A comprehensive bibliometric study of the balanced scorecard

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A R T I C L E   I N F O

A B S T R A C T

This research provides a deeper knowledge in the Balanced Scorecard (BSC) insight by using the bibliometric technique. The existing gap between the traditional literatura reviews and previous bibliometric studies, is covered as it is the first comprehensive analysis carried out in applying quantity, quality, and structural indicators. Web of Science Core Collection was used as the source of information, considering it the most accurate and suitable data base for these studies. This research covers the wider period-of-time possible, from 1992 to 2020, with a final sample of 771 articles in 466 reviews. Quantity indicators show the high interest that the BSC still has in the scholar's community, pointing out Kaplan and Norton as the most productive authors, and confirming that 'management', 'business' and 'accountability' are its most common field of activity, although others as 'systems' and sustainability' are coming to prominence; 'Balanced Scorecard' appears as the most remarkable keyword. Quality indicators found 32,706 citations, with Kaplan and Norton occupying again top positions as well as 'Harvard Business Review' as the most impacting review both in cited articles and in average. Co-citation analysis reveals the existence of a triple corecluster for articles, based on the theory, literature reviews, and case-studies.

1. Introduction

Once a particular issue has reached certain grade of development and acceptance in the scholar community, and after many years of continuous works published in different ways –articles, books, chapters, conferences etc.–, it is frequently observed that the community tends to recapitulate all the existing information, trying to summarize the current knowledge developed through the formula of literature reviews (Ramos-Rodríguez & Ruíz-Navarro, 2004).

Following this criterion, the aim of this paper is to determine how the Balanced Scorecard's (BSC) state of art has evolved since the publication of the first article written by Kaplan and Norton (1992), but using a different approach instead of the traditional literature reviews: by applying bibliometric techniques, as a method widely accepted and used in the scholar community (Albort-Morant & Leal-Rodriguez, 2017; Di Stefano, Peteraf, & Verona, 2010; Dzikowski, 2018; de Sousa, et al., 2020; García-Lillo, Claver-Cortés Úbeda-García, Marco-Lajara, & Zaragoza-Sáez, 2018; García-Lillo, Úbeda-García, & Marco-Lajara, 2016; Punnakitikashem & Hallinger, 2020; Ramos-Rodríguez & Ruíz-Navarro, 2004; Rialti, Marzi, Ciappei, & Busso, 2019).

In order to know the current insight about the BSC and bibliometric studies, on 16th of November of 2020 a search in 'Web of Science Core Collection' data base was caried out, applying both 'Balanced Scorecard' and 'Bibliometric/Bibliographic' in 'Title'. Only 4 documents were obtained: 'Investigating the Academic Trend of Balanced Scorecard from Bibliometric Approach' (Chiu & Li, 2014); 'Critical aspects of the Balanced Scorecard: a Bibliographic analysis' (Rodrigues Quesado, Aibar Guzmán Portela de Lima Rodrigues, 2016) 'Uma análise bibliométrica sobre o Balanced Scorecard no período de 2000 a 2016′ (Moura Silva Montenegro & Cunha Callado, 2018); and 'Balanced scorecard for evaluating the performance of supply chains: A bibliometric study' (de Sousa, et al., 2020).

When comparing the current research with these ones, several differences should be appreciated –apart from Rodrigues et al. (2016), which is a literature review rather than a bibliometric analysis. First, data bases used as sources shows huge differences in quality: 'Web of Science Core Collection', 'Journal Citation Reports InCites', and 'Scopus' and 'Web of Science' can be considered as similar, especially when study only articles or 'certified knowledge' (Callón, Courtial, & Hervé, 1993); however, 'Biblioteca del Conocimiento Online (b-on)' + conferences + books + thesis, and papers related with 'Associaçião Nacional de Pós-Graduação e Pesquisa em Administração (ANPAD)' are far from the

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formers. Second, the period of time included in ours is the wider, as it stars from 'the beginning' to the latest possible data in 2020, being Chiu and Li (2014) the closer but with a significant difference as they ended in 2012. Third, the sample shows relevant differences too, being ours the most complete: 771 articles far from the rest of the research, save Chiu and Li (2014) with 797 but including every document and not applying the additional filter of 'Article'. Fourth, quantity indicators are present in the whole research, although with different criterion: Chiu and Li (2014) shares a similar block of indicators with ours, but not Moura Silva & Cunha Callado (2018) and de Sousa et al. (2020), not including relevant indicators as 'Articles', 'Reviews', 'Categories' or 'Keywords', but do others like 'Education' or 'Degree' of the authors. Fifth, apart from ours, quality indicators are present in two research, although only partially, especially in de Sousa et al. (2020), where the number of citations is unknown and do not provide any information. Sixth, only the present study includes structural indicators.

Taking into consideration the above-mentioned comparison, a gap in the BSC bibliometric analysis is clear, as well as the current research is fulfilling it as it is the most comprehensive study carried out until now, not only because de source selected and the concept of 'certified knowledge' applied provides the more accurate sample possible, but also for the wider period of time used, the dimension of the final sample with 771 articles, and the analysis for the first time of the three types of indicators: quantity, quality and structural. We consider that the present work, using this technique for the first time in a comprehensive approach, is going to contribute on the increasing and enrichment of the BSC insight –yet most commonly applied in other Social Science fields.

This paper is divided in five sections, this one included. In the second, a literature review about the bibliometric technique is displayed. The third explains the methodology used to carry out this research, detailing the source and composition of the data collected. In section four, a discussion of the findings is set out. Finally, the fifth displays the conclusions reached, as well as limitations and lines for future research.

2. Literature review

Bibliometric is defined by Veerbek et al. as "the collection, the handling, and the analysis of quantitative bibliographic data, derived from scientific publications" (Verbeek, Debackere, Luwel, & Zimmermann, 2002, p. 181), and it is the answer to map and systematize existing literature, providing "comprehensive maps of knowledge structure of a given streams of literature" (Rialti, Marzi, Ciappei, & Busso, 2019, p. 2057). It is focused on the works published about certain subject, as well as their classification by authors and citations, by applying mathematics and statistical analysis which allow to have a comprehensive knowledge of it and even, in managing huge amount of data, identify 'hidden patterns' (Ramos-Rodríguez & Ruíz-Navarro, 2004; Ramos-Rodríguez & Ruíz-Navarro, 2008; Albort-Morant & Leal-Rodriguez, 2017; Dzikowski, 2018). And therefore, this technique can be considered as the best choice to study the conceptual structure of a particular subject.

The bibliometric technique analyses three different categories: quantity or activity indicators, which mainly provide information about the volume of publications, most prolific authors, reviews, or countries; quality or impact indicators, measuring the effect that a work provokes in other authors by the citations received; and structural or relationships indicators, which identify and bring to light in many cases the existing bonds between authors and their works (Cadavid-Higuita, Awad, & Franco-Cardona, 2012; Albort-Morant & Leal-Rodriguez, 2017).

