

## **GOOGLE SCHOLAR: AN OPTION FOR CITATION ANALYSIS OF BRAZILIAN ACCOUNTING JOURNALS?**

### **GOOGLE ACADÊMICO: UMA OPÇÃO PARA ANÁLISE DE CITAÇÕES DOS PERIÓDICOS BRASILEIROS DE CONTABILIDADE?**

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## ABSTRACT

This paper aims to identify whether Google Scholar is an option in analyzing the citations of papers published in Brazilian accounting journals. To that end, we collected the citations of 1,810 papers published between 2007 and 2012 by fifteen accounting journals; the collection was done via Google Scholar, accessed in the months of April of the years 2014, 2015, and 2016. The percentage of papers not found by Google Scholar showed a downward trend over the period: from 2.8% in April 2014 to 0.9% in April 2016. The frequency of papers whose citation counts fell between 2014 and 2016 was 1.6% of the sample. The Spearman rank correlation coefficient between Spell's 5-year Impact Factor and the average citation count of the papers published between 2008 and 2012 for each journal is  $r_s = 0.918$ ; however, for Google Scholar, the retrieved citation counts per journal were between 3 to 9 times higher than Spell. The contributions of this article allow researchers and institutions to know the limitations and possibilities of the use of Google Scholar for citation analysis of Brazilian articles and for the analysis of the research impact.

**Keywords:** Citations. Journal. Accounting. Impact Factor.

## RESUMO

Este artigo tem por objetivo identificar se o Google Acadêmico é uma opção para análise de citações dos artigos publicados nos periódicos brasileiros de contabilidade. Para isto, foram coletadas as citações de 1.810 artigos publicados entre 2007 e 2012 por quinze revistas brasileiras de contabilidade; a coleta foi feita via Google Scholar nos meses de abril anos de 2014, 2015 e 2016. O percentual de artigos não encontrados pelo Google Acadêmico apresentou uma tendência de queda ao longo do período: de 2,8% em abril de 2014 para 0,9% em abril de 2016. A frequência de artigos cuja contagem de citações caiu entre 2014 e 2016 foi de 1,6% da amostra. O coeficiente de correlação de postos de Spearman entre o Fator de Impacto de 5 anos do Spell e a média de citações dos artigos publicados entre 2008 e 2012 por revista é de  $r_s = 0,918$ , embora o Google Acadêmico tenha recuperado um número de citações de 3 a 9 vezes maior por revista do que o Spell. A contribuição deste artigo permite que os pesquisadores e instituições conheçam as limitações e possibilidades do uso do Google Acadêmico nas pesquisas de análise de citações de artigos brasileiros e na análise do impacto das pesquisas.

**Palavras-chave:** Citações. Revista. Contabilidade. Fator de Impacto.

## 1 INTRODUCTION

The number of times an article is cited is important data in different dimensions. In the dimension of scientific communication, the number of times an article is cited constitutes an indicator of that article's repercussion in the scientific community; a frequently cited article is interpreted as having high impact. In the researcher's personal dimension, the number of times their articles are cited is understood as a measure of the efficiency and quality of their scientific career. A researcher who accrues many citations – or at least more citations than their peers – is seen as an authority in their line of research and gains an increase in prestige and influence. In the dimension of journal reviews, a journal that is the publisher of frequently cited articles becomes an important communication channel for a certain academic community, which increases that journal's prestige and trustworthiness in its task of disseminating scientific knowledge.

However, as the above interpretations are not exempt from criticism and have been strongly questioned. An issue that is especially hard to discuss is the fact that academia has spent a great amount of energy and attention in the analysis of citations during the 20th century and the start of the 21st century. Ever since Eugene Garfield created the Impact Factor in 1960, becoming one of the founding fathers of bibliometrics, many studies have been conducted on citation analysis. Most of these are dedicated to analyzing the millions of articles and citations mapped by the major databases such as Thompson Reuter's Web of Science or Elsevier's Scopus.

However, almost all of the over 40 Brazilian Accounting journals are not indexed in the two previously mentioned databases, making it impossible to use traditional citation analysis approaches in the context of the Brazilian accounting academia. However, being excluded from the major databases is not a unique trait of the Brazilian community of Accounting researchers: this also happens in other areas and other countries, and these communities have experimented with the possibility of using Google Scholar as an alternative to measure the citations of articles, the impact of journals, and the repercussion of researchers.

Given this context, this article presents the following research question: **Is Google Scholar an option for the citation analysis of Brazilian Accounting journals?** The goal of this research, therefore, is to analyze how trustworthy is the use of citation data from Google Scholar in studies that analyze the citations of Brazilian Accounting journals.

For this, we developed a longitudinal study, initiated in April 2014 and collected data in the months of April of the years 2014, 2015, and 2016, on the behavior of the citations of 1.8 thousand articles published between 2007 and 2012 by the 15 scientific journals maintained by *stricto sensu* Accounting or Controllershship graduate programs existent in Brazil as of 2013.

This article is divided into five sessions: in the Introduction, we present the context and the research question; in the Literature Review, we catalogue similar research findings tangential to the goal of this study; in the Methodologic Procedures, we present the analyzed samples and the data collection process; in the Analysis of Results, the research findings are discussed; and finally, the Conclusions of the Study are synthesized in the fifth section.

