

Construction and qualitative assessment of a bibliographic portfolio using the methodology Methodi Ordinatio

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Abstract Methodi Ordinatio is a methodology used to accomplish systematic literature reviews, to build bibliographical portfolios, and to map the state of the art of a research theme. It is composed of nine phases. The 7th phase, named InOrdinatio, applies an equation that orders the papers according to its scientific relevance. The equation applies the alpha (α) element, which can vary from 0 to 10 depending on the research need of currentness and according to the researcher's perception for its variation. Therefore, the aim of this paper is to test and analyse the variations of the alpha (α) values in the equation InOrdinatio and its influence in the qualification of the items that composes a portfolio. In order to reach this purpose, a practical application was performed and a bibliographic portfolio on the theme Horizontal Business Networks and Trust was built. Using the data from the bibliographic portfolio, the alpha values from 0 to 10 were applied and their influence on the final qualification of the articles was analysed. As a complementary

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objective, the areas where the methodology was successfully applied until now are also identified. The results show that the methodology is coherent, reproducible and useful to sort the most relevant articles in accordance with what is internationally recognized as valid scientific criteria: the impact factor, year of publication, and number of citations.

Keywords Bibliographic portfolio · Systematic literature review · Methodi Ordinati · Trust · Horizontal Business Networks

Introduction

The insertion of a new academic scientific contribution presenting features of an empirical research, a theoretical model or a model allowing that ideas or models might be measured, first need an assessment of what has been previously studied and developed and which are the research gaps that were not sufficiently addressed in previous studies. In face of a large amount of available knowledge, it is complex for researchers to make a decision and choose the best publications that offer significant contributions to the subject under analysis. These tasks usually involve a thorough systematic review, also encompassing the bibliometric analysis, which aims to quantify the information on a number of studies, so as to provide theoretical support by scientific studies and allowing the researcher to continue his research study from what the literature already presents (Vanti 2002; Chaves et al. 2012).

Scientific databases present numerous articles, whose titles refer to systematic reviews, bibliometric analysis, among others, whose purpose is to present a selection of the most appropriate works to compose the desired portfolio. Concerning the assessment and measurement bias of the quality of publications, the study in Kobashi and Santos (2006) sought to understand what the parameters that effectively guarantee the quality of a scientific work are and allow one to reach reliable and meaningful results. These authors explain some indicators taken into account so that the systematic review can present analysis criteria that justify and support the method used, such as volume of citations, number of publications per year. It is also possible to link indicators such as co-authorship networks and interactions among researchers, institutions and countries. These mentioned categories of scientific works are denominated systematic literature reviews, which provides the researcher as much information as possible about a particular subject, allowing query the quality of publications through clear criteria together. Therefore, a strict literature review must be based on consistent criteria since its beginning until the effective construction of the portfolio. According to Fink (2013), a systematic literature review (SLR) should be: systematic, following a reliable methodological approach; explicit, concerning the procedures that were used throughout each step; comprehensive in its scope, to include all relevant material, and finally; reproducible by others who follow the same approach to review the topic, so that it can reach the same result.

Given the importance of a systematic literature review (SLR), it is necessary that the researcher use an appropriate method. A good number of different works aim to provide these criteria, such as Rosenthal (1991), Egger et al. (2008), Shea et al. (2007), Littell et al. (2008), Moher et al. (2009), Higgins and Green (2011), among a few others. In general, they follow the same principles proposed on The Cochrane Collaboration (Sackett 1994), and most of them are directed to studies in the field of health.

Pagani et al. (2015, 2018) present a methodology that was conceived to build bibliographic portfolios on any theme of research by means of a SLR, in such way it can

facilitate the mapping the state of the art. It is a multi-criteria decision aid (MCDA) methodology, which encompasses three relevant factors in a scientific paper as so to classify it as relevant: the year of publication (Dieks and Chang 1976), the number of citations (Bornmann 2010), and the impact factor (Vinkler 1986, 1996, 2004, 2009, 2010, 2012). These factors are pointed in Pagani et al. (2015).

The main characteristic of this methodology is its 7th phase, which presents the equation InOrdinatio (Pagani et al. 2015, 2018). The equation has in its composition the alpha (α) value, which can vary from 0 to 10, according to the personal decision of the researcher.

Therefore, the purpose of this article is to test and analyse the variations of the alpha (α) values in the equation InOrdinatio and its influence in the qualification of the items that compose a bibliographic portfolio for a scientific research. The areas where the methodology was applied until now are also identified, as a complementary objectives of this paper. To reach these objectives, a practical application of the methodology on the theme ‘Trust in Horizontal Business Networks’ will be presented.

This work is divided into six sections: introduction, literature review on SLR methods, the methodology to build up this paper, data presentation and analysis, results and, finally, the closing remarks.

Literature review

The purpose of a SLR is to support the research so that it can be more reliable and bring up the state of the art in a particular field of knowledge. As a result, the researcher will have the SLR as support to fill gaps that have not been explored (Kitchenham et al. 2009). For Littell et al. (2008) and Ziegelmann (2013), the SLR is considered the most complete form of scientific evidence to answer a research question. In this section, we present a theoretical review on existing methodologies for the construction of the state of the art, evidencing the particular characteristics in each SLR methodology developed in each area and its peculiarities.

Systematic Literature Review

Every inclusion of a new study requires a SLR that extracts the characteristics of published studies so as to form a new perspective of study (Petticrew and Roberts 2006; Okoli and Schabram 2010). According to Levy and Ellis (2006), literature reviews should include features, such as: (a) analysis and synthesis of the methodological quality of the study; (b) to provide a solid foundation for the research topic; (c) to provide a solid basis for the selection of a research methodology, and; (d) to demonstrate that the intention of the proposed research can contribute to the advancement of knowledge.

Rigor and reproducibility have always been fundamental traces in the SLR process in the areas of health, which combined SLR and the condensation of several studies into a single measure of effect with the use of meta-analysis (Littell et al. 2008; Rodrigues and Ziegelmann 2010; Ziegelmann 2013); later, these procedures were adopted to other areas. As each area proposes its peculiar search process, these models require parameters and more sustainable criteria, and the methodology tends to be more rigorous in order to ensure evolutionary patterns to the science of knowledge, thus contributing with studies that can

be used as reference due to its relevance (Fink 2013; Petticrew and Roberts 2006; Okoli and Schabram 2010; Pickering et al. 2015).

According to Petticrew and Roberts (2006), a SLR allows that large amounts of research information be distilled in a feasible way and represents subsidies so that decisions are taken transparently and within a justifiable basis, once its lies upon scientifically relevant sources.

Bibliometric analysis

Within the process of construction of a literature portfolio, SLR has a special feature that allows the researcher to find research gaps in the quality aspect and also the quantification of studies found, thereby generating data and information from scientific data, that is, a bibliometric research. According to Broadus (1987) and Okubo (1997), bibliometrics is a tool to stratify all possible measures to be quantified in a study, such as: number of articles published in a given area in a given period of time, volume of articles published by journals, number of citations, among other indicators. According to Macías-Chapula (1998, p. 134) “bibliometrics develops standards and mathematical models to measure [...] processes, using the results to develop forecasts and support decision making.” Thus, this type of tool combines a set of scientific indicators that can be disseminated [...] in generating a new source of study. Through the results obtained, new knowledge can be developed as well as the research may arouse desire in the researcher to continue through figures already built.

Some studies as Hood and Wilson (2001), Belter (2013), Zacca-González et al. (2014), Ivanović and Ho (2014), Ellegaard and Wallin (2015), Liu et al. (2015) used techniques of bibliometric analysis to assess the scientific research produced by institutions. In all these studies mentioned it was possible to find an analysis of different scientific indicators, but always presenting the possibility to extend discussions and to provide the dissemination of knowledge on the subject under study.