By using the bibliometric technique in this research, we identify the most influential authors and works, as well as the existing links between them, mapping the intellectual structure of the BSC under a new approach (Di Stefano, Peteraf, & Verona, 2010; Fernandes, et al., 2017). And in doing so, we fill the current gap existing in the BSC insight, not only identifying the most remarkable authors, articles and reviews –which influence in the scholar community has played a key role in their

works– but also analysing its evolution and changes.

The research also contributes to enrich the current knowledge of the BSC literature, analysing both the theoretical and the practical perspectives. The former is tackled analysing quantity indicators, while the latter is tackled analysing both quality and structural indicators.

Three hypotheses have been set out:

- H1: The BSC maintain the scholar community's interest in its features.
- H2: Kaplan and Norton maintain the leadership along the time in being the more remarkable authors, as the BSC creators.
- H3: Kaplan and Norton works maintain their influence in the scholar community research.

3. Methodology

To carry out this research, 'Web of Science Core Collection' data base was selected as our source, being the most suitable for our purpose, as it is widely recognised as the best choice for Social Science issues and especially for bibliometric studies (Di Stefano, Peteraf, & Verona, 2010; García-Lillo, Úbeda-García, & Marco-Lajara, 2016; Dzikowski, 2018; Rialti, Marzi, Ciappei, & Busso, 2019; de Sousa, et al., 2020).

The search of the sample took place on 11th November of 2020, taking into account two aspects: the whole period of time possible –from 1992, when the article 'The Balanced Scorecard. Measures that Drive Performance' (Kaplan & Norton, 1992) was released, until the day of the research, on November of 2020; and by using the following filters in the 'Title', in order to cover the wider spectrum possible about the BSC and its most remarkable features: 'Balanced Scorecard' or 'Cuadro de Mando Integral' or 'Non-Financial Measure* ' or 'Strategic Map* ' or 'Cause-and-effect Relationship*'. 3169 references were obtained.

In addition, it should be noticed that, in order to cover the wider spectrum of this issue, no filter regarding languages or countries was applied. In fact, authors' nationality is one of the 'quantity/activity' indicators displayed in the research (Dzikowski, 2018).

To this first sample approach, 'Article' was applied as an additional filter, to focus the research on references duly indexed and revised by peers, ruling out other type of works as books, conferences, etc.; 1874 documents were collected. To justify this election, the concept of 'certified knowledge' was applied (Callón, Courtial, & Hervé, 1993): works that have been exposed to the blind-review of other researchers and, after the correction of major and/or minor corrections pointed out by them, their final approval was reached. The use of 'articles' as the only source for bibliometric studies, is a standard practice that guaranties certain quality level and strength the reliability of the outcomes (Ramos-Rodríguez & Ruíz-Navarro, 2004; García-Lillo, Úbeda-García, & Marco-Lajara, 2016; de Sousa, et al., 2020).

However, another final filter was applied to these 1874 articles, in order to rule out those articles regarding 'Cause-and-effect Relationship' but directly related not with the BSC but with clinic analysis, with a final sample of 771 references obtained.

Once the sample was ready to be analysed, three bibliometric indicators have been chosen in order to get the data necessary to carry out the research: quantity or activity indicators, quality or impact indicators, and structural or relationships indicators (Cadavid-Higuita, Awad, & Franco-Cardona, 2012; Albort-Morant & Leal-Rodriguez, 2017). Following these categories, most prolific authors and reviews, and most remarkable keywords are going to be identified, as well those papers and reviews with highest impact in the scientific community; and, eventually, co-citations maps are going to confirm or turn to light certain patterns on flows in this field.

Fig. 1 describes this process step by step.

3.1. Data analysis

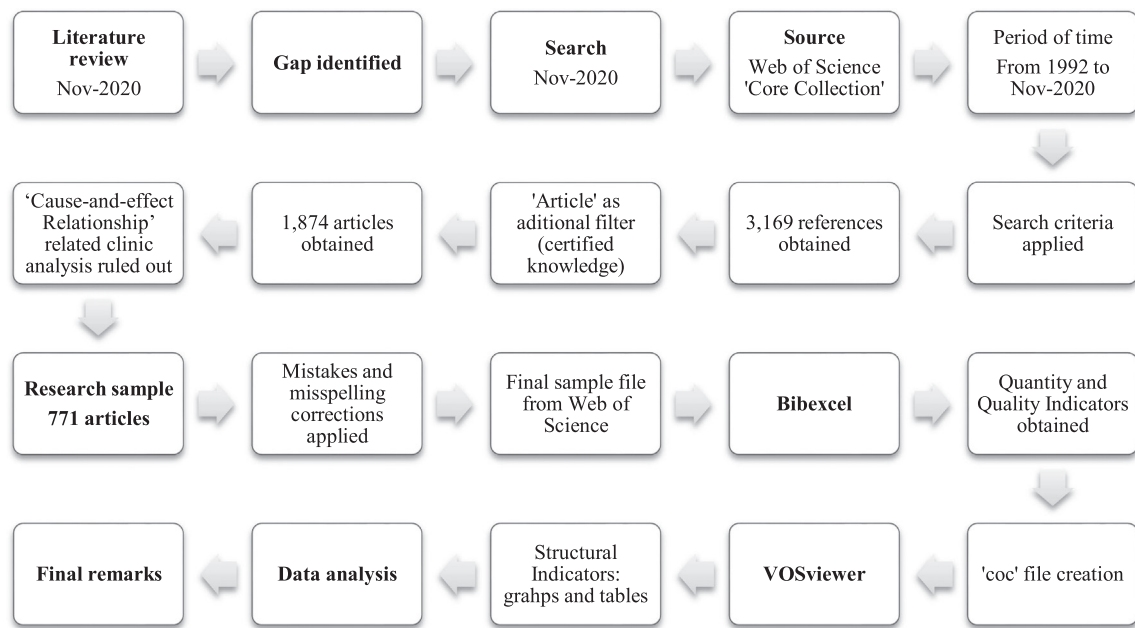To get the necessary fields to carry out this research, the sample was

Fig. 1. Article process.

exported from 'Web of Science Core Collection' with the following items marked in 'Step 2: Select container': Author(s)/Editor(s), ISSN/ISBN, ID of PubMed, Title, References, Times cited, Number of references cited, Access number, Source, Key words, Author's identification, Number of pages/chapters.

With the sample presumably ready for the analysis, several anomalies were noticed: the data displayed were full of errors and/or mistakes in the proper and unique identification of authors, articles, reviews, keywords, and citations, entirely contaminating the sample and so blocking any possibility to carry out a minimum-accurate analysis.

Corrections in all these anomalies were required and took place, in order to unify the data and be ready to carry out the analysis on an accurate sample (García-Lillo, Úbeda-García, & Marco-Lajara, 2016; Ramos-Rodríguez & Ruíz-Navarro, 2008).