## **2 LITERATURE REVIEW**

A series of academic studies estimate the trustworthiness of citation counts produced via Google Scholar. These studies normally estimate the trustworthiness of the citation counts retrieved via Google Scholar and correlate those to the citation counts recovered by ISI Web of Science (WoS) or Scopus.

Jacso (2005a) realized a comparison between WoS, Scopus, and Google Scholar, being one of the first works of that kind. The data collection occurred in April and May of 2005 with articles on Library Science and Information Science. Google Scholar retrieved approximately one third of the citations listed in WoS and Scopus. The author concluded by criticizing the fact that Google Scholar did not use boolean search operators.

Jacso (2005b) also realized a comparison between WoS and Google Scholar. The data collection was conducted in December 2004 for articles from the Asian Pacific Journal of Allergy and Immunology. The results showed that even though Google Scholar retrieved 680 articles and WoS retrieved 675, Google Scholar identified 595 citations, less than half of the 1,355 identified by WoS.

Noruzi (2005) also developed a comparison between WoS and Google Scholar, for which data was collected in September 2005 with the usage of boolean operators. The author points out that Google Scholar retrieved 50% more citations than WoS, but also pointed out that Google Scholar did not conduct searches in languages that used Chinese, Persian, Arabic, or Japanese characters.

Pauly and Stergiou (2005) compared WoS and Google Scholar. The comparison was made between 114 articles from 11 fields of knowledge, published between 1925 and 2004. The authors concluded that WoS retrieved more citations than Google Scholar for the articles published between 1925 and 1999 but there was no significant difference regarding the citations of the articles published between 2000 and 2004. The authors point out the potential benefits stemming from the gratuity of Google Scholar in contrast to the monopoly of the ISI Web of Science.

Bakkalbasi et al. (2006) realized a comparison between WoS, Scopus, and Google Scholar. The data collection was conducted between November 7 and November 12 of 2005 for articles from the fields of Oncology and Condensed Matter Physics published in 1993 and 2003. WoS retrieved more citations for Condensed Matter Physics articles and for papers published in 1993; Scopus retrieved more citations for Oncology articles published in 2003; and Google Scholar retrieved the least citations out of the three alternatives.

Kousha and Thelwall (2007) made a comparison between Google Web/URL, Google Academic, and WoS. The data collection happened in September and October of 2005. The authors detected the existence of an ample correlation between the citations of Google Scholar and of WoS. For the authors, Google Scholar is a tool that may be more adequate for the analysis of citations in Social Sciences than in the so-called “hard sciences.”

Meho and Yang (2007) made a comparison between WoS, Scopus, and Google Scholar. The data collection occurred in March 2006 with 30 articles from Current Science. The authors affirm that Google Scholar stands out in its coverage of the annals of events and journals in languages other than English, significantly increasing the citation rates, but severely criticized the low usability of the search engine.

Schroeder (2007) realized a comparison between WoS and Google Scholar in terms of resources and coverage capacity. The author concluded that WoS presents advantages in its higher coverage of prestigious journals and its advanced search tools, while Google Scholar has a better coverage of event annals, books, and other research report formats; is more adequate for searches in languages other than English; and retrieves more citations.

Bar-Ilan (2008) compared WoS, Scopus, and Google Scholar. The data collection was conducted in November 2006 for the h-index of 40 Israeli researchers. The author identified that the difference in the citation retrieval capacity for the calculation of the h-index between Google Scholar and other databases varies according to the field of knowledge. The h-index

of Google Scholar for the fields of Mathematics and Computing is 30% higher than other bases, but 30% lower for the field of High Energy Physics.

Kousha and Thelwall (2008) compared WoS and Google Scholar. The data collection happened in January 2006 and was conducted by two people. The authors identified that Google Scholar covers a wider variety of documents and, for this reason, retrieves higher citation rates for articles published in open access journals. They also affirm that this wide coverage range may propel the Open Access movement forward.

Bornmann et al. (2009) realized a comparison between Google Scholar, WoS, Scopus, and Chemical Abstracts. The authors point out that the citation counts of WoS, Scopus, and Chemical Abstracts are very similar to each other and different from those of Google Scholar. They reinforce the criticism made by Peter Jacso (2005 apud PERKEL, 2005) that “Google Scholar does *a really horrible job* matching cited and citing references”.

Kulkarni et al. (2009) compared WoS, Scopus, and Google Scholar. The data collection was made on January 2, 2008, with 328 Medicine articles, by four people. Scopus and Google Scholar retrieved higher citation rates than WoS. Precision in the citation search was slightly lower for Google Scholar than for the other options. The authors also concluded that Google Scholar covers books, dissertations and theses, and open access journals.

Martell (2009) realized a comparison between Yahoo, Google, Google Scholar, and WoS. The data collection occurred between Summer and Fall of 217 and encompassed 217 articles published between 2000 and 2006 in the *College & Research Libraries* journal. The author points out that the search engines of Yahoo and Google are not adequate for the retrieval of citations. On the other hand, Google Scholar retrieved an average citation rate per article that was over twice the rate retrieved by WoS.