Methodologies, in general, impose an aspect turned to the qualitative breakthrough. The quantitative aspect—bibliometrics—is added to the research according to what the researcher judges to be necessary for the study. Commonly, methods tend to develop search and selection parameters that enable the researcher to reach a volume of articles for analysis and to develop new perspectives for studies from the gaps in the literature (Littell et al. 2008; Gough et al. 2012). The implementation of bibliometric research can be considered as a necessary part of the study allowing a complete view of the state of the art, while enriching the search, and the researcher has more logical arguments to consider mentioning the new study.

A summary of SLR methodologies commonly found in the literature is presented in Table 1. Some methods present a qualitative systematic approach, while others, a quantitative approach analysis.

As it is possible to observe in Table 1, there are methodologies of interference in several fields of knowledge, which allow adaptation according to the researcher’s need and area of study. According to Okoli and Schabram (2010), and Pickering and Byrne (2014), each methodology has its particularity, but often fails to meet adequately to all areas. The vast majority of the methods described in Table 1 are descriptive. It is possible to find clearly that there is a wide range of studies into systematic search, and some that propose a systematic reading. Generally speaking, what differ are the results. A systematic search is

Table 1 Methodologies for SLR. *Source:* The authors, 2018

Methodology (Authors)	Search process	Choice criteria	Area of development
Handbook for identification and review of the scientific literature (NHMRC 1999)	Search process involves: a set of guidelines: question formulation; search to find studies; evaluation and selection of studies; summary and synthesis of relevant studies to determine the applicability of the results; and reviewing and evaluating the literature	There is no description concerning following fixed parameters and the criteria for making the choices lies on the researcher's will; nevertheless, the decisions for the choices made must be justified and based on the assessment of the study quality and applicability	Health sciences
Procedures for systematic literature review (Kitchenham 2004)	The steps are based on guidelines used in medical research, which are: developing a protocol; defining the research question; specifying what will be done to solve the problem; applying the inclusion/exclusion criteria and conducting data mining with quality data; setting the search strategy; drawing up lists of included and excluded studies; using guides to synthesize data and generate reports	Inclusion\exclusion criteria are not detailed; the selection of the words is made by the researcher's decision criteria according to the methodological data extracting from the study	Software engineering
Framework of literature review process (Levy and Ellis 2006)	Methodology that adopts an input stream, data processing and output	Articles are selected according to the framework of analysis of research methodologies, approach, goals and research questions valid for the proposed study	Information systems
Systematic review: a practical guide (Petticrew and Roberts 2006)	Presents a set of descriptive guidelines that conduct the review: clear definition of the question that will be answered by the review; assessment of the types of studies that must be located in order to reach the objective; conduction of a comprehensive literature search to locate the studies; elaboration of the search results already with its filters and decision making on which one should be satisfactory according to the inclusion criteria; critical evaluation of the included studies; summary of the studies and assessment of the heterogeneity among the study results, and finally; disclosure of the review results	Inclusion and exclusion criteria are classified according to the number of quotation, types of study, intervention, population and the results that are eligible for in-depth review, and those who are excluded are justified. These criteria should be specified, describing the assessment. In case of lack of more precise parameters for evaluation, it must be justified	Social sciences

Table 1 continued

Methodology (Authors)	Search process	Choice criteria	Area of development
Syntheses management and organizational science (MOS) (Rousseau et al. 2008)	It presents an approach for synthesis of a literature review considering: synthesis by aggregation, synthesis by integration, synthesis by the interpretation and synthesis by the explanation	Considers the study characteristics: objective, method, strengths and weaknesses	Organizational management and science
The preferred reporting items for systematic protocol review and meta-analysis—PRISMA (Moher et al. 2009)	PRISMA is a protocol for systematic literature review and meta-analysis, used in the health sciences fields for intervention studies. The SLR is designed from the acronym PICOS (Patient, Intervention, Comparison, Outcomes, Study Designs)	The protocol presents a checklist with 17 items that are parameters for the evaluation of studies of the SLR type and meta-analysis. Through PRISMA, it is possible to generate evaluation reports on randomized trials, but can also be used as a basis for reporting systematic evaluations of other types of research	Health sciences
Guide of systematic literature review (Okoli and Schabram 2010)	The authors describe a methodology with steps to be followed: goals to perform a systematic review - it requires a training regarding the protocols to be followed; research scope must be justified, as well as inclusion and exclusion of articles - quality of the chosen articles is assessed by the chosen methodology. After selection of the articles the extraction of data is performed systematically	The assessment of quality is carried out through the methodological approach adopted by the survey; excluded studies are justified, but without any specific criteria	Information systems
Proknow-C (Ensslin et al. 2010)	Methodology originated from the Cochrane Model. It is presented in a flow chart format, where the search process is detailed. The methodology is divided into two stages: the first stage comprises the collection of articles on data bases after defining the keywords; the second step is the filtering of articles following these criteria: repeated articles; alignment by reading the title, scientific recognition defined by the number of citation; reading the summary; and reading the entire article in the databases. After these procedures, the relevance of the paper is established by the researcher	Criteria are based in a worldview. However, the number of citation is the main concern of this methodology, to help the researcher in decision making; other factors are not as relevant as the number of citation in the decision making	Industrial engineering

Table 1 continued

Methodology (Authors)	Search process	Choice criteria	Area of development
Cochrane handbook for systematic reviews of interventions (Higgins and Green 2011)	Model presented in a flow chart format used to support researchers in the health area for identifying and choosing available scientific publications	It works with the coefficient of correlation (agreement) – Kappa value – between the evaluators. When the coefficient is above 0.75, it means there is an excellent correlation between evaluators, which is an essential factor for an article to be included in the bibliographic portfolio; between 0.60 to 0.74, it means there is a good agreement; between 0.40 to 0.59, it means there is a fair deal between the evaluators; and when the value is less than 0.39, it means there is a little or no agreement at all	Health sciences
Systematic quantitative literature reviews (Pickering and Byrne 2014)	Presents a descriptive flowchart composed of fifteen steps that allows the evaluation of quantitative systematic literature reviews	The inclusion of papers is performed according to the filtering search directed to the subject. There is not a more robust criterion. The authors point out that a database with information about the article is necessary, but does not describe what data are actually required	Social and natural sciences
Methodology MethodiOrdinatio (Pagani et al. 2015)	Methodology of an easier understanding, presented in a flow chart format, where the search process is detailed. The transparency of the search is evidenced in the objectivity of the steps presented; the coverage of the scope search can be as broad as researcher decides depending on his personal preferences	Choice based on adherent's criteria (impact factor analysis, year of publication, and citation number)	Industrial Engineering

typically required within a process of building new knowledge. A systematic reading enables the researcher to choose a particular study to compose a bibliographic portfolio using consistent criteria. For Rousseau et al. (2008), science lacks not only methods to represent phenomena that cannot be observed directly, but also requires a greater effort so that criticality and interpretation can achieve authenticity and value.

In general, the methodologies described in Table 1 are effective in the case of the initial phase of constructing a SLR, with well described and reproducible criteria. When it involves the step of choosing between one article or the other, the Cochrane Model presents a relevant proposal, working with the coefficient Kappa value as a criterion for choosing one study over another. However, the method has strict criteria for the correlation coefficient between evaluators, being the subjectivity the most relevant. It should be considered that, meanwhile a good agreement has not been achieved, more robust parameters should be considered; on this point of view, it is correct to say that the method does not consider any criteria concerning the qualifications of the study, but exclusively the subjectivity of the evaluator.