Once the sample was eventually 'clean' and ready to be analysed, two software were needed to carry out the research: Bibexcel and VOSviewer.

Bibexcel –developed by professor Persson, Institute of Information Sciences of the Swedish University of Umea– is a software specifically designed for the treatment of bibliographic data, allowing the identification and generation of tables with the most prolific authors, reviews, nationalities, keywords, categories, or citations, as well as different co-occurrence matrixes, and being key to carry out a comprehensive bibliometric analysis (García-Lillo, Úbeda-García, & Marco-Lajara, 2016; Ramos-Rodríguez & Ruíz-Navarro, 2008).

VOSviewer 1.6.7 was used to create the different bibliometric networks and mapping them, identifying the most remarkable clusters and items (Rialti, Marzi, Ciappei, & Busso, 2019; Dzikowski, 2018).

4. Outcomes

According to the criterion previously explained in Section 2, three categories of key indicators has been adopted for this research: quantity or activity, quality o impact, and structural or relationship, dividing this section in three parts.

'Quantity/Activity' section includes indicators as: literature evolution and how the articles of the sample are displayed throughout the time; most productive authors; most productive reviews; Web of Science categories; authors' nationality; and keywords identified.

'Quality/Impact' section includes indicators as: most cited

references, analysing both articles and books; and the 24 most relevant reviews, analysing the number of articles published, the citations received, and the average between citations and the articles cited.

Eventually, 'Structural/Relationship' section includes the results of the co-citation analysis, where three techniques are often used to identify the structure of the field to be studied: multidimensional scaling (MDS), to map the connections among the co-citations between articles; cluster analysis, for grouping together interrelated articles into different blocks; and, factor analysis, to identify articles that have something in common (Di Stefano, Peteraf, & Verona, 2010; Fernandes, et al., 2017; McCain, 1990).

4.1. Quantity or activity indicators

4.1.1. Literature evolution

Graph 1 shows how the 771 articles are displayed since 1992. Although several up-and-downs can be observed throughout the time, a constant increasing is clearly visible, with a significant upturn since 2014, demonstrating that the BSC is an issue that still maintains high grade of interest into the scholar's community. What confirms that the BSC is an alive management tool in today's firms (Kaplan & Norton, 1996a) and in a continuous state of evolution (Brudan, 2005), helping them in translating their strategy from top to down (Kaplan & Norton, 1992), rather than a management fashion (Malmi, 2001; Madsen & Stenheim, 2015; Wiersma, 2009).

4.1.2. Most productive authors

Table 1 shows the 20 most prolific authors, since the first article released by Kapan and Norton (1992).

Kaplan and Norton are the most productive authors, something that could be previously expected mainly because they are the BSC creators and after their first article (Kaplan & Norton, 1992), they expended the following years developing it. However, and due to the high interest that the BSC has created in the scholar's community for the past years, other scholars have worked intensively with several papers published, showing a real interest in knowing more about the BSC and in improving the BSC insight: Table 1 reveals that many authors have been developed a hard work regarding the BSC, being several of them even about to overtake Kaplan and Norton. This confirms the interest of this issue in the scholar's community, and the prolific work that they are carrying
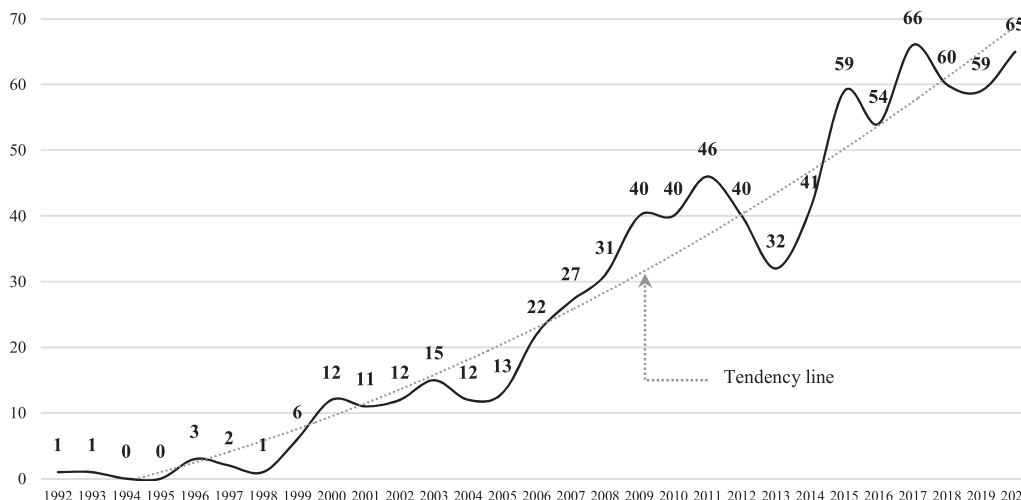
Graph 1. BSC articles published since 1992.

Table 1
Most productive authors.

Rank	Author	Count	%
1	Kaplan, R.S.	9	1.17
2	Norton, D.P.	9	1.17
3	Dincer, H.	8	1.04
4	Yuskel, S.	8	1.04
5	Abdel-Maksoud, A.	6	0.78
6	Bremser, W.G.	6	0.78
7	Niven, P.R.	6	0.78
8	Quezada, L.E.	5	0.65
9	Rodrigues, L.L.	5	0.65
10	Birnberg, J.G.	4	0.52
11	Cheng, M.M.	4	0.52
12	Gallo, P.	4	0.52
13	Grigoroudis, E.	4	0.52
14	Guzman, B.A.	4	0.52
15	Herath, H.S.B.	4	0.52
16	Quesado, P.R.	4	0.52
17	Schmeisser, W.	4	0.52
18	Tseng, M.L.	4	0.52
19	Wang, C.H.	4	0.52
20	Yang, M.C.	4	0.52
	Rest	665	86.25
	Total	771	

out during the last years.

4.1.3. Most prolific reviews

The 771 articles have been published in 466 reviews, as shown in Graph 2.
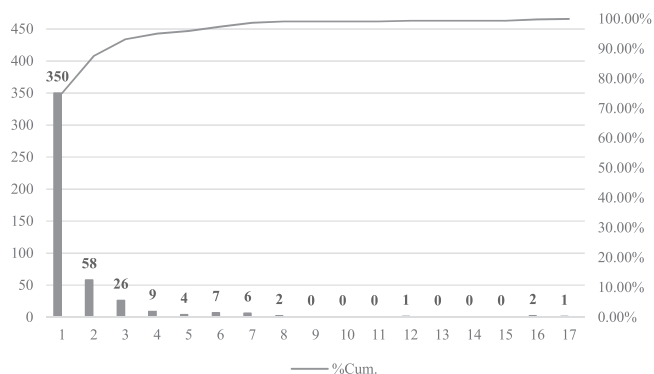
Graph 2. Number of articles published sorted by review.

