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BRAZILIAN SCIENTIFIC PRODUCTION: AUTHORSHIP PROFILE IN KNOWLEDGE MANAGEMENT IN THE COMMUNICATION AND INFORMATION AREA

PRODUÇÃO CIENTÍFICA BRASILEIRA: PERFIL DE AUTORIA EM GESTÃO DO CONHECIMENTO NA ÁREA DE COMUNICAÇÃO E INFORMAÇÃO

PRODUCCIÓN CIENTÍFICA BRASILEÑA: PERFIL DE AUTORÍA EN GESTIÓN DEL CONOCIMIENTO EN EL ÁREA DE COMUNICACIÓN E INFORMACIÓN

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RESUMO: O crescente desenvolvimento de estudos relacionados ao conhecimento e a aplicação prática destes no âmbito organizacional confere certa relevância à Gestão do Conhecimento, que se consolida como uma temática complexa devido às interações com a cultura, tecnologia, pessoas, dentre outras. Consequentemente, o número de publicações científicas relacionadas a esta temática se eleva em detrimento a fatores como aumento de programas de pós-graduação, elevação do número de mestres e doutores, exigências de manutenibilidade do pesquisador no campo acadêmico e as regras de avaliação da CAPES. Neste contexto, contemplado por estudiosos de diversas áreas com as quais a Gestão do Conhecimento se relaciona, este estudo analisa o perfil dos autores na produção científica brasileira de Gestão do Conhecimento. Para a realização de tais análises a metodologia é caracterizada pela natureza descritiva e utilizou abordagem quantitativa por meio do emprego da bibliometria. Alguns dos resultados evidenciam que as produções de autoria dupla são mais frequentes que as individuais e a cada elevação do número de autores há decremento da quantidade de publicações e os autores que publicam individualmente e em coautoria tendem a apresentar um comportamento veementemente mais colaborativo. As interações entre as titulações dos autores apresentam relações mais frequentes entre os indivíduos de mesma titulação e, em segundo momento, os doutores se relacionam mais com mestres que com doutorandos. A replicabilidade da pesquisa em outro recorte temporal é sugestão de trabalho futuro, permitindo evidenciar novas percepções quanto aos perfis acadêmicos brasileiros.

PALAVRAS-CHAVE: Bibliometria. Gestão do Conhecimento. Perfil de autoria. Produção Científica.

ABSTRACT: The increasing development of studies regarding knowledge its practical application in the organizational scope confers certain relevance to Knowledge Management, which is consolidated as a complex theme due to the interactions with culture, technology, people, among others. Consequently, the number of scientific publications related to this subject increases due to factors such as increase in graduate programs, number of masters and doctorates, researcher maintenance requirements in the academic field and CAPES evaluation rules. In this context, contemplated by scholars of several areas with which Knowledge Management relates, this study analyzes the profile of the authors in the Brazilian scientific production of Knowledge Management. To carry out such analyzes the methodology is characterized by its descriptive nature and used a quantitative approach through the use of bibliometrics. Some of the results show that the productions of double authorship are more frequent than the individual ones and with each increase in the number of authors, there is a decrease in the number of publications and the authors who publish individually and in co-authorship tend to present a more collaborative behavior. The interactions between the authors' degrees show more frequent relationships between the individuals with the same degree and, secondly, the doctors relate more to masters than to doctoral candidates. The replicability of the research in another temporal cut is suggestion of future work, allowing to evidence new perceptions regarding the Brazilian academic profiles.

KEYWORDS: Bibliometry. Knowledge management. Authorship Profile. Scientific production.

RESUMEN: El creciente desarrollo de estudios relacionados con el conocimiento y la aplicación práctica de éstos en el ámbito organizacional confiere cierta relevancia a la Gestión del Conocimiento, que se consolida como una temática compleja debido a las interacciones con la cultura, la tecnología, las personas, entre otros. En consecuencia, el número de publicaciones científicas relacionadas con esta temática se eleva en detrimento de factores como aumento de programas de postgrado, elevación del número de maestros y doctores, exigencias de manutención del investigador en el campo académico y las reglas de evaluación de la CAPES. En este contexto, contemplado por estudiosos de diversas áreas con las que se relaciona la Gestión del Conocimiento, este estudio analiza el perfil de los autores en la producción científica brasileña de Gestión del Conocimiento. Para la realización de tales análisis la metodología se caracteriza por la naturaleza descriptiva y utilizó un enfoque cuantitativo a través del empleo de la bibliometría. Algunos de los resultados evidencian que las producciones de autoría doble son más frecuentes que las individuales y cada elevación del número de autores hay decremento de la cantidad de publicaciones y los autores que publican individualmente y en coautoria tienden a presentar un comportamiento vehemente más colaborativo. Las interacciones entre las titulaciones de los autores presentan relaciones más frecuentes entre los individuos de la misma titulación y, en segundo momento, los doctores se relacionan más con maestros que con doctorandos. Realizar esta investigación en otro recorte temporal es sugerencia de trabajo futuro, permitiendo nuevas percepciones en cuanto a los perfiles académicos brasileños.

PALABRAS CLAVE: Bibliometría. Gestión del conocimiento. Perfil de autoría. Producción Científica.

1 INTRODUCTION

Approximately in 1993, Knowledge Management emerged (KM) (BOLISANI & Handžić, 2015) and since then the academy is dedicated to the development of researches that situate knowledge as a central element in organizations. Therefore, the elevation of elements that interact with knowledge such as culture, technology, people, processes, innovation, intellectual capital, among others, foster new research and discussions about negotiations that can boost the management of this asset in organizations.