Onyancha (2009) established a complex evaluation of the journals of Sub-Saharan Africa. The author criticized that the traditional citation analysis methods of WoS cannot be used for these journals because most of the journals are not indexed in WoS and most African institutions cannot afford the high subscription rates of ISI. The author concluded that Google Scholar enabled the comparison of the impacts of magazines that WoS does not cover, allowing for an analysis via the software Publish or Perish that wouldn't be viable otherwise. Regarding the limitations of Google Scholar, the author classifies them as “rectifiable.”

Bar-Ilan (2010) realized a comparison between WoS, Scopus, and Google Scholar. The data collection was done on March 22, 2008, using a single title: the book *Introduction to*

Infometrics. WoS and Scopus covered approximately 90% of the citations retrieved by one another. Google Scholar covered 30% less citations than the other two services, but found 108 citations that were not retrieved by the other services, representing a 30% increase in citations not retrieved by the two previous services. The author also alerts about the low usability of Google Scholar.

García-Pérez (2010) compared WoS, PsycInfo, and Google Scholar. The data collection occurred in October and November of 2009 and targeted articles by four Spanish psychologists. Google Scholar retrieved the highest citation volume, followed by PsycInfo and then WoS. The author identified incorrect citations at the rates of 0.3% in WoS, 1.1% in PsycInfo, and 16.5% in Google Scholar.

Mingers and Lipitakis (2010) realized a comparison between WoS and Google Scholar in the fields of Business and Management. The data collection encompassed articles from three English Business schools. The authors identified that WoS retrieved less than half of the journals, articles, and citations found by Google Scholar. However, the authors warn about the trustworthiness and lack of transparency of Google Scholar.

Sanni and Zainab (2010) developed an evaluation of the citations of the Medical Journal of Malaysia. The authors identified that Google Scholar showed itself to be a viable alternative for citation analysis that is more ample and less restrictive than WoS.

Sember, Utrobicic, and Petrak (2010) made a comparison between WoS, Scopus, and Google Scholar. The data collection was done between January and March of 2009 with articles from the Croatian Medical Journal. WoS retrieved the least citations, followed by Scopus and then Google Scholar; In addition, 22% of the citations retrieved by Google Scholar were unique, that is, not retrieved by the other systems.

Amara and Landry (2012) compared WoS and Google Scholar for the fields of Business and Management. The data collection targeted 1,286 Canadian researchers from the field of Business and happened between April and June of 2010. The authors concluded that the coverage of Google Scholar is much higher than that of WoS, but that despite that, there was a strong correspondence between the most cited authors in Google Scholar and the authors cited in WoS.

Bergman (2012) compared WoS, Scopus, and Google Scholar. The results showed that WoS retrieved the lowest citation rate, followed closely by Scopus. Google Scholar retrieved

citation rates substantially higher than the previous systems, but the authors affirm that it may also not be as trustworthy as them.

Harzing (2013) realized a comparison between WoS and Google Scholar. The author analyzed the stability, coverage, and impartiality of Google Scholar through a longitudinal study of the citations of 20 Nobel prize laureates in Chemistry, Economy, Medicine, and Physics. The data collection occurred in April and September of 2011 and January of 2012. The author reports that Google Scholar showed stability and coverage, with an error margin of 0.5% in the retrieval of articles.

Delgado-López-Cózar and Cabezas-Clavijo (2013) compared Google Scholar Metrics, JCR, and Scimago Journal Rank. The data was collected in January of 2013. The authors conclude that even with low transparency regarding the coverage of Google Scholar, it sorts articles in a very similar way as the other search tools and may become the major competitor of the paid versions.

Chan, C. Chang, and Y. Chang (2013) analyzed the performance of 23 Finance journals using Google Scholar. The data collection happened between July and September of 2011. The authors identified that journals with a high impact factor tend to present a high median of citations and low rates of uncited articles, a large proportion of articles from academic leaders, and, in general, a high impact of the members of their editorial bodies on the citations. The authors also identified that the top of the journal rankings built based on Google Scholar is similar to the rankings developed in other researches.

Ortega and Aguillo (2014) made a comparison between Microsoft Academic Search and Google Scholar Citations. The data collection occurred in June 2012. Google Scholar Citations covers more documents and citations than Microsoft Academic Search but has a stronger bias in the areas of Informatics and Computer Sciences, while Microsoft Academic Search was closer to balanced across the two areas. On the other hand, Microsoft Academic Search showed problems with duplication of profiles and a lower update rate.

The above literature converges towards the following synthesis: Google Scholar has the capacity to retrieve a wider scope of citations than its competitors, even WoS and Scopus, but is also less precise. However, there is an important problem for the test of the citation retrieval capacity of Brazilian Accounting journals: most of these journals are not indexed in WoS or Scopus, which prevents this comparison from being made. Despite that, some Brazilian studies are using Google Scholar as a data source, as is the case of Souza, Ensslin,



and Ensslin (2012), Aragão, Oliveira and Lima (2014), Soares and Casa Nova (2016), and Soares (2017).