350 reviews have published only 1 article, representing the 75.11%. And the 95.07% is reached for 443 reviews, with 4 or less articles published.

The most prolific ones are the 23 displayed in Table 2, grouping together 181 articles and representing the 4.93% of the reviews. This distribution shows how atomised are the publications, revealing the high impact that the BSC wakes up in reviews and editors. But, on the other hand, it shows that this covering attends to punctual situations, not being clear if those reviews have not really interest in publishing more articles specifically related to the BSC, the quality of the articles received have not been enough relevant, or the BSC is not specifically included into their aims and scopes.

On the other hand, Table 2 shows the 23 reviews which have published 5 or more articles, representing almost the 25.00% of the total articles of the sample.

Table 2
Sources.

Rank	Review	Count	%	%Cum.
1	Total Quality Management & Business Excellence	17	2.20	2.20
2	Expert Systems with Applications	16	2.08	4.28
3	Sustainability	16	2.08	6.36
4	International Journal of Productivity and Performance Management	12	1.56	7.92
5	International Journal of Production Economics	8	1.04	8.96
6	Journal of Cleaner Production	8	1.04	10.00
7	Accounting Organizations and Society	7	0.91	10.91
8	Accounting Review	7	0.91	11.82
9	Actual Problems of Economics	7	0.91	12.73
10	Harvard Business Review	7	0.91	13.64
11	Management Decision	7	0.91	14.55
12	Service Industries Journal	7	0.91	15.46
13	Benchmarking. An International Journal	6	0.78	16.24
14	Betriebswirtschaftliche Forschung und Praxis	6	0.78	17.02
15	Industrial Management & Data Systems	6	0.78	17.80
16	International Journal of Health Planning and Management	6	0.78	18.58
17	International Journal of Hospitality Management	6	0.78	19.36
18	Journal of the Operational Research Society	6	0.78	20.14
19	Long Range Planning	6	0.78	20.92
20	African Journal of Business Management	5	0.65	21.57
21	Information System Management	5	0.65	22.22
22	Organizational Dynamics	5	0.65	22.87
23	Production Planning & Control	5	0.65	23.52
	Rest	590	76.52	100.00
		771		

'Total Quality Management and Business Excellence' is the most influential review with 17 articles published, although 'Expert Systems with Application' and 'Sustainability' closely follow it with 16.

As the BSC is a tool specifically designed to implement the strategy within the whole firm and at all levels (Kaplan & Norton, 1992), it is not hardly surprising to see that, on the whole, the majority of the reviews are related with management and accounting. However, second and third positions are occupied by two reviews focused on other issues, showing the especial interest that the BSC wakes up in other scientific fields: 'Expert Systems with Application', focused on the "design, development, testing implementation, and/or management of expert and intelligence systems" (Expert Systems with Application, n.d.); and 'Sustainability', focused on "experimental and theoretical research relating to natural sciences, social sciences and humanities in as much detail as possible in order to promote scientific predictions and impact assessments of global change and development" (Sustainability, 2021), which includes one specific section somehow related with business/management: 'Sustainable Management'.

Further to the former, the scope of the review reaches areas, among others, as accounting, information management, or strategic management, directly related with the aim of the BSC; so, it is interesting to notice the role that the BSC is playing in this specific scientist field. Regarding the latter, its third position reveals the high interest and relevance that this issue is taking not only into the firms and top managers in the last years, but also in the society –in which firms are presented and daily interact.

'Harvard Business School' appears in the 10th position with 7 articles, far from the top with 17.

4.1.4. Web of science categories

Another classification is shown in Graph 3, by using the 'Web of Science Categories' criterion. In this case, what can be noticed is a similar pattern as the one identified in 'Reviews': 'Management', 'Business', 'Economics' and 'Information Systems' or 'Artificial Intelligence', are the most remarkable issues employed, as could be initially expected.

However, and same as happed in the previous classification, 'Environmental' and 'Green Sustainable' categories appear playing the key role that the society and governments are demanding from the last years. And in the last position of the table, the presence of 'Health' reveals the interest that this industry has in the implementation of a BSC in their firms.

Although these fields of activity have apparently nothing to do with management or business issues, confirm the incipient relevance that the BSC is playing on them, revealing two things: first, that the BSC, as a management tool designed to translate the strategy at all levels of the firm, is also demanded by every type of firm, whenever its activity; and second, that the BSC is demonstrating its ability to adapt to the new challenges as, for instance, sustainability.

4.1.5. Authors' nationality

Graph 4 shows how the articles are spread out around the world, according to authors' nationality.

The 25 more prolific countries are displayed in Graph 4 which, grouped together, represent 744 articles and 96.50% of the total sample, showing a remarkable pattern: the interest provoked by the BSC is mainly focus on few nationalities, especially considering that the first six almost represent the half: 382 articles and 49.55%, between USA, Taiwan, Spain, Iran, U.K. and Germany.

USA occupies the first position with the 17.38%, what cannot surprise due to the fact that the BSC was 'born' there and the revolution that it caused in its beginnings into the American management community. However, it is interesting to remark that the following three countries, which cannot be considered as Anglo-Saxon-background, represent the 20.75%, with similar figures between them: Taiwan 7.39%, Spain 7.26%, and Iran 6.10%.