In parallel, companies begin to consider academic contributions and invest in KM initiatives, assigning empirical theories and propositions, resulting in feedback to researchers who feed back such responses into new research, generating a continuous cycle of "experimentation" - experiment and experience - through the application of theories and experiences of KM practices in the organizational sphere.

This exchange between academic research and organizational practice confers a certain relevance and credibility to the CG that, consequently, inhabits several areas of knowledge such as information sciences, computing, business, sociology, psychology (EARL, 2001), social applied, engineering, biological and agrarian (IGARASHI et al, 2008). In this context, the scientific publication presents itself as a useful instrument for the communication of such theories and results of its applications, since "they aim to disseminate the research to the community in a way that allows others to use it and to evaluate it under other visions" (BROFMAN, 2012, p.1).

The number of scientific productions rises considerably, which may be due to factors such as: a) quantity of scientific fields that address the KM (EARL, 2001; IGARASHI et al, 2008); b) increase in the number of postgraduate courses (BROFMAN, 2012); c) consequent elevation of masters and doctors capable of researching on KM (CGEE, 2016); d) need to publish for academic sustainability (SILVA, et al, 2009); e) evaluation of graduate programs by the Higher Education Personnel Improvement Coordination (CAPES, 2016); among others.

In this context, bibliometric analysis becomes useful to analyze academic productions by a spectrum of quantification of constituent elements in the layout of such productions, such as authors, journals, key words, references and citations, allowing to identify characteristics that the researcher is ready for (PRICE, 1976; ARAÚJO, 2007), serving the researcher as a means to observe a certain phenomenon according to the desired aim. The application of the laws Lotka, Bradford and Zipf (GUEDES; BORSCHIVER, 2005), identification of more prolific authors, networks of citations and authors, dispersion of journals (ZANINI, PINTO and FILIPPIM, 2012), among others, are some common analysis in studies of this nature.

This diversity of analyzes is confirmed by the study by Lozano (2017), who investigates doctoral theses on the Internet in Spanish universities, considering the analysis interval from 1996 to 2011. The combination of theses, the Internet, Spanish universities and the temporal cut allow combinations and diverse perceptions about the behavior of the researchers in a certain academic area.

Considering this scenario, this study makes use of bibliometrics to analyze the profile of researchers considering elements such as authors (numbers, names, genres and titles), quantity of productions and their relationships as authors versus productions, interactions between the degrees, temporal dispersion of publications By number of authors and interactions, ranking of most prolific authors, among other aspects. Therefore, we investigate the publication patterns of KM by individual, multiple and total authorship of the scientific productions, weaving the aforementioned analyzes in order to elucidate the understanding of the profile of the scientific productions in the field of Brazilian KM.

For this, this article is subdivided into sections in order to meet the scientific prerogatives aiming at the replicability and understanding of the steps taken during the development of the study. Besides this introduction, four more sections are presented, being: 1) methodological procedures that evidence the paths covered to reach the proposed goal; 2) presentation of the results and discussion, which situates the analyzes in the context sought by the study and discusses the quantification performed; 3) conclusions about the study, as well as its limitations and potential future studies; And 4) literary references used during the research.

2 METHODOLOGIC PROCEDURES

Aiming to provide results oriented to the authors' profile in publications in the KM, this study quantifies and describes the analyzes, therefore it is characterized by the descriptive nature, with a quantitative approach, and makes use of the bibliometric technique. Described as primordial as the description in the description of the phenomena (TRIVINÕS, 1987), elucidating the population and relations presented between the elements (GIL, 2002). Quantitative analysis was based on the quantification of the data (MASCARENHAS, 2012; PEROVANO, 2016), using bibliometrics with statistical techniques in the analyzes (VANTI, 2002; ARAÚJO, 2007).

The methodological approach to reach the proposed intent must demonstrate the paths and instruments used (DEMO, 1995; MINAYO, 1998), allowing the replicability of the methods and revealing the efforts employed during the trajectory covered. Therefore, the course covered has two phases called research and interpretation. The research phase consists of the means used to obtain the data, which is subdivided into three moments.

Firstly, the periodicals to be consulted were defined, with those with Qualis A1, A2 and B1 in the evaluation field of Communication and Information, being a total of 43, selected due to the possibility of on-line consultation. Second, the terms "knowledge management", "knowledge", "organizational knowledge" and "knowledge organization" were defined for conducting research in such journals . Subsequently the query was performed considering any of the terms in keyword, title and abstract, aiming to obtain a broad sample for later interpretation, obtaining 2,284 scientific productions, which were collected through manual download.

The interpretation phase is instituted to treat and analyze the collected publications. Firstly, the scientific productions were filtered considering only articles referring to KM in the period from 2000 to 2013. This procedure resulted in a reduction of the sample to 346 publications from 32 journals. At the next moment the full name and title data of the authors and coauthors were tabulated in Excel for further treatment. Such treatment was intended to standardize the data for the quantitative analyzes, which are presented in the following section of this study along with the results obtained.

3 RESULTS AND DISCUSSION

The analyzes performed in this section present the results in visions that include the entire sample and, later, the sectioning of the sample by publication profiles represented by single and multiple authorship types. The purpose of this elucidation is to identify researchers by publication profile, not objecting to any criticism or qualification regarding such forms of research, but rather to represent different perspectives that can be used according to the perception of other scholars. Thus, the results and discussion on the analyzes are distributed in four subsections.