### 3 METHODOLOGICAL PROCEDURES

In order to develop this study, it was necessary to choose a representative sample of articles published in Brazilian Accounting journals. This research was started in 2014. At the time, the authors of this study assessed that the most consistent sample for the purposes of the study would be made up of the list of journals related to or managed by *stricto sensu* graduate programs in Accounting and Controllershship. The list of journals related to graduate programs in the field is presented in Figure 1 alongside the relevant institution and the number of articles published during the time period.

**Figure 1** Journals of the sample, sorted by institution and number of articles in the sample

Journal	Institution	No. of Papers
BASE	Unisinos	144
Brazilian Business Review - BBR	Fucape	117
<i>Contabilidade Vista e Revista</i>	UFMG	142
<i>Contabilidade, Gestão e Governança</i>	UnB	115
<i>Contextus - Revista Contemporânea de Economia e Gestão</i>	UFC	80
<i>Revista Brasileira de Gestão de Negócios - RBGN</i>	FECAP	140
<i>Revista Contabilidade &amp; Finanças</i>	USP	121
<i>Revista Contemporânea de Contabilidade</i>	UFSC	96
<i>Revista de Contabilidade da UFBA</i>	UFBA	91
<i>Revista de Contabilidade do Mestrado em Ciências Contábeis da UERJ</i>	UERJ	113
<i>Revista de Contabilidade e Controladoria</i>	UFPR	75
<i>Revista de Contabilidade e Organizações</i>	USP/RP	129
<i>Revista de Informação Contábil</i>	UFPE	130
<i>Revista Universo Contábil</i>	FURB	201
<i>Sociedade, Contabilidade e Gestão</i>	UFRJ	116
<b>Total</b>	<b>15</b>	<b>1.810</b>

Source: elaborated by authors (2017).

We accessed each one of the issues published by the journals listed above between the years of 2007 and 2012. A list of all the articles published in them was made using a Microsoft Excel® spreadsheet. Initially, it contained 1,812 articles, but we verified that two articles appeared twice in the list; the oldest of those was published in 2007 and 2008 by the same journal, and the most recent one was published by two different journals in 2008. In these cases, we chose to eliminate the duplicates, keeping only the oldest publications.

The number of citations that each article had in April of 2014, as retrieved by Google Scholar, was registered in the spreadsheet. The same procedure was executed in April of

2015 and April of 2016 to identify the behavior of the citation count of each article over time. The identified results are explored in the next section, “Analysis of the Results.” Following these methods, we reached the total of 1,810 articles, related by journals belonging to 15 different institutions that run graduate programs in the area.

#### 4 ANALYSIS OF THE RESULTS

The analysis of Google Scholar’s capacity to identify citation counts was based on some traits. The first was the number of articles not found by the service over the years. Nine journals, out of the sample total of 15, had all of their articles listed in Google Scholar in the three years in which data collection occurred. The articles missing from Google Scholar were limited to the six journals listed in Table 1.

**Table 1** List of articles not retrieved, by year

Journal	Apr. 2014	%	Apr. 2015	%	Apr. 2016	%	Total
BASE	0	0,0%	1	0,7%	0	0,0%	144
Brazilian Business Review - BBR	7	6,0%	5	4,3%	2	1,7%	117
<i>Revista Brasileira de Gestão de Negócios</i>	7	5,0%	6	4,3%	0	0,0%	140
<i>Revista de Contabilidade e Controladoria</i>	1	1,3%	0	0,0%	0	0,0%	75
<i>Revista de Contabilidade e Organizações</i>	1	0,8%	0	0,0%	0	0,0%	129
<i>Revista de Informação Contábil</i>	34	26,2%	42	32,3%	15	11,5%	130
<b>Totals</b>	<b>50</b>	<b>2,8%</b>	<b>54</b>	<b>3,0%</b>	<b>17</b>	<b>0,9%</b>	<b>735</b>

Source: elaborated by authors (2017).

The journal that had the most cases of articles missing from Google Scholar was *Revista de Informação Contábil* – RIC, of UFPE. The rate of unretrieved articles ranged from 11.5% in the 2016 sampling to 32.3% in the 2015 sampling. This journal had issues with accessing the website over a period of multiple months, which may explain the difficulty Google Scholar had in finding these articles. BBR and RBGN were the next journals with highest non-retrieval rates, with seven unretrieved articles each, in 2014. In the 2016 sampling these numbers fell to zero for RBGN and two for BBR. One article each from RCC (UFPR) and RCO (USP/RP) were unretrieved in 2014, but both were found in the following year; Base magazine also had one unretrieved article in 2015.

Broadly, the article non-retrieval rates were higher in 2014 and 2015 and lower in 2016, falling from approximately 3% of the sample in the earlier years to approximately 1% in 2016. We suggest that future studies continue this analysis, identifying whether this downward trend was maintained throughout 2017 and the following years.

The second way of identifying the citation counting capacities of Google Scholar is identifying the anomalous behavior of citation counts over time. Theoretically, the citation count of an article should be cumulative, either growing or stabilizing as time passes.

The reduction of the citation count of an article, in this data collection, would only be possible in two situations: the first is if some circumstance causes a reference to it to stop existing. For example, if article X, published in moment t, were cited by article Y at t+1, by the end of t+1 the article would accrue one citation. However, if article Y were to be reedited or republished in a version that excluded the citation to article X, or even if article Y were to be ‘unpublished’ entirely, by t+2 the citation count of article X would have shrunk. This is the natural way in which the citation count of an article could fall. The same would happen if the article were to be cited in any online document, such as a class syllabus or a blog comment, which was then deleted.