Sorting this distribution by continents, we face that Europe leads this ranking, with 33.09% of the sample, followed by Asia with 29.96% and America with 27.37% –although the three in a balanced proportion. Grouped together, these three continents represent 90.42%, revealing a 'hidden' pattern, only possible to be seen by using this technique: the BSC is not only an American issue but has gone beyond the borders, showing high interest all over the world, with presence in the whole continents save Africa, but strongly focused on the three ones abovementioned.
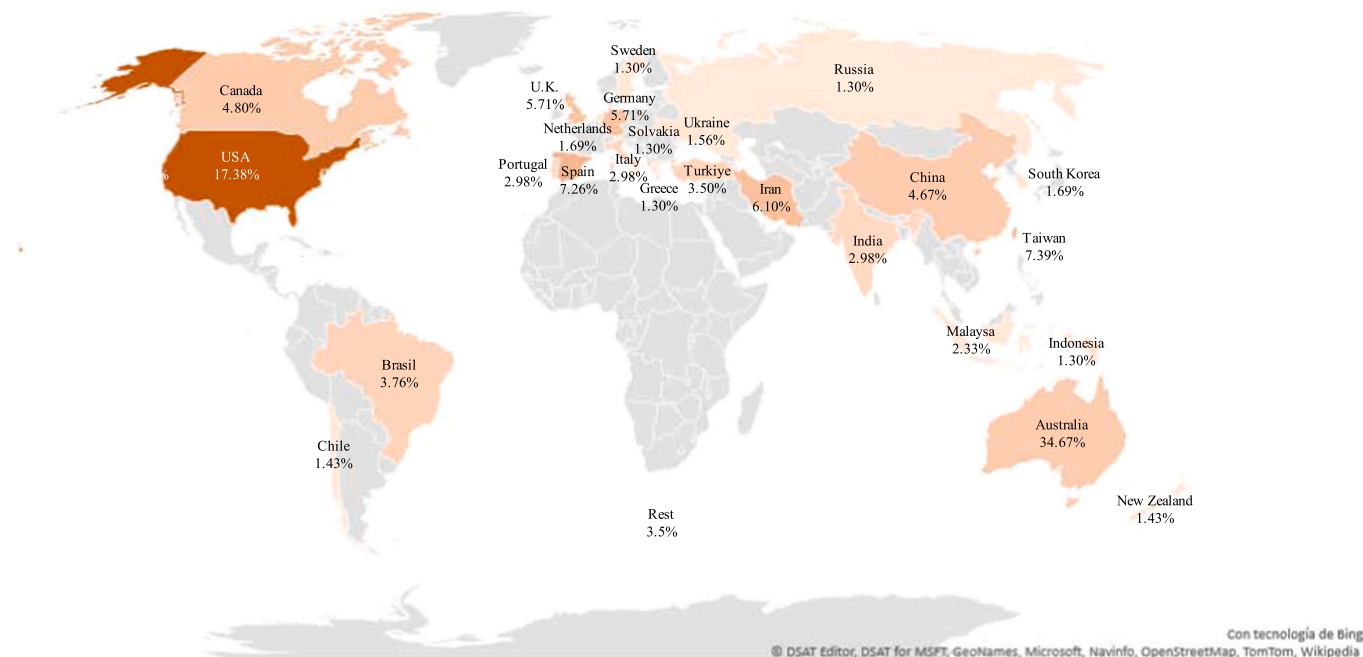
4.1.6. Keywords

As stated in Section 3.1 and in order to preserve the essence of the keywords used in the sample, but at same time be useful for the purpose of this research, a modification was applied to correct the misspellings and/or different forms in naming the same words found, as well as to condensate/unify/simplify their meaning. Table 3 shows the final result with 1879 keywords and once applicated the corrections above mentioned.

As expected, 'Balanced Scorecard' is the most repeated word by large, representing by itself the 25% of the total keywords used and being present in 61.61% of the 771 articles: if an article is focused on the BSC, it seems logical that this word should be presented in the 'keywords' section. In addition, the most remarkable BSC features –nonfinancial measures, cause-and-effect relationships, and strategy maps– have as well high presence, but in most cases by their own, showing the key role that they played in the BSC 'world' and the importance that they have in their practical/daily use in firms and so, their inquisitiveness they provoke in the scholar's community, as many articles are specifically addressed on the study of these BSC features: non-financial measures (Cardinaels & van Veen-Dirks, 2010), cause-and-effect relationships (Bento, Bento, & Fereira White, 2013), and strategy maps (Amirkhani & Moghadas, 2015; Quezada & López-Ospina, 2014; Wu, 2012; Glykas, 2013).

It also should be noticed the relevance that 'Sustainable Balanced
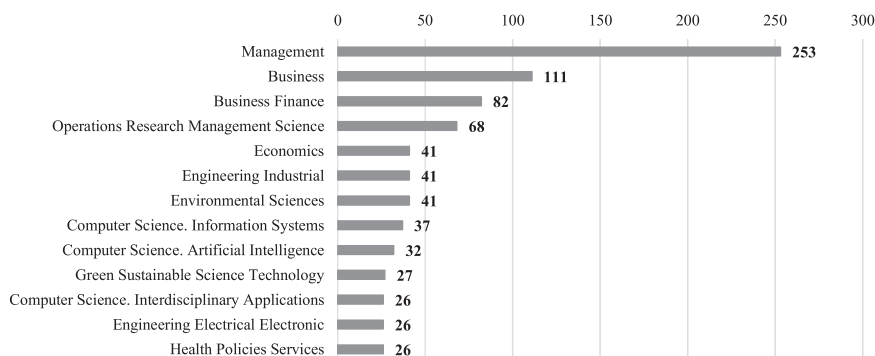
Graph 3. Articles sorted by 'Web of Science Categories'.

Graph 4. Articles sorted by countries.

Table 3
Keywords.

Rank	Keyword	Count	%	%Cum.	%Articles
1	Balanced Scorecard	475	25.28	25.28	61.61
2	Performance Management/ Measurement	153	8.14	33.42	19.84
3	Strategy Maps	51	2.71	36.14	6.62
4	Strategic Management	50	2.66	38.80	6.49
5	Strategy	48	2.56	41.35	6.23
6	Performance Measures	40	2.13	43.48	5.19
7	Sustainability	38	2.02	45.50	4.93
8	Sustainable Balanced Scorecard	21	1.12	46.62	2.72
9	Management	19	1.01	47.63	2.46
10	SMEs	18	0.96	48.59	2.34
11	Non-financial Measures	17	0.91	49.50	2.21
12	Cause-and-effect Relationships	14	0.75	50.24	1.82
13	DEMATEL	14	0.75	50.99	1.82
	Sub-Total	958			
	Rest	921	49.01	100.00	
	Total	**1879**			

Scorecard' is playing, adding to 'Sustainability', showing the transcendence that this issue is playing in the firms especially for the last years –as it was noticed in Sections 4.1.3 and 4.1.4.

Equally, 'Performance Management/Measurement', 'Performance Measures', 'Strategy', 'Strategic Management', and 'Management', are words clearly associated to the aim of the BSC, in the way of implementing the strategy and how to manage this issue, as well as it is considered for many scholars as a new 'Performance Management/Measurement System (PMS)' (Agostino & Arnaboldi, 2012; Malmi, 2001; Ukko, Tenhunen, & Rantanen, 2007).

Eventually, the word 'SMEs' shows the importance that these firms play today in most economies and societies (Dudic, Dudic, Gregus, Novackova, & Djakovic, 2020; Falle, Rauter, Engert, & Baumgartner, 2016; Jong Na, Chang Lee, Uk Choi, & Tae Kim, 2020; Madsen & Stenheim, 2015), as well as in their network composition, being the 99.8% of the total firms and employing up to 70% (Eurostat, 2020; Eurostat, 2021).

4.2. Quality or impact indicators

4.2.1. Most-cited references

As it was explained in Section 3.1, and as well as happened with 'authors', 'reviews' and 'keywords' in Section 4.1, several corrections were needed to be introduced due to the mistakes identified in the first table obtained, being carried out while introducing the data: different ways when writing the authors and/or the reviews, and an inaccurate introduction of fields like 'volume', 'issue', or 'page'. These mistakes provoke situations as the same article appears several times, giving differences entrances and so entirely distorting the citations.

The total amount of citations found in this sample was the 32,706; and, as the sample of this research is composed by 771 articles, it implies an average of 42.42 citations per article.