Subsection 3.1 is intended for the presentation of the sample, considering the temporal dispersion in biennials of the publications by number of authors and distinction of the data referring to the corpus of articles analyzed. Subsequently, subsection 3.2 presents an overview of academic productions and publications rankings considering the totality of the authors and the profile of productions by titration and gender. Subsequently, subsection 3.3 focuses on the individual publications, segmenting the analyzes by titling the publications in biennials and presenting the ranking of researchers referring to the productions of single authorship, and subsection 3.4 complements the previous analyzes, covering publications of multiple authorship by means of exposing the ranking of authors, titling of publications per biennium and interactions among the titles of such authors.

3.1 Sample: publications by number authorship type

The total of 346 articles were analyzed in this study, being the same quantified by number of authors. This quantification allows the identification of the frequency of individual and multiple authoring publications, thus showing the representativeness of the publications in relation to the number of authors, according to Table 1.

Table 1. Bianual dispersion of publications by author numbers

Number of authors	2000 to 2013							Σ
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	
1	14	12	17	21	22	12	18	116
2	6	10	11	20	18	29	34	128
3	1	3	3	8	6	22	24	67
4	2	-	1	-	2	7	5	17
5	-	-	-	-	4	1	4	9
6	-	1	-	1	4	-	1	7
11	-	1	-	1	-	-	-	2
Σ	23	27	32	51	56	71	86	346

Source: Research data.

Table 1 elucidates the dispersion of publication quantities per year versus number of authors. The years were grouped in double intervals, so the "0-1" representation indicates the years 2000 to 2001, and successively. Predominantly, publications with 1 and 2 authors are more frequent than the others and assume the quantitative core of the productions analyzed in this study, representing 244 publications (70.52%) in relation to the total.

The number of double-authored publications is more frequent than individual publications, but the annual dispersion shows that publications with two authors have taken on a predominance as of 2010, with 29 publications by two authors in front of 12 individual publications in that year. In the analysis of the whole range - 2000 to 2013 -, the publications with two authors presented representative growth, unlike the individual authors, which oscillated during this same period and decreased in the last two biennia.

From two authors, with each increment of individuals in the publications, the number of scientific productions declines, which makes it possible to infer that GC researchers, according to the corpus analyzed by this study, preferentially opt for collaborative works in double. This inference is supported by the significant difference of 61 publications - almost double - in relation to the quantitative comparison between productions with 2 and 3 authors.

Camí (1997) expresses the need to publish for social permanence in the scientific community and 11 years later this position is ratified by Machado da Silva et al. (2008) when emphasizing that this is a result of the expression "publish or perish". Next, Silva (2009) makes considerable criticism about the Qualis classification, emphasizing that the academic

career is determined by the quantity of articles published to the detriment of the journal score and, emphatically, states that "in fact, what matters is to publish, even if what is published is hierarchized" (SILVA, 2009, p.121).

Crossing these indications to the records of increase of the productions by 2 authors during the analyzed period, with a disruptive mark in the year of 2010 in relation to the individual authorship, one can raise the discussion that to publish in partnership is a way to reach the quantitative in favor of academic survival.

Obviously, the knowledge pooling promoted by co-authorship tends to elevate scientific discussions to new heights, due to the cooperation between disciplines originating from the origins of such authors, but it is worth conjecture as to the possibility of such collaboration not necessarily reflecting cooperation, but rather the imperative to publish more (ANDRADE; RÊGO, 2015) for academic permanence. During this study some stances will be made in order to elicit this reflection.

The following sections of this research are aimed at analyzing the authors, presenting segmented views on the type of authorship. In order to elucidate the quantitative exposures in such sections, Table 2 presents the corpus analyzed by this study.

Table 2. General data of the analyzed articles' corpus

Authorship type	Articles	Authors	
		Total	Distinct
Single	116	116	95
Multiple	230	635	512
General	**346**	**751**	**585**

Source: Research data.

Table 2 shows the totals of articles and authors by type of authorship. The single authorship consists of the individual articles, whereas the multiple covers the articles with 2, 3, 4, 5, 6 and 11 authors, according to the vision stratified in Table 1. The general quantitative of authors is expressed by the columns "total" Which represents the sum of authors present in such types of authorship, and "distinct", which refers to the unification of these in order to obtain the totality of exclusive individuals existing in the analyzed corpus.

The individual academic productions (type of single authorship) total 116 articles and authors, and when consolidating the number of authors, there are 95 different individuals. The multiple authorship corresponds to 230 productions with the total of 635 authors, being 521 distinct. The overall total of different authors is 585 and does not correspond to the sum of individuals of single authorship (95 people) and multiple (512 people), since there are authors who published individually and in co-authorship.

Thus, when consolidating the overall total of different authors, there is a reduction in the number to the detriment of the attempt to obtain the general quantitative of exclusive authors that make up the entire collection considered in this study. Therefore, the next section is based on the publications considering the total of all authors, in single and multiple authorship - 751 individuals - in order to show dilated characteristics of the publications of KM, related by this study.

3.2 Authors' general profile

In the literature, the bibliometric studies highlight the most prolific authors in a given area, observing the quantitative of publications by authors (SANTOS et al, 2007; IGARASHI et al, 2008; AVELAR; VIEIRA; SANTOS, 2011; ZANINI, PINTO; FILIPPIM, 2012) . This perception tends to punctuate "authorities" in a certain subject of a scientific field and evidence potential literary references to be consulted by others in several academic researches.