As an answer to this deficiency detected, Pagani et al. (2015; 2018) developed the methodology *Methodi Ordinatio*. In its initial steps, this SLR methodology presents criteria similar to the others described in Table 1. However, in addition to the systematic construction of a portfolio of articles, this methodology proposes qualifying criteria thereof, through three parameters: year of publication, number of citations, and the impact factor. These parameters are presented in the equation *InOrdinatio* (1).

$$\text{InOrdinatio} = (\text{IF}/1000) + \alpha * [10 - (\text{Research Year} - \text{Publish Year})] + (\Sigma \text{Ci}) \quad (1)$$

where IF, impact factor, as issued by the Journal Citation Report (JCR), CiteScore, SCImago Journal Rank (SJR), or SNIP; α , coefficient which value of importance is attributed by the researcher to the year of the article, varying from 1 to 10; Research Year, year in which the research is being done; Publish Year, year the article was published; ΣCi , total number of citations of the article.

As it can be observed, the equation includes the coefficient alpha (α), which allows the researcher to assign degrees of importance to the year of publication of the article. It is a parameter that requires certain sensitivity from the researcher and, at the same time, gives subjectivity in the proposal. This will be the main issue to be discussed in this study, which will be the analysis of the influence of alpha (α) value on the other two factors in the classification of items. The criteria are tested in the supplementary material (electronic spreadsheet). The first papers present at least two strong factors (recent year, high number of citation, or high impact factor); as the paper is decreasing in the rank, the strength of the factors are decreasing. The last papers in the rank do not present a strong factor (not recent year, low number of citations, and low impact factor).

Figure 1 shows the flowchart of the steps used by *Methodi Ordinatio*.

This methodology selects and establishes a ranking of the articles before the systematic reading is performed. This allows researchers to save time in the reading process, considering that the most time-consuming task in a portfolio selection is this activity (Pagani et al. 2015, 2018). With other methods, this qualification of the articles only occurs after the systematic reading. Thus, taking into account the gain of time and the effectiveness of the results, this methodology was used to construct the state of the art on the subject “Trust in Horizontal Networks”.



Fig. 1 Phases of the methodology Methodi Ordinatio. Source: Pagani et al. (2015)

Methodology

This is an exploratory research, since the authors worked to generate a bibliographic portfolio and analyse it using the methodology Methodi Ordinatio. It is descriptive for it describes the measurements and characteristics of the articles to build up the bibliographic portfolio (Salomon 1999). The instrument of intervention used was the methodology Methodi Ordinatio due to the arguments presented before. This paper is using the bibliographic portfolio from the theoretical model proposed by Campos et al. (2017), which

was published in the Journal of Intelligent Manufacturing, to present the analysis of alpha (α) value. All the stages will be explained in the sequence.

Selecting the bibliographic portfolio using Methodi Ordinatio

This subsection presents the steps provided by the methodology, and comprises nine phases. They are described in the sequence:

Phase 1—Intention of research: for this study, the intention of research was ‘Trust in Horizontal Business Networks’; the axis defined to proceed the search on data bases are ‘Horizontal Business Network’ AND ‘Trust’.

Phase 2—Preliminary research with keywords: after defining the research axis and reading some articles, we created a set of keywords that would be used for the adhesion test: Enterprises Networks, Cluster of Companies, Horizontal Network of Companies, Collaborative Networks, Local Productive Arrangement, Cooperation Networks, Interorganisational Networks, Business Network.

Phase 3—Final decision on key words combinations and databases: after performing adherence tests and considering the opinion of some experts in SLR, the following words and their combinations were defined: Collaborative Networks, Business Networks, and Industrial Cluster. For the axis Trust, the following words were analysed: Types of Trust, and Relationships.

Based on the set of words to the two search axes, the words were combined among them: “Collaborative Networks” AND “Trust”; “Collaborative Networks” AND “Types of Trust”; “Collaborative Networks” AND “Relationships”; “Business Networks” AND “Trust”; “Business Networks” AND “Types of Trust”; “Business Networks” AND “Relationships”; “Industrial Cluster” AND “Trust”; “Industrial Cluster” AND “Types of trust”; “Industrial Cluster” AND “Relationships”; “Horizontal collaborative Networks” AND “Trust”.

The temporal limit established for the research was from 2004 to 2017. Regarding the databases, it was selected those which presented a larger number of works on the researched theme. They are: Web of Science (WOS), Scopus, Science Direct Online, Emerald, Springer Link, IEEEExplore, Academic Search Premier—(ASP EBSCO), Scielo, Sage Pub, Taylor & Francis, Oxford University Press, Cambridge University Press.

Phase 4—Final search on databases using a reference manager: Table 2 shows the volume of articles obtained considering each data base researched and every combination of words used.

Phase 5—Filtering procedures: in this phase, the articles were analysed individually applying the following filters: eliminating duplicity (easily performed by using the reference manager); papers whose title were not related to the area; papers belonging to book chapters or conferences (they are searched in a second search, for they do not have impact factor). If any doubt concerning the paper remains, the keywords and abstracts were be analysed to check whether or not the paper was related to the area. From a total of 12,109 articles, 322 were excluded for being in periods prior to 2005; 432 item were book chapters and/or articles from the conference; 3054, by duplicity; 7664 for the title filtering, that is to say, after reading the title it was realized that they were not related to the topic of research. Up to this step, were 11,472 articles were excluded, leaving a remainder of 519 articles. The abstracts of 519 articles were read and 401 articles were eliminated, for they

Table 2 Gross volume of articles obtained in the databases. *Source:* Campos et al. (2017, p. 3)

Data bases Key words combinations	WOS	Scopus	Science Direct	Emerald	Springer	IEEE Explore	EBSCO	Scielo	Sage	Taylor & Francis	Oxford	Cambridge University Press	Gross total of articles
Collaborative networks and trust	48	18	8	99	259	24	10	7	177	407	62	15	1134
Collaborative networks and types of trust	4	4	1	1	2	36	0	1	1	9	0	12	71
Collaborative networks and relationships	68	69	16	212	588	25	25	10	253	611	114	20	2011
Business networks and trust	67	61	20	521	430	24	50	4	354	324	138	123	2116
Business networks and types of trust	8	13	5	4	8	2	0	0	8	16	4	0	68
Business networks and relationships	195	123	111	886	682	11	225	3	566	988	210	2	4002
Industrial cluster and trust	22	9	3	71	141	10	2	1	66	128	23	0	476
Industrial cluster and types of trust	2	0	0	0	123	2	0	0	0	3	0	0	130
Industrial cluster and relationships	124	96	20	127	381	48	42	0	122	211	47	0	1218
Horizontal collaborative networks and trust	36	34	5	174	221	1	0	0	226	115	59	12	883
Total by each data base	574	427	189	2095	2835	183	354	26	1773	2812	657	184	12,109

did not belong to the theme. Finally, 118 articles remained to effectively compose the final portfolio of research. Table 3 presents the used filters.

The next step was to classify the papers using the Equation InOrdinatio (1).

Phase 6—Searching for the impact factor and number of citation: the methodology has been updated (Pagani et al. 2018) concerning the tools used to perform the tasks. Then, the reference manager JabRef was also used, which automatically provided a list of papers with the name of the authors, title of the paper, name of the journal, year of publication, type of publication, and URL. The number of citations was manually extracted from Google Scholar; the metrics (impact factor) was also manually obtained from the Clarivate Analytics¹ list; if not found there, the list provided by Scopus² is then searched.

Phase 7—Ranking the articles using the InOrdinatio: with the identification of parameters made in Phase, 6, 118 items were classified from highest to lowest Index Ordinatio (InOrdinatio) using alpha (α) values from 0 to 10.