The second way in which a citation count could fall is if the search algorithm used by Google Scholar is not stable and presents an excessively large downwards oscillation in the citation count. Considering that none of the 15 journals in the sample published retractions, errata, or excluded any articles from their collections during the sampling period, it is reasonable to assume that reductions in the citation counts of the sampled articles stem from imprecisions on the part of Google Scholar. Table 2 lists the citation count decreases, by journal, between the years 2014 and 2015:

**Table 2** Registered decreases in the citation counts between the 2014 and 2015 samplings

Journal	-1	-2	-3	-4	-5	-8	-9	-11	Total
BASE	4	1	2						7
Brazilian Business Review - BBR	3	2		1					6
<i>Contabilidade Vista e Revista</i>	3	1	1	1			1		7
<i>Contabilidade, Gestão e Governança</i>	2							1	3
<i>Contextus - Revista Contemporânea de Economia e Gestão</i>	2	1	1	2					6
<i>Revista Brasileira de Gestão de Negócios</i>	3		1						4
<i>Revista Contabilidade e Finanças</i>	1	1							2
<i>Revista Contemporânea de Contabilidade</i>	3								3
<i>Revista de Contabilidade do Mestrado em Ciências Contábeis da UERJ</i>	2								2
<i>Revista de Contabilidade e Organizações</i>	1	1							2
<i>Revista de Informação Contábil</i>	3	1							4
<i>Revista Universo Contábil</i>	4				1	1			6
<i>Sociedade, Contabilidade e Gestão</i>			1						
<b>Total</b>	<b>31</b>	<b>8</b>	<b>6</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>53</b>

Source: elaborated by the authors (2017).

The number of articles for which falling citation counts were registered between 2014 and 2015 was 53, representing a total of 2.9% of the sample. Only two journals escaped this phenomenon: the *Revista de Contabilidade* of UFBA and the *Revista de Contabilidade e Controladoria* of UFPR. In 31 cases only a small decrease of one citation was observed; but in 22 cases, the number was more significant, from a decrease of two citations up to an incredible decrease of 11 citations. Table 3 presents the same type of data as Table 2, but for the time period of 2015-2016:

**Table 3** Registered decreases in the citation counts between the 2015 and 2016 samplings

Journal	-1	-2	-3	-4	-5	-7	-14	-22	-23	Total
BASE	2	1	1							4
Brazilian Business Review – BBR	0					1				1
<i>Contabilidade, Gestão e Governança</i>	4	1								5
<i>Revista Brasileira de Gestão de Negócios</i>	2		1		1		1			5
<i>Revista Contabilidade e Finanças</i>	2	1						1		4
<i>Revista Contemporânea de Contabilidade</i>	1	1								2
<i>Revista de Contabilidade da UFBA</i>	1			1						2
<i>Revista de Contabilidade do Mestrado em Ciências Contábeis da UERJ</i>	1									1
<i>Revista de Contabilidade e Controladoria</i>	1			1						2
<i>Revista de Contabilidade e Organizações</i>	1								1	2
<i>Revista de Informação Contábil</i>	0		1							1
<i>Revista Universo Contábil</i>	5	2		1						8
<i>Sociedade, Contabilidade e Gestão</i>	4									4
<b>Total</b>	<b>24</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>41</b>

Source: elaborated by the authors (2017).

The number of articles with falling citation counts between the 2015 and 2016 samplings was 41, representing 2.3% of the sample. 24 articles had only a unitary decrease in their citation counts, while the remaining 17 articles had larger decreases. The largest registered decreases were of 22 and 23 citations, well above the largest registered decrease between the 2014-2015 samplings, which was 11. Table 4, finally, synthesizes the citation count decreases between the years of 2014 and 2016:

The registered decreases in citation counts from 2014 to 2016 occurred in 29 cases, representing 1.6% of the sample. Among these, 16 articles registered a decrease of only one citation while the other 13 presented decreases between 2 and 13 citations. Between the first and the third samplings, there was also an increase in the number of journals that did not have any decreases in citation counts.

**Table 4** Registered citation count decreases between the 2014 and 2016 samplings

Journal	-1	-2	-3	-5	-7	-8	-9	-10	-13	Total
Brazilian Business Review - BBR	4						1			5
<i>Contabilidade Vista e Revista</i>	2		1				1			4
<i>Contabilidade, Gestão e Governança</i>	0					1				1
<i>Contextus - Revista Contemporânea de Economia e Gestão</i>	1	1								2
<i>Revista Brasileira de Gestão de Negócios</i>	2		1							3
<i>Revista Contabilidade e Finanças</i>	0								1	1
<i>Revista Contemporânea de Contabilidade</i>	2									2
<i>Revista de Contabilidade e Organizações</i>	0	1						1		2
<i>Revista de Informação Contábil</i>	0	1								1
<i>Revista Universo Contábil</i>	3			1	1					5
<i>Sociedade, Contabilidade e Gestão</i>	2		1							3
<b>Total</b>	<b>16</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>29</b>

Source: elaborated by the authors (2017).