In this section such ranking is presented, seeking to relate the discourse to that presented in the previous section. The list of authors who publish the most expresses the number of publications and does not necessarily represent the quality of the publications (SILVA, 2009). The purpose of this research is not to measure such quality, but rather to highlight numbers that refer to more productive authors in KM.

Thus, of the total of 346 publications, 751 authors were identified, of which 585 were distinct. These authors were counted with their respective presences in the publications, thus creating a total number of authors versus quantitative publications on the subject of KM, with individuals with more than 2 scientific productions listed in Table 3.

Table 3. Authors' general ranking

Author	Publications		Accumulated	
	N.	%	N.	%
Emeide Nóbrega Duarte	15	2,00	15	2,00
Marta Lígia Pomim Valentim	9	1,20	24	3,20
Maria Inês Tomaél	8	1,07	32	4,26
Ricardo Rodrigues Barbosa	8	1,07	40	5,33
Marcelo Seido Nagano	5	0,67	45	5,99
Rivadávia Correa D. de A. Neto	5	0,67	50	6,66
Antônio Braz de Oliveira e Silva	4	0,53	54	7,19
Claudio Paixão A. de Paula	4	0,53	58	7,72
Fernando César Lima Leite	4	0,53	62	8,26
Helena de Fátima Nunes Silva	4	0,53	66	8,79
Regina de Barros Cianconi	4	0,53	70	9,32
Adriana Rosecler Alcará	3	0,40	73	9,72
Alzira Karla Araújo da Silva	3	0,40	76	10,12

Author	Publications		Accumulated	
	N.	%	N.	%
Andrea Valéria Steial	3	0,40	79	10,52
Claudia Canongia	3	0,40	82	10,92
Frederico Cesar Mafra Pereira	3	0,40	85	11,32
Gregório Varvakis Rados	3	0,40	88	11,72
Ivone Guerreiro Di Chiara	3	0,40	91	12,12
José Leomar Todesco	3	0,40	94	12,52
Marcos Paulo Farias Rodrigues	3	0,40	97	12,92
Marta Araújo Tavares Ferreira	3	0,40	100	13,32
Maurício Barcellos Almeida	3	0,40	103	13,72
Mirian de Albuquerque Aquino	3	0,40	106	14,11
Mônica Erichsen Nassif	3	0,40	109	14,51
Plácida L. V. A. da Costa Santos	3	0,40	112	14,91
Regina Maria Marteleto	3	0,40	115	15,31
Roberta Moraes de Bem	3	0,40	118	15,71
Roberto Carlos dos S. Pacheco	3	0,40	121	16,11
Rodrigo Baroni de Carvalho	3	0,40	124	16,51
Sandro Rautenberg	3	0,40	127	16,91
Sergio Luis da Silva	3	0,40	130	17,31
Sueli Angelica do Amaral	3	0,40	133	17,71
Suzana Queiroga da Costa	3	0,40	136	18,11
Valéria Martin Valls	3	0,40	139	18,51
Vinícius Medina Kern	3	0,40	142	18,91
Total of ...				
... 59 auhtors with 2 articles	118	15,71	260	34,62
... 491 authors with 1 article	491	65,38	751	100,00
Total	751	100,00	751	100,00

Source: Research data.

As for the researchers who published more on the topic of KM, whether in the role of author or coauthor, we highlight Emeide Nóbrega Duarte, with 15 studies; Marta Lígia Pomim Valentim, with 9 articles; Maria Inês Tomaél and Ricardo Rodrigues Barbosa, both with 8 scientific productions.

The sums of the publications of these 585 authors represent 751 academic productions, since in this representation a certain publication is counted more than once. For example, Ricardo Rodrigues Barbosa and Rivadávia Correa D. de A. Neto are present in two publications (ALVARENGA NETO, BARBOSA; CÉNDON, 2006; ALVARENGA NETO, BARBOSA; PEREIRA, 2008), with both productions scoring.

Facing the general ranking of authors who publish the most, according to the productions analyzed by this study, the triangulation of the quantitative of publications by titration and genre was constructed. In this context, it is emphasized that an author can

present more than one degree, like the researcher Antônio Braz de Oliveira e Silva, who has four publications in which he has informed to be pursuing a doctoral degree (SILVA, 2006), then a doctor degree (SILVA; FERREIRA, 2007), and in another publication (SILVA; BASTOS, 2005) the titration is not informed.

The maintenance of the original titration characteristic, reported in the scientific publication, is supported by the intention to visualize the titrations and not the individual. Although it is possible to attribute the highest titration to the individual, it was decided not to do so that it is possible to represent the quantification of the productions by academic profile and gender, which is expressed by Table 4.

Table 4. Productions profile by title and genre

Title	Male		Female		Total	
	N.	%	N.	%	N.	%
Doctor	124	16,51	135	17,98	259	34,49
Doctoral student	41	5,46	44	10,73	85	11,32
Master's	33	4,39	40	9,76	73	9,72
Master's student	28	3,73	34	8,29	62	8,26
Specialist	5	0,67	9	2,20	14	1,86
Undergraduate	9	1,20	12	2,93	21	2,80
Undergrad. Student	3	0,40	5	1,22	8	1,07
Not informed	98	13,05	131	31,95	229	30,49
Total	341	45,41	410	54,59	751	100,0

Source: Research data.