The alpha (α) value is a criterion that the researcher has the freedom to choose, and even change, during this step. As Pagani et al. (2015) in their analysis considered the alpha (α) value equal to 10, it remained the question about the best value for the alpha parameter to use. So, this paper tests all the values ranging from 0 to 10.

Analysis of results

Figure 2 shows the volume of papers distributed between the periods of 2005–2017.

It is recommended that the researcher uses a broader temporal delimitation, that is, the whole period ranging from when the theme started to figure on the literature till the moment the research is being done will produce better results. By following this procedure, the ‘classic’ works, the ones that are the core references for the theme and which are the most cited across time, will be included. When the researcher uses a broad temporal delimitation, and attributes the value 0 for alpha(α), the most cited (classic ones) will figure in the portfolio as the most relevant studies.

Citation indicators are constructed by means of computed data identifying the number of times a particular article was cited by a new academic/scientific contribution. This is a feature commonly used as a way to choose between a paper and another (Macias-Chapula 1998; Pagani et al. 2015, 2018). For the present study, we analysed the volume of the article citations according to the alpha (α) values from 0 to 10, as shown in Fig. 3.

As it can be observed in Fig. 3, considering the portfolio of 118 papers, the volume of citations of each study can be a decisive factor for the researcher when selecting what to read. But then, the most cited can also imply ‘old’ works. Considering that new knowledge from more recent studies must be also analysed, then, other factors must be taken into consideration, such as year of publication and the reputation of the journal, translated by the impact factor. The impact factor is considered an important criterion for evaluating a journal because it presents quantitatively the representativeness in the journal over the last 5 years (Pagani et al. 2015). Therefore, when we use the highest alpha (α) value (10), the most recent works will be included in the research, not due to the number of citations, but due to a high impact factor of the journal where it was published.

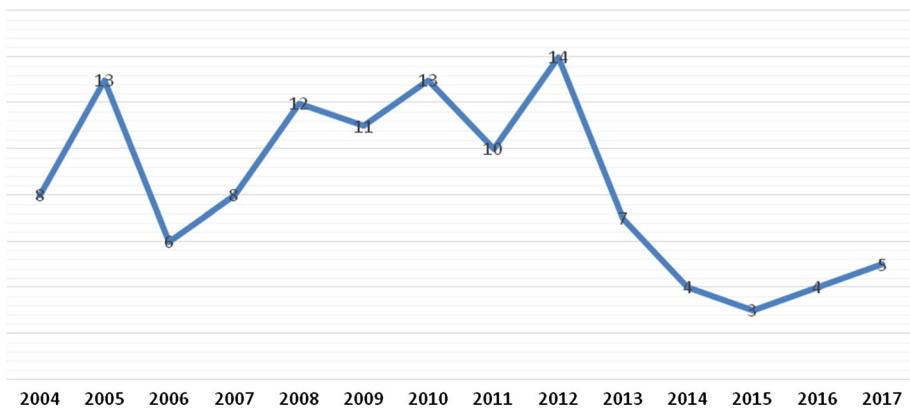
In Fig. 4, we present the distribution of the 118 papers and their classification obtained from InOrdinatio. We analysed three situations: in the first one we have the alpha (α) value

¹ <https://clarivate.com/products/journal-citation-reports/>.

² <https://journalmetrics.scopus.com/>.

Table 3 Number of papers before and after filtering procedures. *Source:* Campos et al. (2017, p. 3)

Filtering procedures used	Gross selected articles	Articles crossed off	(%)
Gross total of papers	12.109 papers		100
Before 2005		322 papers	2.66
Book chapters'/conference papers		432 papers	3.57
Duplicates		3054 papers	25.22
Discared after reading the title		7664 papers	63.29
Discared after reading the abstract		519 papers	4.29
Total of papers discarded		11,991 papers	99.03
Total of papers de selected to compose the portfolio		118 papers	0.97


Fig. 2 Volume of papers distributed between the periods of 2005–2017

equal to 0, 1, 5 and 10. As it can be observed, the punctuation obtained for the alpha (α) values to 0 and 1, there is a little variation. However, when we observe the punctuation for the alpha (α) values 0 and 5, the difference is bigger and more distant if compared to alpha (α) value 0, and this difference is very significant when the portfolio has a very large number of papers, reflecting directly in the ordination.

In the second situation, in Fig. 5, it is possible to observe that the alpha (α) values 2, 3 and 4 present a difference that might significant in the general classification of the study, that is, depending on the other individual criteria for the ordination, the position in the rank might be higher or lower.

In the third situation, in Fig. 6, observing the values of alpha (α) equal to 6, 7, 8, and 9, the difference to is much higher when compared to alpha (α) value 1. For instance, when we look at the paper ID 1 (in Table 4) with alpha (α) value 0, and we compare it with alpha (α) value 6, the difference amongst the index reaches 138 points; to alpha (α) value 7, the difference reaches 161 points; to alpha (α) value 8, the difference reaches 184 points; and to alpha (α) value 9, the difference reaches 207 points.

Table 4 helps to understand the variations amongst all alpha (α) values from 0 to 10.

So, it can be inferred that the researcher, when optioning for higher alpha (α) values, tends to have a portfolio with more recent published articles, with a fairly low number of

