Investigation*

The preliminary phase included a generalized search by Article Title, Abstract and Key Words in *Scopus* and by Topic in *Web of Science.* The results for "*financiali?ation*"[2] in both bibliographic databases are considerably high: 3101 publications in *Scopus*, a great focus of this topic in the Social Sciences areas, which these tools provide, there were more 2871 in the *Web of Science*[3]. Using the statistical analysis that these tools provide, it was possible to verify that there is a great focus on this theme in the areas of Social Sciences, Economics/Econometry/Finance, and Management and Accounting, mostly in the form of Articles.

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[1] Data taken from Google Academics in March 2021

[2] The concept of financialization appears written in its English forms: financialization and financialisation and that is why it was used the **?** as Boolean operator.

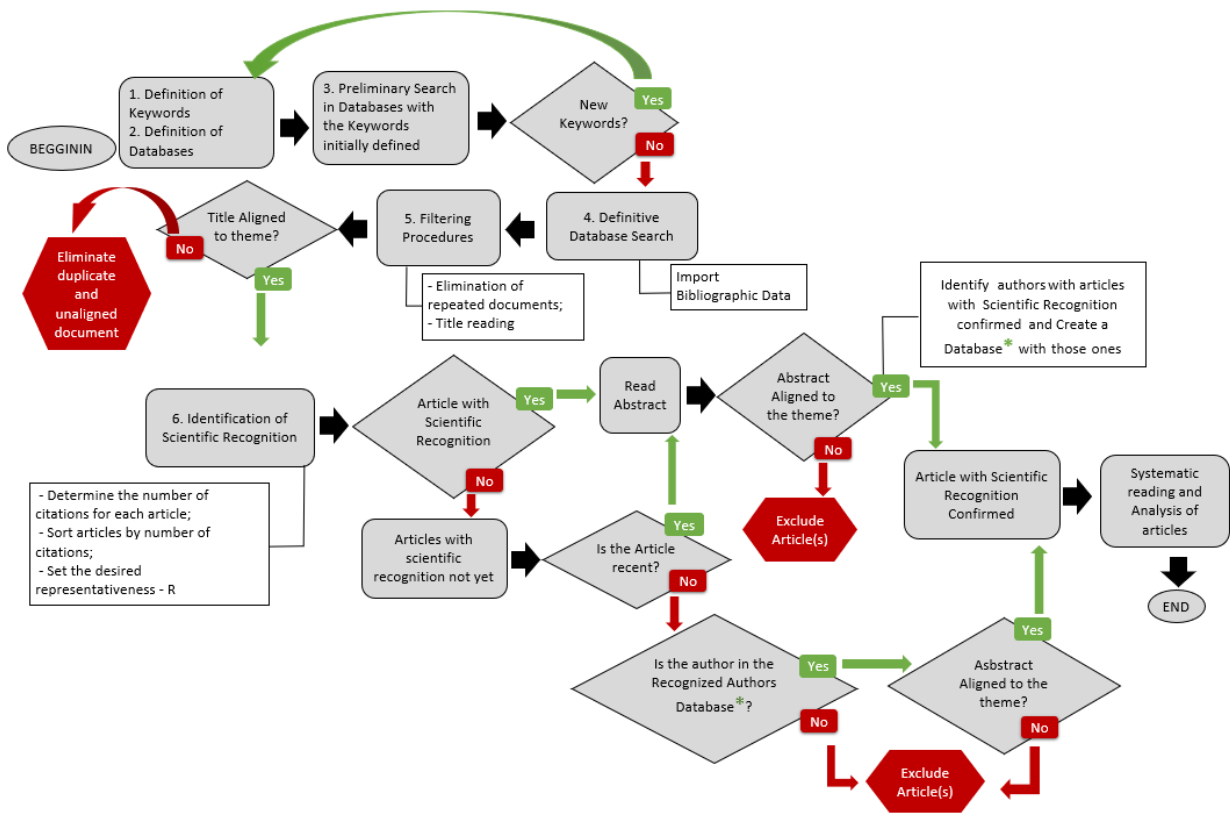[3] Preliminary Investigation performed in January 2021