In a wider perspective, we note that there is a downward trend in the number of articles with decreasing citation counts, leading us to believe that the search and citation count algorithms of Google Scholar have become more trustworthy over the analyzed time period.

It is not possible to make a comparison of the citation counts listed by WoS, Scopus, and Google Scholar, as is done in various studies of the literature, with Brazilian articles. This is due to the fact that there is no Brazilian journal among the 25 Accounting journals indexed in the main collection of WoS. Table 5 shows the two Brazilian business journals indexed in WoS:

**Table 5** Brazilian Business journals indexed in the main collection of WoS

Journal	Time Period	No. of Articles	Journal Impact Factor 2016
<i>Custos e Agronegócio On Line</i>	2009-2016	257	0.162
<i>RBGN - Revista Brasileira de Gestão de Negócios</i>	2008-2016	256	0.153

Source: elaborated by the authors (2017).

RBGN, which is classified in this study as a Brazilian Accounting journal, is listed as a Business journal in WoS. However, beginning in 2014, the Scielo Citation Index database was integrated into WoS via a partnership between Fapesp and Thomson Reuters (Packer, 2014). Therefore, the journals indexed in Scielo will also have the indexes calculated for WoS. However, only *Revista Contabilidade & Finanças* and *Revista Brasileira de Gestão de Negócios* are available in Scielo, and since only the 2016 and 2017 numbers of RBGN are indexed, the journal still does not have a calculated Impact Factor. The two year Impact Factor for 2016 of *Revista Contabilidade & Finanças* is 0.1042.

The Scopus database, in turn, indexes a total of 73 Accounting journals, thus having a much wider coverage in relation to WoS. However, the only Brazilian journals indexed are the ones presented in Table 6.

**Table 6** Brazilian Accounting journals indexed in Scopus

Journal	Time Period	No. of Articles	SJR
<i>Custos e Agronegócio</i>	2009-2016	398	0.201
<i>Revista Brasileira de Gestão de Negócios</i>	2004-2016	368	0.181
<i>Revista Contabilidade &amp; Finanças</i>	2015-2016	39	0.111

Source: elaborated by authors (2017).

Scopus indexes the three journals listed in Table 6 along with their SJR. Note that only two of the journals featured in the sample of this research are listed in Scopus and that *Revista Contabilidade & Finanças* does not have enough articles in the database for us to compare its citation counts between Scopus and Google Scholar.

However, of the fifteen journals that make up the sample of this research, eleven have their 2013 Impact Factor calculated in Spell. Therefore, we proceeded to a comparison of Spell's 2013 5 year Impact Factor with the average citations of the articles from 2008 to 2012 in Google Scholar, as shown in Table 7.

**Table 7** Comparison between the 2013 5 year Impact Factor of Spell with the average citations of the articles from 2008 to 2013 in Google Scholar

Journal	Spell	#	Google Scholar	#
BASE	0,235	8	1,901	7
Brazilian Business Review - BBR	0,312	5	1,853	8
<i>Contabilidade Vista e Revista</i>	0,558	2	2,805	2
<i>Contabilidade, Gestão e Governança</i>	0,272	7	1,933	6
<i>Contextus - Revista Contemporânea de Economia e Gestão</i>	0,097	11	0,886	10
<i>Revista Brasileira de Gestão de Negócios - RBGN</i>	0,306	6	1,964	5
<i>Revista Contabilidade &amp; Finanças</i>	1,156	1	7,641	1
<i>Revista de Contabilidade do Mestrado em Ciências Contábeis da UERJ</i>	0,192	9	0,765	11
<i>Revista de Contabilidade e Organizações</i>	0,434	3	2,592	3
<i>Revista Universo Contábil</i>	0,406	4	2,191	4
<i>Sociedade, Contabilidade e Gestão</i>	0,115	10	1,067	9