In relation to titration, PhD researchers represent the highest authorship in the publications (34.49%), and the total of 63.78% of the studies are postgraduate authors, or in the postgraduate process, at the stricto sensu level (Doctor, doctorate student, master and master's degree student), evidencing the weight and the influence of this degree of qualification for Brazilian scientific production. It is important to note that 30.49% of the scientific publications that constitute the corpus of this study did not present the titration of the authors, and it is not possible to size the expressiveness of more than a quarter of the sample.

Regarding gender, of a total of 751 researchers, the largest share is represented by the female gender (54.59%). In 2001, Guimarães, Lourenço and Cosac (2001) highlighted a growing increase in the presence of women in the scientific environment, and in this study, these figures confirm this evolution that surpasses, in percentage points, the male gender.

In sequence the results are presented considering the publications made by a single researcher, thus intending to visualize the "authorities" in a certain area according to the individual publication standard. This optics tends to allow ponderings on which authors seek

or at least represent different rankings that other researchers may use in their studies, either in theoretical delimitation or other forms envisioned by the student in the process of knowledge construction in the field of KM.

3.3 Individual authors' profile

In this section we confronted the results of the general reviews performed earlier, along with the individual. In view of this attempt, Table 5 presents the 116 individual publications segmented by the author's title, informed in the article, distributed per biennium.

Table 5. Titling of single-authored publications per biennium

Profile	2000 to 2013							Σ
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	
Dr	4	5	10	6	12	4	11	52
Drs	2	-	-	3	2	4	2	13
Ms	1	-	-	4	3	1	2	11
Mss	1	3	1	3	1	-	1	10
Sp	-	-	-	-	1	-	-	1
Ug	-	2	-	-	-	-	-	2
Ugs	-	-	-	-	-	-	-	-
Ni	6	2	6	5	3	3	2	27
Σ	14	12	17	21	22	12	18	116

Captions: Dr: doctor; Drs.: doctoral student; Ms: master; Mss: master student; Sp: Specialist; Ug: undergraduate; Ugs: undergraduate student; Ni: not informed.
Source: Research data.

The accounting of the titration informed in the articles of single authorship reveals predominance of the titration doctor (52 times), followed by titration doctoral (13 times), master (11 times) and master (10 times), however, in the years 2010 and 2011 The doctoral and doctoral student degrees accounted for the same amount of publications, one of the most unproductive years - 12 total publications - represented by the period, equivalent to the biennium 2002 and 2003. The total of 27 qualifications could not be identified due to the absence of this information.

Bringing the focus to the profiles of doctoral and masters students, who present quantitative publications in the stricto sensu titration process, the impetus of such profiles in producing science during a process of maturation of knowledge and submitting such individual productions for evaluation should be highlighted. In order to materialize such boldness, we highlight Frederico Cesar Mafra Pereira, who presents two individual publications as a master's degree (PEREIRA, 2005) and a doctorate (PEREIRA, 2008). In an attempt to elucidate other names, the authors who most published in single authorship are listed in Table 6.

Table 6. *Ranking* of authors in single authorship publications

Author	Publication		Accumulated	
	N.	%	N.	%
Marta Lígia Pomim Valentim *	3	2,59	3	2,59
Ricardo Rodrigues Barbosa *	3	2,59	6	5,17
Angela Maria Barreto	2	1,72	8	6,90
Antonio García Gutiérrez	2	1,72	10	8,62
Claudio Paixão A. de Paula *	2	1,72	12	10,34
Emeide Nóbrega Duarte *	2	1,72	14	12,07
Fernando César Lima Leite *	2	1,72	16	13,79
Frederico Cesar Mafra Pereira *	2	1,72	18	15,52
Maíra Baumgarten	2	1,72	20	17,24
Maria Alice Guimarães Borges	2	1,72	22	18,97
Maria Inês Tomaél (*)	2	1,72	24	20,69
Mirian de Albuquerque Aquino *	2	1,72	26	22,41
Mônica Erichsen Nassif *	2	1,72	28	24,14
Paulo Prochno	2	1,72	30	25,86
Regina Maria Marteleto *	2	1,72	32	27,59
Sergio Luis da Silva *	2	1,72	34	29,31
William Sampaio Francini	2	1,72	36	31,03
Total of 78 authors with 1 article	78	67,24	116	100,00
Total	116	100,00	116	100,00

Caption (*): also presente in the general ranking of most published authors (Table 3).
Source: Research data.

Among the 116 articles published individually, which represent 33.52% of the total of 346 scientific productions, there are 95 different authors. The authors who performed more than 1 publication individually are listed in Table 6 and present distinctions regarding the overall total ranking of publications (Table 3).

The total of 11 authors, being Marta Lígia Pomim Valentim, Ricardo Rodrigues Barbosa, Claudio Paixão A. de Paula, Emeide Nóbrega Duarte, Fernando César Lima Leite, Frederico Cesar Mafra Pereira, Maria Inês Tomaél, Mirian de Albuquerque Aquino, Monica Erichsen Nassif, Regina Maria Marteleto and Sergio Luis da Silva - represented by the asterisks - are present in both rankings (Table 3 and 6), however 6 new names appear in this representation, which can also be evaluated as relevant sources for queries.

For the authors shown in Table 6 and also present in the general ranking of publications (Table 3), it is worth mentioning that the totals presented here are fragmentations of the general view presented. In this context, Marta Lígia Pomim Valentim has 9 publications in the general ranking (Table 3), 3 of them by individual authors (Table 6).

Comparing the data with the Meadows (1999) perspective, when the authors considered more productive tend to present a more collaborative behavior, the 11 previously

elucidated authors tend to present this behavior, since they are more productive individually and present a collaborative behavior in co-authorship works.