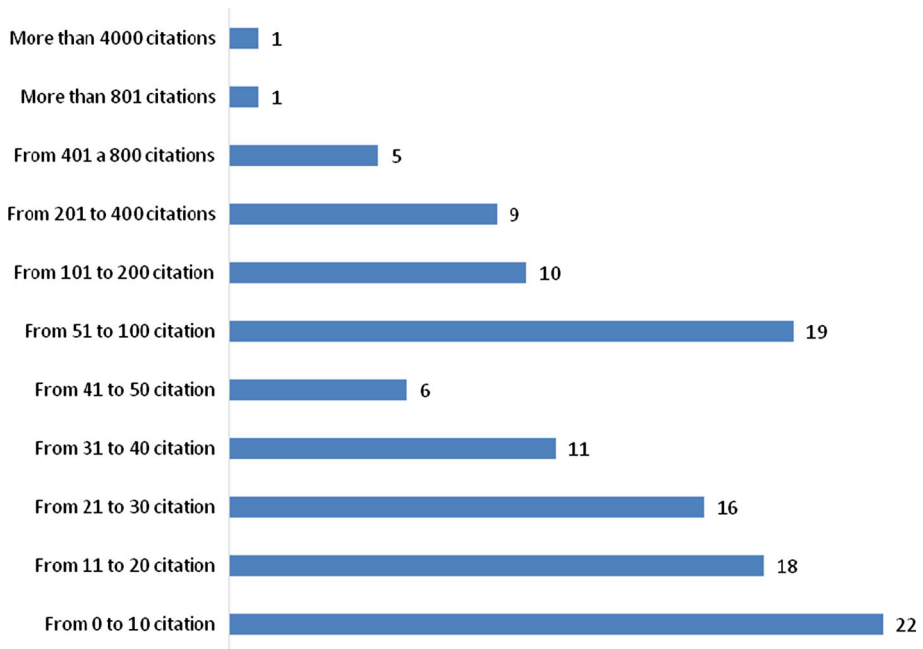


Fig. 3 Volume of citations by journals

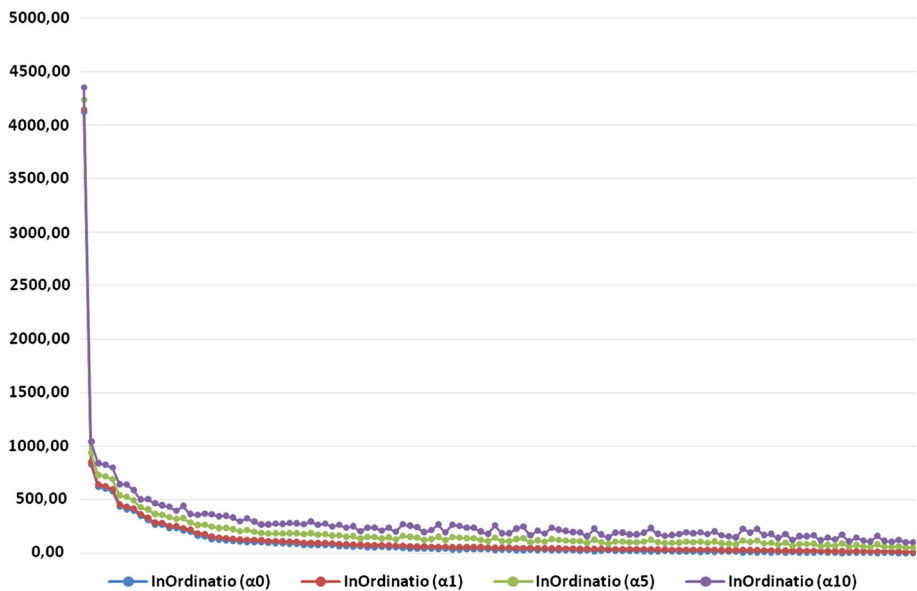


Fig. 4 Index of InOrdinatio Alfa (α) 0, 1, 5 and 10

citations; on the other hand, the values of (α) lower alpha imply older articles, and with higher volume of citations.

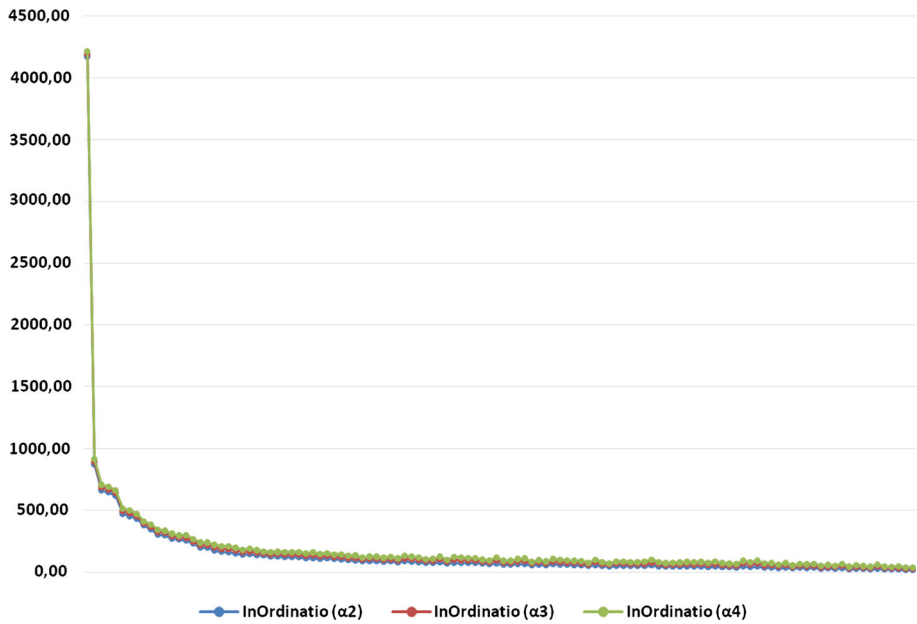


Fig. 5 Index of InOrdinatio Alfa (α) 2, 3 and 4

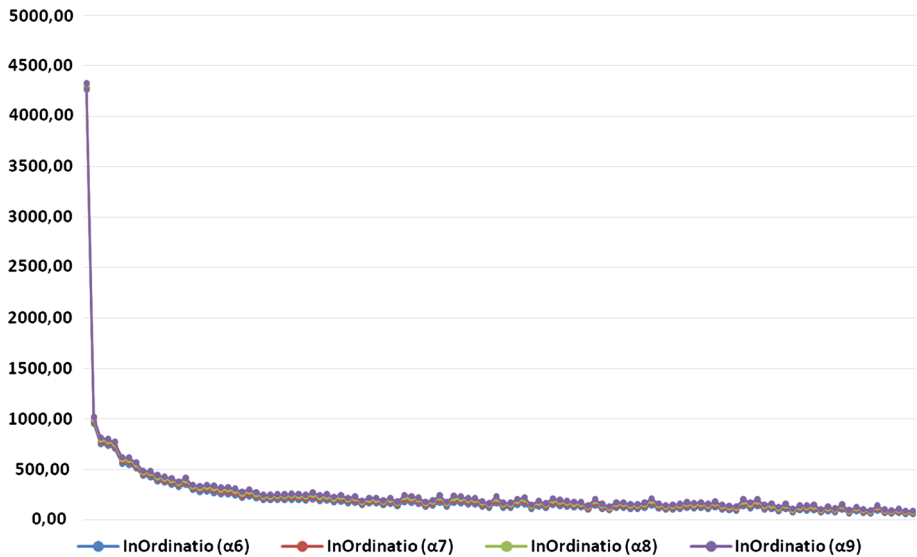


Fig. 6 Index of InOrdinatio Alfa (α) 6, 7, 8 and 9

Finally, after testing with the alpha (α) values 0 to 10, it was possible to build a conceptual framework with the general characteristics of publications. Table 5 provides the basis for researchers to build new perspectives for studies using the features as relevant considerations concerning the choice of the alpha (α) values.

Table 4 Index order of 118 article

ID	Year	IF	Ci	($\alpha 0$)	($\alpha 1$)	($\alpha 2$)	($\alpha 3$)	($\alpha 4$)	($\alpha 5$)	($\alpha 6$)	($\alpha 7$)	($\alpha 8$)	($\alpha 9$)	($\alpha 10$)	Average	Standard deviation
1	2004	5776	4124	4124.01	4147.01	4170.01	4193.01	4216.01	4239.01	4262.01	4285.01	4308.01	4331.01	4354.01	4239.01	76.282
2	2006	7417	832	832	853	874	895	916	937	958	979	1000	1021	1042	937.01	69.649
3	2005	3107	621	621	643	665	687	709	731	753	775	797	819	841	731.00	72.966
4	2005	3035	606	606	628	650	672	694	716	738	760	782	804	826	716.00	72.966
5	2005	1.396	578	578	600	622	644	666	688	710	732	754	776	798	688.00	72.966
6	2006	1.427	434	434	455	476	497	518	539	560	581	602	623	644	539.00	69.649
7	2004	7.733	411	411	434	457	480	503	526	549	572	595	618	641	526.01	76.282
8	2008	7.417	399	399	418	437	456	475	494	513	532	551	570	589	494.01	63.016
9	2012	7.733	351	351	366	381	396	411	426	441	456	471	486	501	426.01	49.749
10	2008	0	313	313	332	351	370	389	408	427	446	465	484	503	408.00	63.016
11	2009	4.461	266	266	284	302	320	338	356	374	392	410	428	446	356.00	59.699
12	2007	1.846	265	265	285	305	325	345	365	385	405	425	445	465	365.00	66.332
13	2011	0	236	236	252	268	284	300	316	332	348	364	380	396	316.00	53.066
14	2007	1.846	234	234	254	274	294	314	334	354	374	394	414	434	334.00	66.332
15	2004	1.195	211	211	234	257	280	303	326	349	372	395	418	441	326.00	76.282
16	2011	7.417	204	204	220	236	252	268	284	300	316	332	348	364	284.01	53.066
17	2008	4.929	166	166	185	204	223	242	261	280	299	318	337	356	261.00	63.016
18	2006	5.776	159	159	180	201	222	243	264	285	306	327	348	369	264.01	69.649
19	2004	0	132	132	155	178	201	224	247	270	293	316	339	362	247.00	76.282
20	2005	0	124	124	146	168	190	212	234	256	278	300	322	344	234.00	72.966
21	2004	2.024	119	119	142	165	188	211	234	257	280	303	326	349	234.00	76.282
22	2005	3.354	112	112	134	156	178	200	222	244	266	288	310	332	222.00	72.966
23	2008	2.67	108	108	127	146	165	184	203	222	241	260	279	298	203.00	63.016
24	2011	2.2	106	106	122	138	154	170	186	202	218	234	250	266	186.00	53.066
25	2008	3.677	104	104	123	142	161	180	199	218	237	256	275	294	199.00	63.016