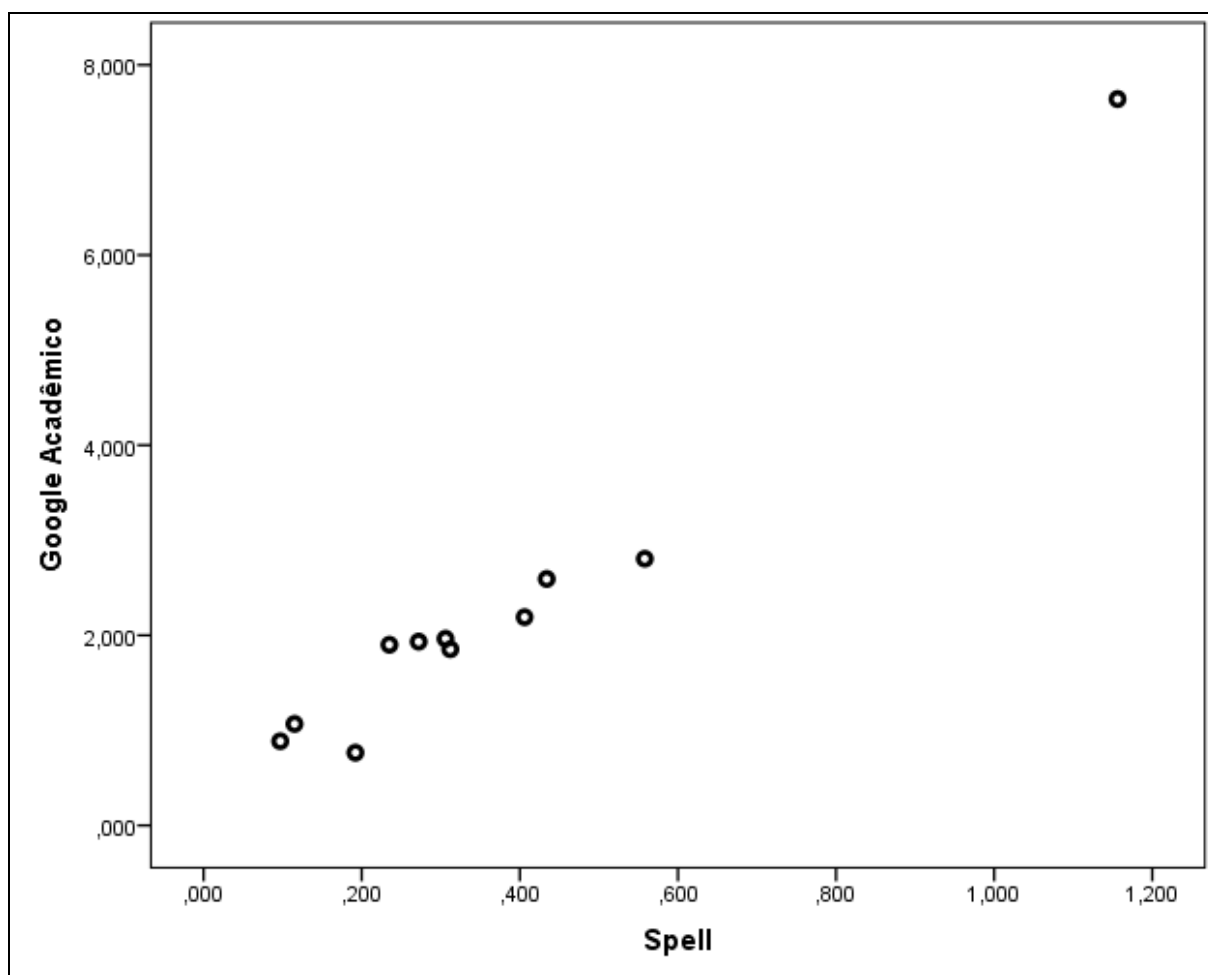
Source: elaborated by the authors (2017).

One may observe that Spell's 5 year Impact Factor is lower than the average citations of the articles from 2008 to 2012 as found by Google Scholar, reinforcing the literature, which affirms that Google Scholar has a wider scope than the closed databases. One may also observe that the four journals with the highest 5 year Impact Factor in Spell are also the top

four highest average citation counts in Google Scholar, and in exactly the same order: *Revista Contabilidade & Finanças* in first place, *Contabilidade Vista & Revista* in second, *Revista de Contabilidade e Organizações* in third, and *Revista Universo Contábil* in fourth. From *Brazilian Business Review* on to the rest of the list, the ranks are no longer equal between Google Scholar and Spell given that the journal appears in fifth place in Spell and eight place in Google Scholar.

In order to identify the relationship between these indexes, we conducted an exploratory analysis via dispersion diagram.

**Figure 2** Dispersion diagram between the citation counts according to Spell and to Google Scholar



Source: elaborated by the authors (2017).

Figure 2 shows an apparently linear association between the two measurements, leading us to analyzing the correlation between them as our following step. For this, we first conducted the Shapiro-Wilk normality test, given that the sample has  $n < 30$  (Fávero & Belfiori, 2017), so that we could then choose a correlation measurement.

**Table 8** Shapiro-Wilk normality tests

Variable	Statistic	gl	Sig.
Spell's 5 year Impact Factor	0.781	11	0.005
Google Scholar's average citation count of the articles from 2008 to 2012	0.675	11	0.000

Source: elaborated by the author (2017).

The results of the tests reject the null hypothesis that the distributions are normal, on a level of significance of 5%; therefore, the correlation measurement cannot be parametric. Triola (2017) warns that when Pearson correlation is involved, it is a common mistake to use averages, for averages suppress individual variation and may increase the coefficient.

Given the above, we chose to use Spearman's  $r_s$  - *rho* correlation coefficient, which Field (2009) and Triola (2017) affirm to be an option when data is not normal. This choice was made because according to Sampieri, Collado, and Lucio (2013), Spearman's  $r_s$  is more adequate than Kendall's  $\tau$  when data is continuous and without a large number of ties in the ranks. The interpretation of Spearman's *rho* coefficient is similar to Pearson's  $r$  (Barbetta, 2006; Sampieri, Collado & Lucio, 2013).

**Table 9** Spearman's correlation matrix

			Spell	Google Scholar
Spearman's <i>rho</i>	Spell	Sig. correlation coefficient (bilateral) N	1.000 11	0.918** 11
	Google Scholar	Sig. correlation coefficient (bilateral) N	0.918 11	1.000 11

Source: elaborated by authors (2017).