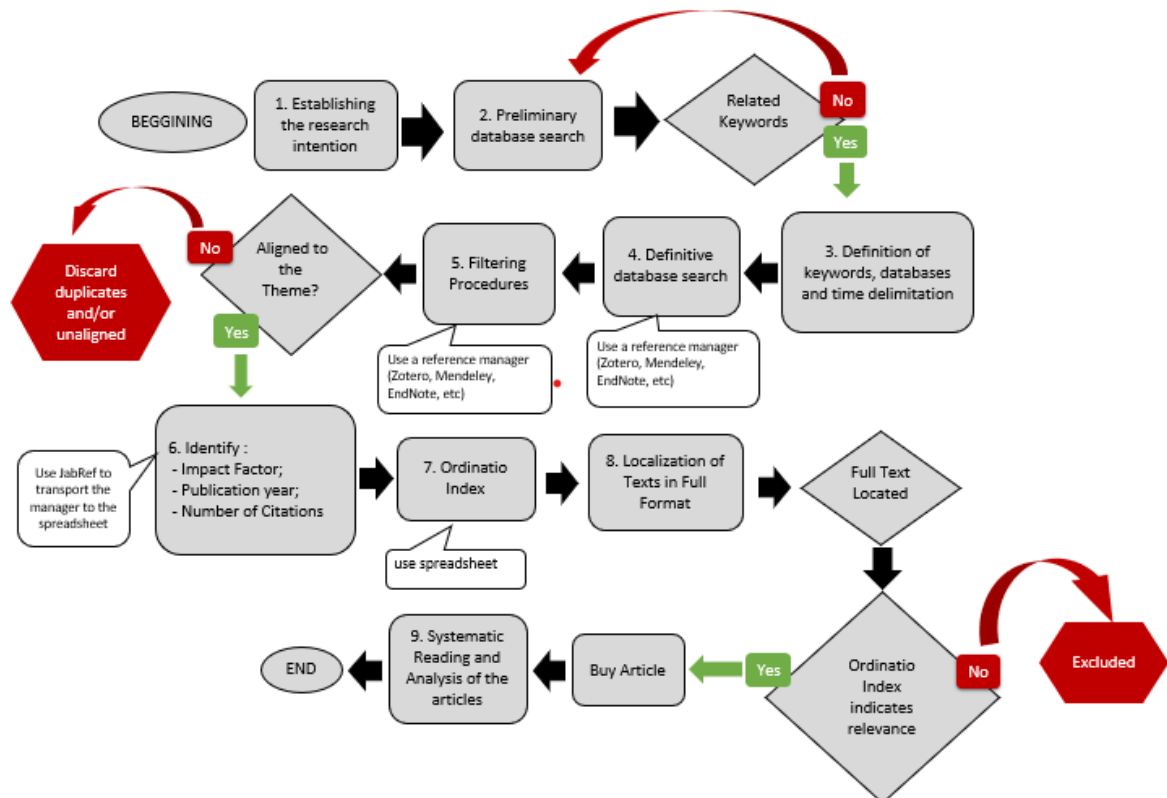**Figure 1** – ProKnow-C Method's Phases – Adapted from [14]

Figure 2 - Methodi Ordinatio's Phases - Adapted from [18]

Given the final objective of a systematic review of the topic "Financialization and Corporate Governance", bibliometric data extracted from *Scopus* and *the Web of Science* were analysed via VosViewer software. From there, a final search algorithm[4] was developed starting a new phase of research that generated two initial portfolios, one coming from *Scopus* and a second coming from the *Web of Science*.

Scopus returned 549 publications from different scientific areas and *Web of Science* 394 publications. A second filter was applied regarding the intended scientific areas: *Scopus* (Economics; Econometrics and Finance Business; Business, Management and Accounting) and *Web of Science* (Economics, Business Finance; Management and Business), resulting in a set of 128 publications in *Scopus* and 148 publications in the *Web of Science*.

B. Phase II – Portfolio Selection

With 128 publications from *Scopus* and 148 from *Web of Science*, it was necessary to apply the protocol for selecting the publications that should be included in the systematic review. The first step was to read the titles and respective abstracts by two pairs in order to understand whether both would be aligned with what we intended to carry out. It is true that the reading of the abstracts in the ProKnow-C Method, compared to the Ordinatio Method, is only performed a posteriori, however, for strategic and resource management reasons, it was decided that it made sense to work from the beginning with publications whose titles and abstracts were aligned, because whenever there are doubts about the title, the abstract is read.