Table 4 continued

ID	Year	IF	Ci	($\alpha 0$)	($\alpha 1$)	($\alpha 2$)	($\alpha 3$)	($\alpha 4$)	($\alpha 5$)	($\alpha 6$)	($\alpha 7$)	($\alpha 8$)	($\alpha 9$)	($\alpha 10$)	Average	Standard deviation
26	2005	2.622	104	104	126	148	170	192	214	236	258	280	302	324	214.00	72.966
27	2010	7.733	96	96	113	130	147	164	181	198	215	232	249	266	181.01	56.383
28	2009	2.76	94	94	112	130	148	166	184	202	220	238	256	274	184.00	59.699
29	2009	3.107	92	92	110	128	146	164	182	200	218	236	254	272	182.00	59.699
30	2008	2.67	89	89	108	127	146	165	184	203	222	241	260	279	184.00	63.016
31	2008	3.166	88	88	107	126	145	164	183	202	221	240	259	278	183.00	63.016
32	2008	3.166	79	79	98	117	136	155	174	193	212	231	250	269	174.00	63.016
33	2010	2.053	76	76	93	110	127	144	161	178	195	212	229	246	161.00	56.383
34	2008	1.312	75	75	94	113	132	151	170	189	208	227	246	265	170.00	63.016
35	2005	2.2	74	74	96	118	140	162	184	206	228	250	272	294	184.00	72.966
36	2007	0	74	74	94	114	134	154	174	194	214	234	254	274	174.00	66.332
37	2010	0	67	67	84	101	118	135	152	169	186	203	220	237	152.00	56.383
38	2013	3.166	65	65	79	93	107	121	135	149	163	177	191	205	135.00	46.433
39	2007	1.846	65	65	85	105	125	145	165	185	205	225	245	265	165.00	66.332
40	2008	1.98	61	61	80	99	118	137	156	175	194	213	232	251	156.00	63.016
41	2012	3.166	59	59	74	89	104	119	134	149	164	179	194	209	134.00	49.749
42	2009	4.28	57	57	75	93	111	129	147	165	183	201	219	237	147.00	59.699
43	2009	3.05	57	57	75	93	111	129	147	165	183	201	219	237	147.00	59.699
44	2013	2.19	57	57	71	85	99	113	127	141	155	169	183	197	127.00	46.433
45	2009	2.521	55	55	73	91	109	127	145	163	181	199	217	235	145.00	59.699
46	2005	0	48	48	70	92	114	136	158	180	202	224	246	268	158.00	72.966
47	2012	2.153	46	46	61	76	91	106	121	136	151	166	181	196	121.00	49.749
48	2006	1.396	45	45	66	87	108	129	150	171	192	213	234	255	150.00	69.649
49	2010	3.166	43	43	60	77	94	111	128	145	162	179	196	213	128.00	56.383
50	2012	0	43	43	58	73	88	103	118	133	148	163	178	193	118.00	49.749

Table 4 continued

ID	Year	IF	Ci	(x0)	(x1)	(x2)	(x3)	(x4)	(x5)	(x6)	(x7)	(x8)	(x9)	(x10)	Average	Standard deviation
51	2007	1.41	42	42	62	82	102	122	142	162	182	202	222	242	142.00	66.332
52	2013	1.92	40	40	54	68	82	96	110	124	138	152	166	180	110.00	46.433
53	2011	0	40	40	56	72	88	104	120	136	152	168	184	200	120.00	53.066
54	2004	2.024	36	36	59	82	105	128	151	174	197	220	243	266	151.00	76.282
55	2007	0.82	36	36	56	76	96	116	136	156	176	196	216	236	136.00	66.332
56	2007	0.26	36	36	56	76	96	116	136	156	176	196	216	236	136.00	66.332
57	2012	2.897	35	35	50	65	80	95	110	125	140	155	170	185	110.00	49.749
58	2012	0	35	35	50	65	80	95	110	125	140	155	170	185	110.00	49.749
59	2005	2.28	34	34	56	78	100	122	144	166	188	210	232	254	144.00	72.966
60	2004	0	34	34	57	80	103	126	149	172	195	218	241	264	99.00	43.116
61	2014	0	34	34	47	60	73	86	99	112	125	138	151	164	149.00	76.282
62	2012	1.92	31	31	46	61	76	91	106	121	136	151	166	181	106.00	49.749
63	2007	0	29	29	49	69	89	109	129	149	169	189	209	229	129.00	66.332
64	2004	2.39	28	28	51	74	97	120	143	166	189	212	235	258	143.00	76.282
65	2009	2.325	28	28	46	64	82	100	118	136	154	172	190	208	118.00	59.699
66	2014	2.293	27	27	40	53	66	79	92	105	118	131	144	157	92.00	43.116
67	2008	0.307	27	27	46	65	84	103	122	141	160	179	198	217	122.00	63.016
68	2015	4.48	26	26	38	50	62	74	86	98	110	122	134	146	86.00	39.799
69	2009	2.67	26	26	44	62	80	98	116	134	152	170	188	206	116.00	59.699
70	2010	1.98	26	26	43	60	77	94	111	128	145	162	179	196	111.00	56.383
71	2005	1.312	26	26	48	70	92	114	136	158	180	202	224	246	136.00	72.966
72	2006	0.677	25	25	46	67	88	109	130	151	172	193	214	235	130.00	69.649
73	2012	0.91	24	24	39	54	69	84	99	114	129	144	159	174	99.00	49.749
74	2010	0	24	24	41	58	75	92	109	126	143	160	177	194	109.00	56.383
75	2012	1.71	23	23	38	53	68	83	98	113	128	143	158	173	98.00	49.749