The significance of the test (p-value = 0.000) leads us to reject the null hypothesis that there is no correlation between the measurements done by Spell and Google Scholar, at a level of significance of 5% (Triola, 2017). The  $r_s$  coefficient = 0.918 shows that the citation counts calculated by Spell are strongly correlated with the citation counts retrieved by Google Scholar (Sampieri, Collado & Lucio, 2013; Triola, 2017).

In Table 10 we analyze the ratio between Spell's 2013 5 year Impact Factor and Google Scholar's 2008-2012 average citation counts:



**Table 10** Ratio between Spell's 2013 5 year Impact Factor and Google Scholar's 2008-2012 average citation counts

Journal	Spell	Google Scholar	Ratio
BASE	0.235	1.901	8.089
Brazilian Business Review - BBR	0.312	1.853	5.938
<i>Contabilidade Vista e Revista</i>	0.558	2.805	5.027
<i>Contabilidade, Gestão e Governança</i>	0.272	1.933	7.105
<i>Contextus - Revista Contemporânea de Economia e Gestão</i>	0.097	0.886	9.131
<i>Revista Brasileira de Gestão de Negócios - RBGN</i>	0.306	1.964	6.419
<i>Revista Contabilidade &amp; Finanças</i>	1.156	7.641	6.610
<i>Revista de Contabilidade do Mestrado em Ciências Contábeis da UERJ</i>	0.192	0.765	3.986
<i>Revista de Contabilidade e Organizações</i>	0.434	2.592	5.972
<i>Revista Universo Contábil</i>	0.406	2.191	5.397
<i>Sociedade, Contabilidade e Gestão</i>	0.115	1.067	9.281

Source: elaborated by the authors (2017).

The calculated ratio between the Spell and the Google Scholar data indicates that Google Scholar retrieved citation counts ranging from 3.98 (*Revista de Contabilidade do Mestrado em Ciências Contábeis da UERJ*) to 9.28 times (*Sociedade, Contabilidade e Gestão*) higher than Spell, showing that the scope of Google Scholar is far wider than Spell's. However, as shown by Pearson's correlation coefficient, the indexes are still highly related.

This finding – that Google Scholar's search engine retrieves more citations than a closed database, namely Spell – runs counter to the research of Jacso (2005a); Jacso (2005b); and Bakkalbasi et al. (2006); and reinforces the findings of Noruzi (2005); Bar-Ilan (2008); Kousha and Thelwall (2008); Martell (2009); Onyancha (2009); Bar-Ilan (2010); Mingers and Lipitakis (2010); Sember, Marijan, and Petrak (2010); Amara and Landry (2012); Bergman (2012); and Harzing (2013), contributing to the construction of an understanding of the trustworthiness of Google Scholar as a way of measuring citations.

## 5 CONCLUSIONS

This article was developed to identify whether Google Scholar is a plausible option for counting the citations of Brazilian Accounting articles. The justification for the development of this research is the fact that most Brazilian Accounting journals are not indexed in Web of Science or Scopus, which prevents an analysis following the steps of studies undertaken in other fields of knowledge and other countries. In order to answer the research question, we monitored, in 2014, 2015, and 2016, the citation counts of 1,810 articles published by 15 Brazilian Accounting journals between the years of 2007 and 2012. The main findings of our study were:

- The number of articles not retrieved by Google Scholar has followed a downward trend throughout the analysis period, falling from 2.8% of the sample in April of 2014 to 0.9% of the sample in April of 2016.
- The rate of articles with decreasing citation counts from 2014 to 2015 was 2.9% of the sample; the rate of articles with decreasing citation counts from 2015 to 2016 was 2.3% of the sample; and the rate of articles with decreasing citation counts from 2014 to 2016 was 1.6% of the sample.
- The average citation counts of the articles published between 2008 and 2012, per magazine, according to Google Scholar is 2 to 9 times higher than Spell's 2013 5 year Impact Factor.
- The Spearman's rank correlation coefficient between Spell's 5 year Impact Factor and Google Scholar's 2008-2012 average citation counts per journal is  $r = 0,918$ .

These analyses support the conclusion that Google Scholar presents itself as a relatively safe – even if imperfect – option for the citation analysis of Brazilian Accounting studies. This conclusion is important because it enables the development of citation analysis studies on Brazilian Accounting articles.

While the average citation counts calculated from Google Scholar data are often higher than Spell's Impact Factor, the high correlation between the two show that they share a strongly positive relationship, and that if certain caveats are observed, Google Scholar can be used to calculate the citation counts of the more than 20 Brazilian Accounting journals which are not indexed by Spell.

As for future research, we suggest measuring the trustworthiness of Google Scholar's citation counts via the examination of each citation found by the search engine in order to identify any misattributed or duplicate citations. We also suggest classifying the origin of the citations in order to identify the proportion of citations originating from theses, dissertations, monographies, or event annals, which databases such as Spell do not capture. For the Brazilian journals which are now included in international indexers, we suggest a comparison of the citations and the impact factors of journals, articles, and authors, which should be done in a few years so that the 3 and 5 year citation factors can be established.

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