After reading the titles and abstracts, two initial portfolios of publications remained: of the 128 publications from *Scopus*, 56 were aligned with what was intended, and of the 148 from *Web of Science*, 83 aligned publications were identified. These 56 publications from *Scopus* plus the 83 from *Web of Science* correspond to a total of 117 aligned publications (since some are repeated). However, both methodologies were not applied to this total of 117 publications, but rather applied to each of the two initial portfolios. The file with the bibliometric data of the 117 publications aligned to the theme, served later, as will be seen, for a careful analysis of co-citations of cited references and cited authors. In Figure 3 it is possible to graphically analyse this phase of the methodology.

B1. Method ProKnow-C

Since the databases used have their own methodologies for counting citations and evaluating their journals, the ProKnow-C Method was applied separately to the 56 *Scopus* publications aligned to the topic and to the 83 *Web of Science* publications. The bibliometric data was brought into an excel sheet, where it was worked out and sorted in descending citation order. For each publication, its citation percentage and cumulative citation percentage was calculated. It was decided to use Pareto's Law [16] as a rule to set the desired representativeness, with 80% of the total citations being provided by 23% of the 56 aligned *Scopus* publications and by 19.27% of the 83 aligned *Web of Science* publications.

As suggested by the method, a first re-selection of the most recent publications was performed, so a total of 29 publications from 2019 and 2020 were re-selected: 9 from *Scopus* and 20 from *Web of Science*. The second re-scoring is done by identifying the authors of publications with confirmed scientific recognition, i.e., if any publication by these authors was excluded in the first seriation, it should be included in the final portfolio. Thus, 5 more publications from *Web of Science* were retrieved.
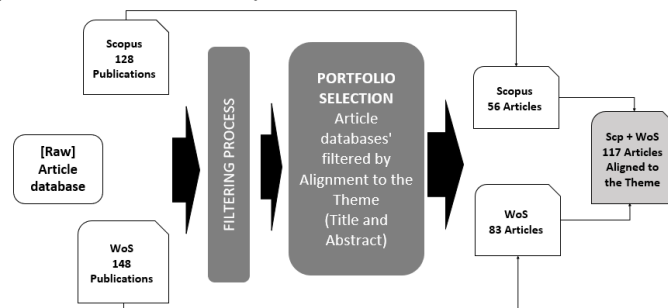

Figure 3– Initial selection process for the initial portfolio of publications

At the end of the ProKnow-C Methodology applied separately to publications according to their origin, 22 publications were identified from *Scopus* (13 relevant and 9 recent) and 41 publications from *Web of Science* (21 recent and 20 relevant). Fifteen repeated publications were eliminated, resulting in a final ProKnow-C Method Portfolio of 48 publications, of which 25 are relevant and 23 are recent. Figure 1 helps to understand what is described here.

B2. Methodi Ordinatio

The bibliometric data were again converted to an excel file, where the Methodi Ordinatio was applied separately thus giving rise to the calculation of an Ordinatio Index for *Scopus* publications and an Ordinatio Index for *Web of Science* publications. For *Scopus* publications, the 2019 *CiteScore Index* available at *Scimago* in *Journal & Country Rank* - metrics used by *Elsevier* - was used, and for *Web of Science* publications, the *Impact Factor* from *Clarivate Analytics* owner of *Web of Science* was used, ie, the 2019 *JIF* available at *Journal Citation Reports* (JCR) was used. In the absence of 2019 *CiteScore* and the 2019 *JIF*, the value of zero was assumed in the calculation of the Ordinatio Index. It was decided to set $\alpha=10$ to include more recent publications, since they could be excluded due to lack of sufficient citations.

Once the Ordinatio Index was determined the publications were sorted in descending order of the index and then the accumulated percentages of the Ordinatio Index were calculated, and the negative indexes were reduced to zero. The Methodi Ordinatio does not define a cut-off limit for ranked articles, but its authors [18] argue that researchers can select, for example, the top 10, the top 50 articles and so on, so it was decided to apply – like [5] - the Pareto Principle to the Ordinatio Index, a criterion already used in the ProKnow-C Method. Thus, the best ranked publications responsible for 80% of the accumulated Ordinatio Index were selected to be included in the final portfolio of the systematic review, i.e., from 56 *Scopus* publications aligned to the theme, 32

[4] Final search algorithm

(("Financiali?ation" AND "CEO Compensation") OR ("Financiali?ation" AND "Managerial Compensation") OR ("Financiali?ation" AND "CEO Characteristics") OR ("Financiali?ation" AND "pay-performance sensitivity") OR ("Financiali?ation" AND "Executive Compensation") OR ("Financiali?ation" AND "Corporate Finance") OR ("Financiali?ation" AND "CEO Incentives") OR ("Financiali?ation" AND "ceo power") OR("Financiali?ation" AND "managerial incentives") OR