Categorically, it is emphasized that the other authors do not fit the previous placement. On the contrary, they confirm Meadows's (1999) statement because they are present in the general ranking of authors, shown in Table 3, and have their publications in co-authorship studies, essentially presenting a collaborative character. However, the reflection presented points to the perception that the authors present in both rankings tend to collaborate more vehemently, since they position themselves individually and cooperate with other researchers.

This consideration, although presenting an apparent contradiction to Meadows' (1999) statement, relies on the relation with the behavior of publishing or perishing. Since such authors publish individually and in multiple authorship, they tend to be less susceptible to Silva's (2009) maxim in publishing at any cost. Again, not that others are adherent to this view, but by the relationships between the data presented here, it is reflected that those present in both analyzes (Table 3 and 6) may be less susceptible to such behavior.

In continuity, the profile of publications by multiple authorship is explored in order to identify relations with the profile of single authorship.

3.4 Profile of authors with multiple authorship

The previous section discussed single authored publications. Following the analytical approach, this section deals with the multiple authorship publications presented in this study, considering publications with more than 2 authors. Of the total of 346 articles with 751 authors, of which 585 are distinct, this section stands on the 230 articles of multiple authorship with 635 authors, of which 512 are distinct.

Three optics are arranged: (1) bi-annual dispersion of publications by titration; (2) interaction between authors by profile; (3) authors who have published most in co-authorship. The 635 author titres reported in the multiple authorship publications were counted separately, in order to allow the visualization of this profile per biennium, according to Table 7.

Table 7. Titling of multi-authored publications per biennium

Profile	2000 to 2013							Σ
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	
Dr	5	9	16	21	31	53	72	207
Drs	3	4	2	7	20	10	25	71
Ms	1	2	3	5	13	18	20	62
Mss	6	1	3	3	9	19	11	52

Profile	2000 to 2013							Σ
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	
Sp	2	2	-	3	2	-	4	13
Ug	-	-	-	5	6	4	4	19
Ugs	-	-	1	-	1	5	1	8
Ni	6	28	10	38	24	48	49	203
Σ	23	46	35	82	106	157	186	635

Captions: Dr: doctor; Drs.: doctoral student; Ms: master; Mss: master student; Sp: Specialist; Ug: undergraduate; Ugs: undergraduate student; Ni: not informed.
Source: Research data.

Doctors publish more in partnership than the other degrees and, disregarding unreported degrees (203 times), are present in 47.9% of scientific productions. In both individual publications (Table 6) and in multiple authorship, this profile appears to be more prolific.

Although in the individual publications the doctors and doctoral students are equal in the quantitative of productions referring to the biennium 2010-2011, in multiple authorship this equation does not occur; On the contrary, the proportion of doctors in relation to the profile of doctoral candidates is positively significant in approximately 400%, 43 of which are the most performed by doctors in this biennium.

While individual doctors have a homogeneity in relation to the number of publications, with a peak of 12 productions in 2008-2009, in multiple author publications, the quantity of productions increases each year, with the apex of the years 2012-2013, with 72 publications, 19 more than the previous year and 67 in relation to 2000-2001.

Three aspects can be considered in relation to these numbers, being co-authoring practices to increase the number of publications, the increase of doctors in Brazil and evaluation of graduate programs by CAPES. The first strand establishes itself in the demands placed upon postgraduate programs, which lead to co-authoring practices between the students and the advisors who, in Silva's (2009, p.122) perception, "a simple thank-you note in the footer would do justice to the advisor".

According to the Center for Management and Strategic Studies (CMSS), an organization supervised by the Ministry of Science, Technology and Innovation (MSTI), the number of doctoral programs in Brazil shows a growth of 210.2% in 1996 to 2014 - 630 and 1,954 programs, respectively - with a 486.2% increase in doctoral degrees in the same period - 2,854 and 16,729 titles, respectively - (CMSS, 2016).

The same statistic shows a growth of 205% in master programs in Brazil - 1,187 and 3,620 programs, respectively - and a 379% increase in teacher qualifications for the same

period - 10,482 and 50,206 degrees, respectively - (CMSS, 2016). The number of masters is expressively superior to the number of doctors, however the individual and multiple authorship production does not follow. Doctoral students, between the master's and doctoral degrees, present more publications than the masters, both in the individual productions (Table 3) and in the multiple ones (Table 7).

In the third section, there is CAPES, which scores seven questions for the evaluation of graduate programs, including: proposal of the program, faculty, research activities, training activities, student body, thesis and dissertation, and intellectual production , 2016), each with different weights according to the type of program (master's, master's, doctorate) and area of evaluation.

In the area of interdisciplinary evaluation, for example, 35% of the grade of the master's and doctoral programs is based on the item called intellectual production. This item is subdivided into four sections to be scored, of which the scientific production in periodicals, based on Qualis of the area, and distribution of the productions among the permanent professors (CAPES, 2016), represent 50% and 30% of the evaluation, respectively. Therefore, it is estimated that 80% of the mark referring to the item intellectual production, which represents 35% of the grade of the course, is measured through publications in periodicals.

Still in the interdisciplinary area of academic and doctoral programs, another 35% of the grade is established in the student body, theses and dissertations, subdivided into four segments, of which 50% is influenced by "the percentage of participation in intellectual production with student participation in relation to the program's intellectual production" (CAPES, 2016, p.21).