Table 4 continued

ID	Year	IF	Ci	($\alpha 0$)	($\alpha 1$)	($\alpha 2$)	($\alpha 3$)	($\alpha 4$)	($\alpha 5$)	($\alpha 6$)	($\alpha 7$)	($\alpha 8$)	($\alpha 9$)	($\alpha 10$)	Average	Standard deviation
76	2012	0.4	23	23	38	53	68	83	98	113	128	143	158	173	98.00	49.749
77	2010	3.035	21	21	38	55	72	89	106	123	140	157	174	191	106.00	56.383
78	2010	2.024	21	21	38	55	72	89	106	123	140	157	174	191	106.00	56.383
79	2013	2.02	20	20	34	48	62	76	90	104	118	132	146	160	90.00	46.433
80	2010	3.035	19	19	36	53	70	87	104	121	138	155	172	189	104.00	56.383
81	2011	2.062	19	19	35	51	67	83	99	115	131	147	163	179	99.00	53.066
82	2006	1.16	19	19	40	61	82	103	124	145	166	187	208	229	124.00	69.649
83	2012	2.369	18	18	33	48	63	78	93	108	123	138	153	168	93.00	49.749
84	2011	2.369	16	16	32	48	64	80	96	112	128	144	160	176	96.00	53.066
85	2014	1.396	16	16	29	42	55	68	81	94	107	120	133	146	81.00	43.116
86	2013	2.39	15	15	29	43	57	71	85	99	113	127	141	155	85.00	46.433
87	2011	2.369	15	15	31	47	63	79	95	111	127	143	159	175	95.00	53.066
88	2012	0.577	15	15	30	45	60	75	90	105	120	135	150	165	90.00	49.749
89	2010	3.035	14	14	31	48	65	82	99	116	133	150	167	184	99.00	56.383
90	2005	0.5	14	14	36	58	80	102	124	146	168	190	212	234	124.00	72.966
91	2009	0	14	14	32	50	68	86	104	122	140	158	176	194	104.00	59.699
92	2009	2.67	13	13	31	49	67	85	103	121	139	157	175	193	103.00	59.699
93	2016	1.092	12	12	23	34	45	56	67	78	89	100	111	122	67.00	36.483
94	2008	0.246	12	12	31	50	69	88	107	126	145	164	183	202	107.00	63.016
95	2009	0.79	11	11	29	47	65	83	101	119	137	155	173	191	101.00	59.699
96	2014	0	11	11	24	37	50	63	76	89	102	115	128	141	76.00	43.116
97	2016	2.67	9	9	20	31	42	53	64	75	86	97	108	119	64.00	36.483
98	2011	1.154	9	9	25	41	57	73	89	105	121	137	153	169	89.00	53.066
99	2017	1.534	8	8	18	28	38	48	58	68	78	88	98	108	58.00	33.166
100	2010	0	8	8	25	42	59	76	93	110	127	144	161	178	83.00	49.749

Table 4 continued

ID	Year	IF	Ci	(x0)	(x1)	(x2)	(x3)	(x4)	(x5)	(x6)	(x7)	(x8)	(x9)	(x10)	Average	Standard deviation
101	2012	0	8	8	23	38	53	68	83	98	113	128	143	158	93.00	56.383
102	2017	3	7	7	17	27	37	47	57	67	77	87	97	107	57.00	33.166
103	2012	1.24	7	7	22	37	52	67	82	97	112	127	142	157	82.00	49.749
104	2005	1.007	7	7	29	51	73	95	117	139	161	183	205	227	117.00	72.966
105	2010	0	7	7	24	41	58	75	92	109	126	143	160	177	92.00	56.383
106	2015	0	7	7	19	31	43	55	67	79	91	103	115	127	67.00	39.799
107	2016	0	7	7	18	29	40	51	62	73	84	95	106	117	62.00	36.483
108	2005	0	6	6	28	50	72	94	116	138	160	182	204	226	116.00	72.966
109	2011	0	6	6	22	38	54	70	86	102	118	134	150	166	86.00	53.066
110	2013	0.88	5	5	19	33	47	61	75	89	103	117	131	145	75.00	46.433
111	2017	2.67	4	4	14	24	34	44	54	64	74	84	94	104	54.00	33.166
112	2016	2.024	4	4	15	26	37	48	59	70	81	92	103	114	59.00	36.483
113	2013	1.094	4	4	18	32	46	60	74	88	102	116	130	144	74.00	46.433
114	2015	0.812	2	2	14	26	38	50	62	74	86	98	110	122	62.00	39.799
115	2010	0.307	2	2	19	36	53	70	87	104	121	138	155	172	87.00	56.383
116	2017	0.19	1	1	11	21	31	41	51	61	71	81	91	101	51.00	33.166
117	2017	0	1	1	11	21	31	41	51	61	71	81	91	101	51.00	33.166
118	2011	0	0	0	16	32	48	64	80	96	112	128	144	160	80.00	53.066

Table 5 Characteristics of publications considering the importance of alpha (α) value

Alfa (α) values	Characteristics of selections
Alfa (α) 0	When choosing alpha (α) equal to 0, the researcher assumes that the publication year of the study is the less important criterion in the general classification
Alfa (α) 1	Allows a selection of articles that considers the state of the art in more classical terms. It offers a more homogeneous distribution of the IF between the selected articles; articles with the higher number of citations are more classical; articles with a lower number of citations with higher impact factor. Thus, this factor is referred to a more conservative portfolio, where it favours the journal's impact factor at the expense of greater relevance of the article. For this alpha range, the most cited articles tend to be the most classic ones
Alfa (α) 2, 3 e 4	These alpha (α) values represent an option in which the researcher takes partially into account the year of publication of the study as a criterion of choice. When this range of importance is chosen, the researcher assumes that s/he will have a sample with articles of moderate age in his portfolio, but the index, as well as other values, is weighted by other criteria (IF and citation volume)
Alfa (α) 5	Allows an intermediate selection of articles by the criterion year of publication, i.e., the volume of articles from the earliest period to the most recent is close, which ensures an even distribution; the researcher will have in its portfolio the classics of literature and the current state of the art. The other criteria (impact factor and citation) will also be considered
Alfa (α) 6, 7, 8 e 9	In this case, little higher importance is given to the year of publication of the article. By choosing these values the researcher can have a more recent range of articles and with an intermediate volume of citations, given the premise that the year of publication has a greater importance, but also the number of citations
Alfa (α) 10	It allows a selection of the most recent articles, with a tendency to journals with high IF, and a wider range of IF among the items that make up the portfolio. The number of citations of articles tends to be lower; the most frequently cited are those older ones. Thus, in this selection will appear the most recent articles and those with a high number of citations, which are generally classics. Therefore, the alpha 10 will be used when the recentness of the papers is more relevant for the research, and the authors want that the most recent papers be included in the final reading

Therefore, if the research requires only more recent papers, no matter the number of citations, it is recommended to use alpha (α) value 10; if the classics and most cited are required over the most recent ones, the alpha (α) value should be 1; to have a balance, but risking losing the most recent works, the alpha (α) value should be 5.

Areas of applicability

Since the methodology was proposed (Pagani et al. 2015), it has been successfully used by some researchers. For instance, Pinto et al. (2016) conducted a literature review on Green Supply Chain Management (GSCM) in order to identify developments in this area and the main ways in which this issue was addressed. Stadler et al. (2017) identified the peculiarities and specific demands of the cooperative sector versus the management of corporate social responsibility (CSR). Barros et al. (2017) performed a systematized theoretical analysis of scientific research on Life Cycle Assessment (LCA) of electric power generation systems. Campos et al. (2017) built a theoretical model for the

Table 6 Areas of study using Methodi Ordinatio

Year	Title	Type of work	Web link	Area of study
2018	Inovação Aberta em PMEs: Uma análise da rede de citações entre os autores	Journal paper	http://periodicos.unifebe.edu.br/index.php/reei/article/view/594	Innovation
2018	Usefulness of Technological Capacity Evaluation for Brazilian Farmer Stakeholders: A Bibliometric Analysis	Journal paper	https://www.mdpi.com/2071-1050/10/4/1036	Technological Capacity
2018	Model to support decision-making on the implementation of SDGs in business networks	Doctoral thesis	http://repositorio.utfpr.edu.br:8080/jspui/handle/1/3075	Sustainable Development in networks of companies
2018	Offset policy in the technology transfer process: an analysis under the anthropotechnological approach	Masters dissertation	http://repositorio.utfpr.edu.br/jspui/handle/1/3025	Technology transfer
2017	Avaliação de Ciclo de Vida de sistemas de geração de energia elétrica mais limpa: uma análise de produção científica	Conference paper	http://www.advancesincleanerproduction.net/sixth/files/sesoes/6B/11/barros_mv_et_al_academic.pdf	Sustainability
2017	Life cycle assessment of electric power generation in Brazil: historical and future perspectives in global warming	Masters dissertation	http://repositorio.roca.utfpr.edu.br/jspui/handle/1/7784	Sustainability
2017	Social responsibility in tourism cooperatives: proposal of a measurement model based on the VBA model.	Book chapter	https://www.cabdirect.org/cabdirect/abstract/20183122697	Sustainability
2017	Development of a methodology for the minimization of environmental costs from concepts of industrial symbiosis in horizontal networks of companies	Masters dissertation	http://repositorio.utfpr.edu.br/jspui/handle/1/2302	Sustainability
2017	Proposal of a methodology for evaluation and planning for horizontal networks of companies based on your life cycle	Masters dissertation	http://riut.utfpr.edu.br/jspui/handle/1/2346	Networks of companies
2017	Analysis Of The Scientific Production Of The Journal Of Engineering Education (Jee) From 2006 To 2015 [Análise Da Produção Científica Do Journal Of Engineering Education (Jee) De 2006 A 2015]	Journal paper	http://107.161.183.146/~abengeorg/revista/index.php/abenge/article/view/1377	Bibliometric Analysis