("Financiali?ation" AND "CEO pay") OR ("Financiali?ation" AND "Earnings Management") OR ("Financiali?ation" AND "Excess compensation") OR ("Financiali?ation" AND "Financial system") OR ("Financiali?ation" AND "shareholder value") OR ("Financiali?ation" AND "Upper echelons theory") OR ("financiali?ation" AND "Corporate Governance"))

publications were selected, and from 83 aligned *Web of Science* publications, 53 publications were selected.

Similarly, to what was done in the ProKnow-C Method, it was necessary to aggregate these results, so after eliminating 16 repeated publications, we were left with a final output of 69 publications, of which 46 are relevant and 23 are recent.

Figure 2 facilitates the understanding of what is explained here.

C. The Final Portfolio Selecion

Figure 4 allows us to highlight that from these two subsets of portfolios depending on the method used, a total sum of 79 publications can be identified: 56 publications with scientific recognition (relevant) and 23 recent publications. Both methods provided the same 23 recent publications, i.e., published within the last 2 years, and to a lesser extent, only the same 15 relevant publications. These same 15 publications represent 40% of the relevant publications obtained by the ProKnow-C Method and 32.6% of those obtained by Methodi Ordinatio. The intersection of the two methods then allows us to define a total of 38 common publications - all of them articles.
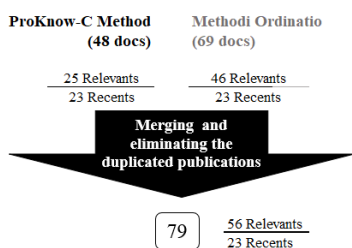
Figure 4 – comparative analysis of the portfolios obtained by the two methods

5. RESULTS AND DISCUSSION

To evaluate the ability of both methods as a method for selecting and filtering an initial publication portfolio, some comparative analyses have been performed.

A. The Final Portfolio

As already mentioned, an analysis of these two subsets of final portfolios according to the method used, allows us to identify a total sum of 79 publications and the intersection of the two methods allows us to define a total of 38 publications in common. It will be up to the researchers to define the final portfolio to include for the systematic review, whether the total of 79 publications or the total common to both methods, the 38 publications.

Analysing the Final Portfolio of the 79 publications it can be seen that most of them were published between 2017 and 2021 (70%). This observation may have to do with two reasons, either most publications on this topic are more recent publications, or these two methods can capture the most recent articles. Both statements are correct. When analysing Figure 5 the Final Portfolio seems to be very representative of the Initial Portfolio and apart from the years 2013, 2014 and 2016 (with a lower representativeness of articles from the initial portfolio in the final portfolio) there does not seem to be much of a gap. The ability of both methods to select very recent publications seems evident.
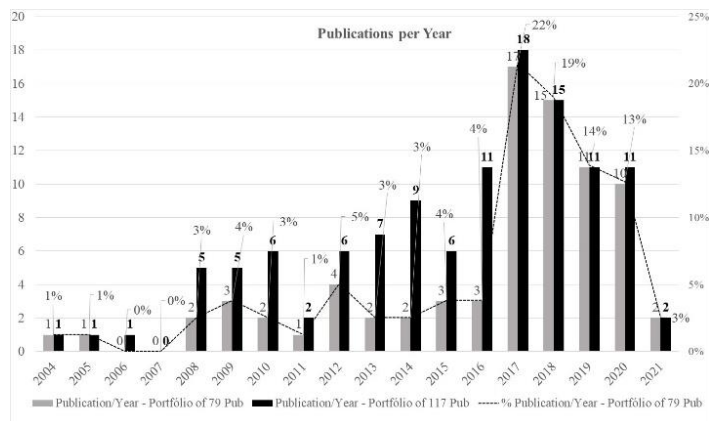
Figure 5 - Comparative analysis of the number of publications per year

B. Caracteristics of the Final Portfolio Articles

B1. Evolution and Quality of Scientific Production

Figure 5 also shows the temporal development of research about financialization in the area of corporate governance and the growth trend of citations, indicating the significant increase of this subject in research in recent decades (Figure 6). The accentuation of scientific production in the last decade may, most likely, be associated with the global financial crisis that was felt between 2008-2011.