Considering these three aspects, it is possible to reflect that the increase of the publications related to the KM is influenced not only by the increase of the interest of researchers in the area, but also by the increase in the number of titles of masters and doctors, fomented by the increase in the number of master's and doctoral degrees programs, as well as the direct relationship of these teachers and students with the scientific publications that guide a representative percentage in the evaluation of graduate programs.

Once the program grade is influenced by the teachers and students' production, if a multiple author publication is authored by at least one of these members, it tends to count positively on both issues. Thus, this factor can be an influential element of the superiority of publications in multiple authorship versus individual authorship in scientific productions, and may result in co-authorship practices as presented by Silva (2009).

Considering the aforementioned strands and considering the expressive and constant elevation of publications by the doctors throughout the analyzed range (Table 7), it becomes

relevant to analyze how the multiple authorship publications are given, by visualizing the interactions between the titration profiles of the authors. Thus, the interactions were counted through a combinatorial analysis, in which the number of iteration possibilities between the authors' titles of an article is identified, by means of the calculation n * (n-1), in which n corresponds to the number of authors.

Considering an article with 3 authors, each individual will have an iteration with the others. Thus TitAu1, TitAu2, TitAu3, in which "TitAu" correspond to the author's title. The following interactions between such titrations would result in the following relationship:

TitAu1 = [TitAu1 x TitAu2] and [TitAu1 x TitAu3]
TitAu2 = [TitAu2 x TitAu1] and [TitAu2 x TitAu3]
TitAu3 = [TitAu3 x TitAu1] and [TitAu3 x TitAu2]

Therefore, 6 iterations are accounted for bidirectionally. As an example of a publication with three authors being doctor, master and specialist will be identified 6 interactions, namely: doctor x master and doctor x specialist, master x doctor and master x specialist, and specialist x doctor and specialist x master. As a result, 1472 interactions between the titres of the total of 635 individuals present in multiple authorship publications are identified. In this sense, the interactions between multiple authorship titrations were arranged matrically so as to allow the intersectional visualization between rows and columns, which are represented in Table 8.

Table 8. General interactions between authors' qualifications[1]

	Dr	**Drs**	**Ms**	**Mss**	**Sp**	**Ug**	**Ugs**	**Ni**
Dr	160	57	70	39	9	17	8	18
Drs	57	50	7	10	2	6	1	27
Ms	70	7	20	3	4	7	1	8
Mss	39	10	3	38	-	1	3	15
Sp	9	2	4	-	8	3	-	-
Ug	17	6	7	1	3	6	1	2
Ugs	8	1	1	3	-	1	2	2
Ni	18	27	8	15	-	2	2	546
Σ	378	160	120	109	26	43	18	618

Captions: Dr: doctor; Drs.: doctoral student; Ms: master; Mss: master student; Sp: Specialist; Ug: undergraduate; Ugs: undergraduate student; Ni: not informed.
Source: Research data.

[1] The main diagonal counts interactions of the same titration. Thus, a study with 2 doctor-authors is represented at the intersection Dr <-> Dr as 2 interactions, being [doctor1 x doctor2] and [doctor2 x doctor1], taking into account the combinatorial pattern applied. To quantify a single time such iterations simply divide the cells of the main diagonal by 2.

Regarding the interaction between the different types of degrees, there were no interactions between the profiles of master's students x specialists and specialists x undergraduates and master's students; In addition all the titrations informed have interacted with each other, however the frequency between them is representatively distinguished. Doctors interact more often with each other (160 times). Secondly, this profile interacts with the masters (70 times), which may reveal: a) possible maintenance of research among prospective advisors; b) partnerships in research that include masters outside of the student-mentor relationship.

The doctoral student profile publishes more than its professors on individual (Table 3) and multiple (Table 7) authorship, however, when comparing the interactions between these profiles with the doctors, the professors interact more (70 times) than doctoral students (57 times), which may be understood by occupations related to the doctorate (sandwich year, participation in events, among others).

All the profiles present a greater interaction with the doctors, but secondly the profiles of doctoral students, masters and their professors correspond more frequently to their pairs of the same degree (50, 20 and 38 times respectively - main diagonal). This signals the opportunity of Higher Education Institutions to foster partnerships in publications between different individuals (different degree levels), creating non-existent interactions, such as those related to masters, specialists and undergraduates, and raising the less frequent ones, thus supporting the training of the student in research during the titration process with "more experienced" students.

Expert profiles, graduates and graduates tend to interact with different degree profiles in addition to doctors, and may come from support related to scholarships and scientific initiation programs.

The individuals with higher titration tend to interact more than the ones with the lowest titration, possibly due to the aggregation of the interactions between the profiles and comprehensibly due to the maturity in research acquired during the obtaining of the title, as well as to the increase of the personal network established in this course. In due course, the significant amount of interactions between individuals who did not report titration in the articles (total of 618 times) is highlighted.

In line with the rankings presented in the previous sections of this study, the authors who most published in multiple authorship are listed in Table 9.