Table 4 shows the most-cited works, including a minimum of 30 citations each: they are 41, divided into 35 articles and 6 books. These works have 2919 citations, representing the 8.92% of the total citations, and with an average of 71.20 citations per article-book. Last column shows how many times the 'work' has been cited, regarding the 771 articles of the sample; and it should be remarked that the two first are presented in half of them: the first Kaplan and Norton article (1992) and book (1996).

Kaplan and Norton's articles and books appear on top, occupying 9 of the 11 first positions. This is something that cannot surprise and could be expected in advance, because they are the BSC creators and after their first article they expend the following years developing it. In particular, the two first works stand out on the rest due to the high impact they have over the others: their first article 'The Balanced Scorecard. Measures that drive Performance' (Kaplan & Norton, 1992), and the book published as a demand after the huge impact that the article provoked into the American management community 'The Balanced Scorecard: Translating Strategy into Action' (Kaplan & Norton, 1996) –taking advantage of the format to develop it in more detail and including the analysis/experience of the recent BSC implementation in several firms. These two works can be considered the starting point, where everything began; and therefore, it is even logical that, when doing a study focused on the BSC or any of its features, or even on any other issue but where the BSC is mentioned, one of them or both should be cited as the basis.

On the other hand, it is interesting to remark that these Kaplan and

Table 4

Most-cited articles.

Rank	Article	Citations	Cit_Cum.	%	%_Cum.	Cit_Cum.
1	Kaplan R.S., 1992, V70, P71, HARVARD BUS REV	420	420	1.28%	1.28%	54.57%
2	Kaplan R.S., 1996, BALANCED SCORECARD TRANSLATING STRATEGY INTO ACTION	340	760	1.04%	2.32%	44.10%
3	Kaplan R.S., 1996, V74, P75, HARVARD BUS REV	199	959	0.61%	2.93%	25.81%
4	Kaplan R.S., 2001, P12, IVEY BUSINESS JOURNAL	144	1103	0.44%	3.37%	18.68%
5	Kaplan R.S., 2004, STRATEGY MAPS CONVERTING INTANGIBLE ASSETS INTO TANGIBLE OUTCOMES	134	1237	0.41%	3.78%	17.38%
6	Kaplan R.S., 1993, V71, P134, HARVARD BUS REV	100	1337	0.31%	4.09%	12.97%
7	Norreklit H, 2000, V11, P65, MANAGE ACCOUNT RES, DOI DOI 10.1006/MARE.1999.0121	88	1425	0.27%	4.36%	11.41%
8	Kaplan R.S., 2001, V15, P87, ACCOUNT HORIZ, DOI DOI 10.2308/ACCH.2001.15.1.87	81	1506	0.25%	4.61%	10.51%
9	Kaplan R.S., 2000, V78, P167, HARVARD BUS REV	74	1580	0.23%	4.84%	9.60%
10	Lipe MG, 2000, V75, P283, ACCOUNT REV, DOI 10.2308/accr.2000.75.3.283	72	1652	0.22%	5.06%	9.34%
11	Kaplan R.S., 1996, V39, P53, CALIF MANAGE REV, DOI 10.2307/41165876	66	1718	0.20%	5.26%	8.56%
12	Speckbacher G., 2003, V14, P361, MANAGEMENT ACCOUNTIN, DOI DOI 10.1016/J.MAR.2003.10.001	61	1779	0.19%	5.45%	7.91%
13	Hoque Z., 2000, V12, P1, J MANAGEMENT ACCOUNT, DOI 10.2308/JMAR.2000.12.1.1	56	1835	0.17%	5.62%	7.26%
14	Malmi T., 2001, V12, P207, MANAGEMENT ACCOUNTIN, DOI DOI 10.1006/MARE.2000.0154	56	1891	0.17%	5.79%	7.26%
15	Malina MA, 2001, V13, P47, J MANAGEMENT ACCOUNT, DOI DOI 10.2308/JMAR.2001.13.1.47	55	1946	0.17%	5.96%	7.13%
16	Banker RD, 2004, V79, P1, ACCOUNT REV, DOI 10.2308/accr.2004.79.1.1	53	1999	0.16%	6.12%	6.87%
17	Norreklit H, 2003, V28, P591, ACCOUNT ORG SOC, DOI 10.1016/S0361–3682(02)00097–1	50	2049	0.15%	6.27%	6.49%
18	Ittner CD, 2003, V78, P725, ACCOUNT REV, DOI 10.2308/accr.2003.78.3.725	46	2095	0.14%	6.41%	5.97%
19	Figge F, 2002, V11, P269, BUS STRATEG ENVIRON, DOI [10.1002/bse.339, DOI 10.1002/BSE.339]	46	2141	0.14%	6.55%	5.97%
20	Kaplan R.S., 2006, ALIGNMENT USING BALANCED SCORECARD TO CREATE CORPORATE SINERGIES	43	2184	0.13%	6.68%	5.58%
21	Davis S., 2004, V15, P135, MANAGEMENT ACCOUNTIN, DOI DOI 10.1016/J.MAR.2003.11.001	43	2227	0.13%	6.81%	5.58%
22	Kaplan R.S., 2001, V15, P147, ACCOUNT HORIZ, DOI DOI 10.2308/ACCH.2001.15.2.147	43	2270	0.13%	6.94%	5.58%
23	Inamdar N, 2002, V47, P179, J HEALTHC MANAG	39	2309	0.12%	7.06%	5.06%
24	Ittner CD, 2003, V28, P715, ACCOUNT ORG SOC, DOI 10.1016/S0361–3682(03)00033–3	39	2348	0.12%	7.18%	5.06%
25	Hoque Z, 2014, V46, P33, BRIT ACCOUNT REV, DOI 10.1016/j.bar.2013.10.003	38	2386	0.12%	7.30%	4.93%
26	Ittner C. D., 1998, V10, P205, J MANAGEMENT ACCOUNT	38	2424	0.12%	7.42%	4.93%
27	Niven P. R., 2002, BALANCED SCORECARD	36	2460	0.11%	7.53%	4.67%
28	Kaplan R.S., 2004, V82, P52, HARVARD BUS REV	35	2495	0.11%	7.64%	4.54%
29	Otley D., 1999, V10, P363, MANAGEMENT ACCOUNTIN, DOI 10.1006/MARE.1999.0115	35	2530	0.11%	7.75%	4.54%
30	Martinsons M, 1999, V25, P71, DECIS SUPPORT SYST, DOI 10.1016/S0167–9236(98)00086–4	35	2565	0.11%	7.86%	4.54%
31	Zelman William N, 2003, V29, P1, J Health Care Finance	34	2599	0.10%	7.96%	4.41%
32	Ahn H, 2001, V34, P441, LONG RANGE PLANN, DOI 10.1016/S0024–6301(01)00057–7	34	2633	0.10%	8.06%	4.41%
33	Banker RD, 2000, V75, P65, ACCOUNT REV, DOI 10.2308/accr.2000.75.1.65	34	2667	0.10%	8.16%	4.41%
34	Kaplan R.S., 2008, EXECUTION PREMIUM LINKING STRATEGY TO OPERATIONS FOR COMPETITIVE ADVANTAGE	33	2700	0.10%	8.26%	4.28%
35	Libby T, 2004, V79, P1075, ACCOUNT REV, DOI 10.2308/accr.2004.79.4.1075	32	2732	0.10%	8.36%	4.15%
36	Lipe MG, 2002, V27, P531, ACCOUNT ORG SOC, DOI 10.1016/S0361–3682(01)00059–9	32	2764	0.10%	8.46%	4.15%
37	MOORAJ S., 1999, V17, P481, EUROPEAN MANAGEMENT, DOI DOI 10.1016/S0263–2373(99)00034–1	32	2796	0.10%	8.56%	4.15%
38	Braam GJM, 2004, V37, P335, LONG RANGE PLANN, DOI 10.1016/j.lrp.2004.04.007	32	2828	0.10%	8.66%	4.15%
39	Kaplan R.S., 2000, HARVARD BUSINESS SCHOOL PRESS	31	2859	0.09%	8.75%	4.02%
40	Saaty T.L., 1980, ANAL HIERARCHY PROCE	30	2889	0.09%	8.84%	3.89%
41	FORNELL C, 1981, V18, P39, J MARKETING RES, DOI 10.2307/3151312	30	2919	0.09%	8.93%	3.89%
	Rest	30,141	32,706	91.08%	100.00%	———