A more careful analysis shows that 34% of these publications are concentrated in 9 main journals, i.e., in one third of them. Apart from *Accounting Economics and Law-a Convivium*, which was evaluated neither by *Scimago's Journal & Country Rank* (*Scopus*) nor by Clarivate Analytics' *Journal Citation Report* (*Web of Science*), of these 13 journals 41% are ranked by *Scimago* in Quartile 1 and 32% in Quartile 2 (Figure 7).

This study also analysed Spearman correlations between different measures of journal impact from the *Scopus* and *Web of Science* database and *Google Scholar*, namely the *JIF/2019*, the *CiteScore2019*, the *Scimago H-Index* and the *Google Scholar H5-Index*.
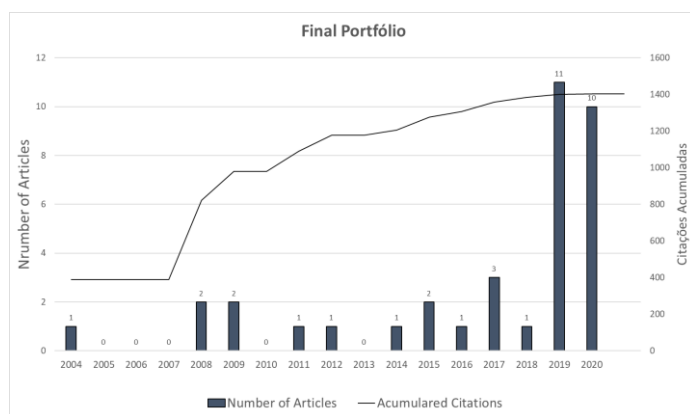
Figure 6 – Number of Articles per year and Accumulated Citations

BEST SCIMAGO QUARTILE 2019
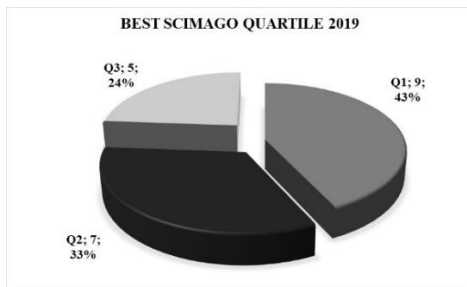
Q3; 5; 24%
Q1; 9; 43%
Q2; 7; 33%

Figure 7 - – Best Scimago Quartil

Considering the sample of 40 selected journals, the results confirm highly positive and significant correlations between *JIF/2019* and *CiteScore/2019* (Rho = 0.893 p-value <0.001), between *JIF/2019* and *Scimago H-Index* (Rho=0.774, p-value <0.001), between *Google Scholar H5 - Index* and *JIF/2019* (Rho=0.879 and p-value <0.001) and *CiteScore/2019* (0.819 and p-value <0. 001). These results are consistent with the results obtained in recent literatures[5] [22].

C. Co-Citation Analysis

Remembering that a total of 117 publications were obtained with the title and abstract aligned to the theme (Figure 3), an analysis of the most cited references of these 117 publications was performed to verify whether both the ProKnow-C Method and the Methodi Ordinatio had the ability to identify publications of scientific relevance.

The VosViewer software was used again and after creating two dictionaries - one for the cited references and the other for the respective authors, since the bibliometric fields #*references cited*# and #*authors*# in each database are different - we proceeded to the co-authorship analysis of the 117 aligned documents, since the co-citation link between two articles in the VosViewer exists when both are cited by the same document. Two reference tables were constructed: one with all articles that were cited at least 8 times, and a second table with all authors with at least 15 co-citations. We concluded that from the final accumulated portfolio of 79 publications there are 7 of these publications that were co-cited at least 8 times (6 of them were "captured" by both methods simultaneously and only one of them by the ProKnow-C Method). And regarding authors, of the 79 publications, 31 of them come from authors with a high citation index. Once again both methods show similarity as of the 31 publications, only 13 of them come from a single method.

6. Conclusions

As already mentioned, the purpose of this paper was not to present a systematic review, but to present all the preparatory work involved in it and to demonstrate how the use of two methodologies, based on bibliometrics metrics accepted by the scientific community as evaluators of scientific quality, can help in the preparation of an essential portfolio for any literature review, whether systematic or not. We verified that both have the ability to capture articles, not only from journals very well evaluated by and in the scientific community, but also articles with a high number of citations and co-citations.

Acknowledgments

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