Table 6 continued

Year	Title	Type of work	Web link	Area of study
2017	To evaluate the process of transfer of knowledge and technology in the discipline of Industrial Management Techniques	Masters dissertation	http://repositorio.utfpr.edu.br/jspui/handle/1/2455	Transfer of knowledge
2017	A management model to transferring knowledge and technology to academic internship A management model to transferring knowledge and technology to academic internship	Doctoral thesis	http://repositorio.utfpr.edu.br/jspui/handle/1/2628	Transfer of knowledge
2017	Proposal of a methodology for the classification of alternatives to open innovation in small and medium enterprises	Masters dissertation	http://repositorio.utfpr.edu.br/jspui/handle/1/2286	Innovation
2017	Integrating life cycle assessment into the product development process: a methodological proposal	Doctoral thesis	http://repositorio.utfpr.edu.br:8080/jspui/handle/1/2452	Sustainability
2017	Mechanisms of technology transfer in technological universities: comparison of the Brazilian and Colombian model	Masters dissertation	http://riut.utfpr.edu.br/jspui/handle/1/2575	Technology transfer
2017	Reverse logistics for the end-of-life and end-of-use products in the pharmaceutical industry: a systematic literature review	Journal paper	https://www.emeraldinsight.com/doi/abs/10.1108/SCM-01-2017-0040	Reverse Logistic
2017	Fatores econômicos determinantes da corrupção no Brasil: uma análise com dados em painel do Ministério Público Federal	Masters dissertation	http://repositorio.unb.br/handle/10482/31316	Economy
2017	Determining the best configuration for load occupation for a cargo load transport system to minimize cost and carbon footprint	Masters dissertation	http://repositorio.roca.utfpr.edu.br/jspui/handle/1/7783	Logistics
2017	Barriers, external aspects and trust factors in horizontal networks of companies: a theoretical proposal for the construction of a model for evaluation of trust	Journal paper	https://link.springer.com/article/10.1007/s10845-017-1339-x	Networks of companies
2016	Proposta de um modelo para mensuração de confiança em redes horizontais de empresas	Masters dissertation	http://repositorio.utfpr.edu.br/jspui/handle/1/1956	Networks of companies

Table 6 continued

Year	Title	Type of work	Web link	Area of study
2016	Systematic analysis of economic and sectorial indicators for strategic planning in the construction sector	Masters dissertation	http://repositorio.utfpr.edu.br/jspui/handle/1/1958	Strategic planning
2016	Uma Análise da Evolução da Produção Científica sobre Green Supply Chain Management	Journal paper	http://www.revistaespacios.com/a16v37n06/16370616.html	Green Supply Chain
2016	Technology transfer models: typology and a generic model	Journal paper	https://www.inderscienceonline.com/doi/abs/10.1504/IJTTC.2016.079923	Technology transfer
2016	Proposal for a framework of a supply chain management from technology transfer	Masters dissertation	http://repositorio.utfpr.edu.br:8080/jspui/handle/1/1957	Supply Chain
2016	Meta-analysis of business-related research in the former Warsaw Pact and the Soviet Union countries	Journal paper	https://www.emeraldinsight.com/doi/abs/10.1108/BJM-01-2016-0009	Business

assessment of trust within horizontal networks of companies. Bureš (2017) identified the main topics and trends associated with business-related research conducted in Belarus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Russia, Slovakia and Ukraine. Bonatto et al. (2017) developed a model for analysing the performance measurement of horizontal business networks. Resende et al. (2018) evaluated the publications of Journal of Engineering Education (JEE) from 2006 to 2015, Vaz et al. (2018), Peres et al. (2018) analysed the network of citations among the authors of the most scientific articles on Open Innovation in Small and Medium Enterprises. These, are other works that can be found on Google Scholar, are listed on Table 6. Besides these works, there are others, like master's dissertations and doctoral thesis. The works are listed on Table 6.

Final assignments for under graduation were not listed on Table 6, as well as other conference papers that appear on Google search engine, but are not listed on Google Scholar. As it can be observed, the methodology is being used to accomplish researches in different areas, mainly related to Engineering, Business and Economics.

Conclusions

This work analysed the variation of the alpha (α) in the equation InOrdinatio and its influence in the qualification of the papers that compose a portfolio for a scientific research. It can be concluded that when the researcher decides for higher alpha (α) values, the bibliographic portfolio tends to present more recent articles, with a fairly low number of citations. When the values of alpha (α) are lower, it implies older articles, and with higher volume of citations.

It is a characteristic of the scientific research, in its evolutionary sense, the advance of knowledge. However, the construction of new knowledge encompasses aspects in which the researcher depends on intensive consultation to what the literature has in order to start building a systematic literature review.

The methodology developed by Pagani et al. (2015) and improved in Pagani et al. (2018) provides an efficient framework and presents an adequate management of information for an article once the method is a pioneer in working with input data equating three segments of information for the article—impact factor, year of publication and volume of quotation. The methodology allows the sort of relevance of papers using consistent criteria. This classification obtained provides the researchers an efficient decision-making in relation to building a portfolio of relevant papers.

Most of the work of the researcher is still done manually, like searching for impact factor and number of citations. Nevertheless, it is still considered to favour the research work, since it diminishes the work time considering that the researcher will read only the papers s/he finds relevant for his research after applying the InOrdinatio—which ranks the scientific papers according to their scientific relevance, which differs from other methods. Some of the tasks were improved by using the TICs, as described in Pagani et al. (2018).

The contribution of the methodology *Methodi Ordinatio*, beyond what other methodologies have done, is the index *InOrdinatio* that ranks the articles according to its scientific relevance. With a more complete view and within a critical rigor, the method has international scientific support when considers the impact factor, pondering it with the publication year and number of citation; this index gives the researcher greater convenience for ordering the articles.

The method is being used in areas like engineer, business, economics, and sustainability. The structure provided by the methodology indicates, and the works done using it so far, indicates that it can be reproducible in other areas.

Besides being used to sort journal papers, which uses impact factor metrics, for instance JCR, CiteScore, SJR (Scimago) and SNIP, the methodology can also be used to sort books, book chapters and conference works. In the case of books, book chapters and conference works, the researcher is not going to insert values for the metrics in the equation *InOrdinatio* to know the relevance of the work.

The limitation of this study is that search results tend to be different when made from different sources. For instance, in Brazil, searches made from a Federal University will differ from a State University, considering that financial supports for research are different in these two scopes; therefore, the sources will also differ.

Future studies could include a search done from both institutional scopes, federal and state, to compare the results. Future studies may also be developed into two parts: first expanding the volume of databases to be searched, as well as a larger set of key words, allowing a higher income and, therefore, allowing a deeper analysis. The second part goes to the statistical interference evaluating the sample obtained by the method and confronting with the final sample and performing hypothesis testing, variance and/or other tests that statistically consolidate the validity of the sample and the importance of the method.

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