Norton 9 works on top positions, were published between 1992 and 2001 –apart from their third book Kaplan & Norton (2004). These works were written during the initials of the BSC and not regarding any features developed later, and therefore, this set of works can be considered as a general reference for the scholar community.

Other authors like Ittner, Norreklit or Hoque, stand out of the rest with two or more articles published, although all included in this table have enough cites to be considered relevant about this issue.

Table 5 represents Table 4 but sorted by reviews.

'Harvard Business Review' maintains the top position by far, with both the highest number of citations and average, 828–165.6, although 'The Accounting Review' and 'Management Accounting Research' with the same number of articles. However, on the whole, the reviews maintain a remarkable average in citations, showing that their articles have a great impact into the scholar community.

Further to the 7 books, it does not surprise that 5 of them belong to Kaplan and Norton: 'The Balanced Scorecard: Translating Strategy into Action' (1996), with 340 citations; Kaplan & Norton (2004), with 134 citations; Kaplan & Norton (2006), with 43 citations; Kaplan & Norton (2008), with 33 citations; and 'The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment' (2000), with 31 citations.

4.2.2. Most relevant reviews: articles and citations

Table 6 shows the 24 most prolific and cited reviews, sorted by the

Table 5

Most-cited articles, sorted by review.

Review	ISSN	Articles	Citations	Average
Harvard Business Review	0017–8012	5	828	165.60
The Accounting Review	1558–7967	5	237	47.40
Management Accounting Research	1044–5005	5	283	48.75
Journal of Management Accounting Research	1558–8033	3	149	49.67
Accounting, Organizations and Society	0361–3682	3	121	40.33
Accounting Horizons	1558–7975	2	124	62.00
Long Range Planning	0024–6301	2	66	33.00
Ivey Business Journal	1492–7071	1	144	144.00
California Management Review	0008–1256	1	66	66.00
Business Strategy and the Environment	1099–0836	1	46	46.00
Journal of Healthcare Management	1096–9012	1	39	39.00
The British Accounting Review	0890–8389	1	38	38.00
Decision Support Systems	0167–9236	1	35	35.00
Journal of Health Care Finance	1078–6767	1	34	34.00
European Management Journal	0263–2373	1	32	32.00
Journal of Marketing Research	1547–7193	1	30	30.00
Books	———	7	647	92.43
		41	2919	71.20

Table 6
Most relevant reviews, sorted by citation.

Review	ISSN	Articles	Citations	Average
Harvard Business Review	0017–8012	17	980	57.65%
Management Accounting Research	1044–5005	21	445	21.19%
The Accounting Review	1558–7967	13	325	25.00%
Accounting, Organizations and Society	0361–3682	22	305	13.86%
Expert Systems with Applications	0957–4174	20	238	11.90%
Journal of Management Accounting Research	1558–8033	8	197	24.63%
International Journal of Operations & Production Management	0144–3577	16	143	8.94%
Long Range Planning	0024–6301	7	126	18.00%
European Journal of Operational Research	0377–2217	8	95	11.88%
Journal of Healthcare Management	1096–9012	5	91	18.20%
Journal of Health Care Finance	1078–6767	6	79	13.17%
International Journal of Productivity and Performance Management	1741–0401	8	74	9.25%
European Management Journal	0263–2373	4	67	16.75%
The British Accounting Review	0890–8389	5	63	12.60%
Journal of Operational Research Society	0160–5682	5	60	12.00%
Contemporary Accounting Research	1911–3846	4	50	12.50%
International Journal of Hospitality Management	0278–4319	4	49	12.25%
Journal of Accounting and Organizational Change	1832–5912	5	45	9.00%
Journal of Accounting Research	1475–679X	4	45	11.25%
International Journal of Public Sector Management	0951–3558	4	40	10.00%
International Journal of Production Economics	0925–5273	5	39	7.80%
Benchmarking: An International Journal	1463–5771	4	29	7.25%
Academy of Management Review	1930–3807	4	28	7.00%
Total Quality Management & Business Excellence	1478–3371	4	26	6.50%
Total		203	3639	17.93%

Table 7
Most relevant reviews, sorted by average.

Review	ISSN	Articles	Citations	Average
Harvard Business Review	0017–8012	17	980	57.65%
The Accounting Review	1558–7967	13	325	25.00%
Journal of Management Accounting Research	1558–8033	8	197	24.63%
Management Accounting Research	1044–5005	21	445	21.19%
Journal of Healthcare Management	1096–9012	5	91	18.20%
Long Range Planning	0024–6301	7	126	18.00%
European Management Journal	0263–2373	4	67	16.75%
Accounting, Organizations and Society	0361–3682	22	305	13.86%
Journal of Health Care Finance	1078–6767	6	79	13.17%
The British Accounting Review	0890–8389	5	63	12.60%
Contemporary Accounting Research	1911–3846	4	50	12.50%
International Journal of Hospitality Management	0278–4319	4	49	12.25%
Journal of Operational Research Society	0160–5682	5	60	12.00%
Expert Systems with Applications	0957–4174	20	238	11.90%
European Journal of Operational Research	0377–2217	8	95	11.88%
Journal of Accounting Research	1475–679X	4	45	11.25%
International Journal of Public Sector Management	0951–3558	4	40	10.00%
International Journal of Productivity and Performance Management	1741–0401	8	74	9.25%
Journal of Accounting and Organizational Change	1832–5912	5	45	9.00%
International Journal of Operations & Production Management	0144–3577	16	143	8.94%
International Journal of Production Economics	0925–5273	5	39	7.80%
Benchmarking: An International Journal	1463–5771	4	29	7.25%
Academy of Management Review	1930–3807	4	28	7.00%
Total Quality Management & Business Excellence	1478–3371	4	26	6.50%
		203	3639	17.93%

number of citations received.