Table 9. Ranking of authors in publications with multiple authorship

Author	Publication		Accumulated	
	N.	%	N.	%
Emeide Nóbrega Duarte	13	2,05	13	2,05
Maria Inês Tomaél	6	0,94	19	2,99
Marta Lígia Pomim Valentim	6	0,94	25	3,94
Marcelo Seido Nagano	5	0,79	30	4,72
Ricardo Rodrigues Barbosa	5	0,79	35	5,51
Rivadávia Correa D. de A. Neto	5	0,79	40	6,30
Antonio Braz de Oliveira e Silva	4	0,63	44	6,93
Helena de Fátima Nunes Silva	4	0,63	48	7,56
Regina de Barros Cianconi	4	0,63	52	8,19
Adriana Rosecler Alcará	3	0,47	55	8,66
Alzira Karla Araújo da Silva	3	0,47	58	9,13
Andrea Valéria Steial	3	0,47	61	9,61
Claudia Canongia	3	0,47	64	10,08
Gregório Varvakis Rados	3	0,47	67	10,55
Ivone Guerreiro Di Chiara	3	0,47	70	11,02
José Leomar Todesco	3	0,47	73	11,50
Marcos Paulo Farias Rodrigues	3	0,47	76	11,97
Marta Araújo Tavares Ferreira	3	0,47	79	12,44
Plácida L. V. Amorim da Costa Santos	3	0,47	82	12,91
Roberta Moraes de Bem	3	0,47	85	13,39
Roberto Carlos dos Santos Pacheco	3	0,47	88	13,86
Rodrigo Baroni de Carvalho	3	0,47	91	14,33
Sandro Rautenberg	3	0,47	94	14,80
Suzana Queiroga da Costa	3	0,47	97	15,28
Valéria Martin Valls	3	0,47	100	15,75
Vinícius Medina Kern	3	0,47	103	16,22
Total of...				
... 46 authors with 2 articles	92	14,49	195	30,71
... 440 authors with 1 article	440	69,29	635	100,00
Totais	635	100,00	635	100,00

Source: Research data.

Table 9 corresponds to the subtraction of the general ranking of authors (Table 3) minus the ranking of authors who published individually (Table 6). The total of 512 distinct authors are represented, evidencing the name of 26 authors with more than 3 publications, including. The 635 publications correspond to the number of total scientific productions represented by the listed authors, because a certain publication is counted more than once. For example, Emeide Nóbrega Duarte and Marcos Paulo Farias Rodrigues are present, in a co-authorship, in a publication (RODRIGUES; DUARTE, 2006), this production being scored for both.

Naturally, the names tend to be the same as those of the general ranking presented in Table 3, with some authors who have published more frequently individually, being Claudio Paixão Anastácio de Paula and Fernando César Lima Leite, who are listed in the quantification of authors who published twice in multiple authorship. In fact, the author Emeide Nóbrega Duarte presents the apex of 13 publications in multiple authorship in KM, being 86.66% of the author's total publications - 13 out of 15 publications - and more than double the publications of the two coming in the ranking, which shows a collaborative behavior regarding the profile of publication with others.

Maia and Caregnato (2008), analyzing Meadows's (1999) assertion regarding the tendency of collaboration present in the most productive authors, came to the conclusion that "the most productive author is predominantly collaborative" (MAIA, CAREGNATO, 2008, p. 24). In the scope of this study, based on the fragmentations of the publications by type of authorship, one has the confirmation of the affirmations mentioned above.

The total of 440 authors who published in multiple authorship did so only once. By this spectrum, 21.71% of the authors in multiple authorship published more than once, being that there was a predominance of authors who published only once (69.29%), resulting in the adherence of the result to Lotka's Law in this type of publication.

4 FINAL THOUGHTS

The relevance of knowledge in academia and in organizations is hardly disputed. The biannual increase in the number of academic publications related to KM highlights the attention devoted to this topic and the practices of KM in organizations such as SERPRO, Petrobrás, among others, reinforces empirical actions oriented to knowledge.

Specifically in the academic field, this study sought to quantify the scientific productions related to KM and to discuss the results through analyzes based on the combination of the publications and authors, titles, gender, type of authorship and interactions among degrees, highlighting aspects through segmented views in single and multiple authorship.

As a result, double productions are more frequent than individual productions, and each increase in the number of authors decreases the number of publications, making it possible to infer a preference for collaborative works in double.

On the one hand, collaboration may not result in cooperation, due to the influence of the evaluation of graduate programs by CAPES and the need to publish for social permanence in the scientific community, which may lead to co-authoring practices for increasing the number of publications.

On the other hand, the interaction between different degrees and academic formations of the authors tends to foment the discussions related to the KM, and it is not possible to disregard or quantify the cooperation regarding the collaboration discussed in this study.

By these conjectures, the inferences made refer to the assumption that authors who publish individually and in partnership tend to behave in a more collaborative way than the others that publish specifically in partnership.

It is believed that this study will contribute, through bibliometric quantification, to the exposition of rankings by type of authorship, in order to show the names of authors that can be consulted by other researchers, who may be useful in theoretical delimitations or in other identifiable applications by scholars of KM.

In addition, the analysis of interactions between the titrations can be useful to elucidate the behavior of these profiles in order to signal the possibility of elevation of the relations between the individuals by the Institutions of Higher Education, fomenting the exchange of experiences of incoming students with the veterans, seen as more experienced.

This study presents as a limitation the use of a database that ends in the year 2013, however the 14-year time cut and the expressiveness of the Qualis A1, A2 and B1, referring to the sources consulted, prints a certain credit to the constituent data in the sample.

This limitation allows us to suggest as future work the application of these analyzes in publications of years after 2013, in order to understand: a) if in recent years there were changes in relation to the analyzes presented here, considering the same Qualis ?; b) in smaller QUALIS than B1, how is the behavior of interactions between titles and which are the most prolific authors?; And c) Is the comparison of these analyzes by the group of Qualis (A1, A2 and B1 versus inferior to B1) related to some new assumption or hypothesis that can be researched?

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