In Table 7, the 24 most prolific and cited reviews are sorted by the average between the citations received and the articles cited.

As expected in advance, almost the whole reviews are related with management and accountability, although several tackle other issues as health, hospitality or operations, including the public sector, showing the interest that the BSC wakes in other fields of activity.

Both tables show that the most influential review by large is 'Harvard Business Review', not only because of the number of articles published but also because of the great impact that its 17 articles have provoked: 980 citations, with an average of 57.65 citations per article.

At first sight in Table 6, six reviews stand out on the others as they have more than 10 articles referenced and have most of the number of citations: 'Accounting, Organizations and Society' (22/305), 'Management Accounting Research' (21/445), 'Expert Systems with Applications' (20/238), 'Harvard Business Review' (17/980), 'International Journal of Operations & Production Management' (16/143), and 'The Accounting Review' (13/325) –apart from 'Journal of Management Accounting Research', that has 197 citations in 8 articles. However, the rest cannot be underestimated: although their figures are not the same that the first ones, but they are not as far from them, also showing a significant impact into the scholar community. It also confirms that this relevance not only go to highly recognised reviews, and mainly focused on management and accountability, but also to others that tackle with

other 'no traditional' issues. And this relevance confirms the importance that the BSC is gaining in these fields of activity, widening the scope of the BSC application: the BSC is increasing year by year its weight in the whole industries, activities and even in the public sector.

On the other hand, when taking into account Table 7 –considering 'citations' as the most relevant quality/impact indicator (Podsakoff, MacKenzie, Podsakoff, & Bachrach, 2008)– the ranking displayed in Table 6 shows a slightly variation: 'Harvard Business Review' (57.65), 'The Accounting Review' (25.00), 'Journal of Management Accounting Research' (24.63), and 'Management Accounting Research' (21,19), maintain top positions with an average up to 20 citation per article. But, 'Accounting, Organizations and Society' (13.86), 'Expert Systems with Applications' (11.90), and 'International Journal of Operations & Production Management' (8.94), significantly drop positions down, with averages even below the 10 citations per article. However, the two first reviews, together with other eleven, have an average up to 10 citations per article, showing the high relevance that they play. On the whole, all the data displayed in the table shown solid averages, remarking again the relevance and impact that these reviews and their articles have in researchers and into the scholar community.

Eventually, it should be noticed that 'Ivey Business Journal' does not appear in Table 6 and Table 7, because only 1 article was published on it, although it has 144 citations –placed in fourth position in Table 4. The explanation for such grade of success is that this article written by

Kaplan and Norton, but also a resume of their second book 'The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment' (2000). With this resume, 'transforming' a book into an article, Kaplan and Norton simplified its reading, making easier the interpretation and assimilation of its key points and outcomes.

4.3. Structural or relationships indicators

According to previous studies (Fernandes, et al., 2017; García-Lillo, Úbeda-García, & Marco-Lajara, 2016; Dzikowski, 2018; Ramos-Rodríguez & Ruíz-Navarro, 2004), as the volume of the data collected is too high and in order to make it easy to handle, a cut-off was carried out selecting the documents with higher impact.

4.3.1. Article co-citation analysis

In BibExcel and on the basis of the 'out' and 'cit' files previously obtained, a new 'coc' file was created but restricting the cit-file taking into consideration those most-cited articles with 30 or more citations –shown in Table 4. And from it, two new files were created to be used in VOSviewer software: 'net' and 'vel'.

Once in VOSviewer, and on 'net' file, a minimum total link strength of an item of 0 was applied, obtaining 41 items divided into 3 clusters, distributed as shown in Graph 5.

As expected, the article 'The Balanced Scorecard. Measures that Drive Performance' by Kaplan and Norton (1992) is the largest circle of the map, although closely followed by the book they published as a consequence of the good reception of the former: 'The Balanced Scorecard: Translating Strategy into Action' (1996) –both in cluster 2 (green) and clearly standing out form the rest. The article 'The balance on the balanced scorecard. A critical analysis of some of its assumptions' (Nørreklit, 2000), even leading cluster 1 (red), occupies the sixth position, behind five Kaplan and Norton works: 3 articles and 2 books. Table 8 shows the whole items identified in the co-citation map, including their links and the total link strength of each one, justifying the circle-size of the articles.

Graph 5 reflects that clusters 1 (red) and 2 (green) share the central position in the 'intellectual space,' while cluster 3 (blue) is slightly above. However, them all are very close, like they were forming a group

as a unique circle, indicating how important and interrelated are the three.

As Graph 5 and Table 8 show, cluster 1 (red) with 18 articles, slightly stands out from cluster 2 (green). In the former, apart from the two Nørreklit's theoretical articles, very critical with the BSC, the rest are mostly case studies carried out in different industries and countries, concluding that the BSC is a useful management tool to implement the firm's strategy. Cluster 2 (green) with 13 documents, groups together the majority of the Kaplan and Norton's works, mainly focused on the first stages of the BSC development treated as a 'BSC theory', including the book 'The Balanced Scorecard: Translating Strategy into Action' (Kaplan & Norton, 1996) –although two other books are included: 'Decision making. The Analytic Hierarchy Process' (Saaty, 1980), and 'Balanced Scorecard Step-by-Step: Maximizing Performance and Maintaining Results' (Niven, 2002). Cluster 3 (blue) with ten documents, leading by 'Building a Strategy-Focused Organization' (Kaplan & Norton, 2001), has four Kaplan and Norton books, and the rest of the articles are literature reviews or theoretical frameworks.

This allows us to conclude that the three clusters define a clear and interesting pattern: the whole BSC insight is contained into a 'circle', with three different parts or areas of knowledge –almost equally divided. A first, focused on the theory frame, developed by Kaplan and Norton as the BSC 'creators' (cluster 2); a second, focused on literature reviews, acting as a theoretical analysis (cluster 3); and a third, focused on case studies, being the practical application (cluster 1). This result shows that the BSC insight covers the whole spectrum of knowledge activity.

When comparing the link strength of these three clusters, remarkable differences can be noticed.

Cluster 2 is by far the stronger, where the first Kaplan and Norton article and book are in the lead, together with their article Kaplan & Norton, (1996a) –1859, 1549, and 1010, respectively. As it was commented previously, the data displayed shows that these works have been widely recognised by the scholar community almost as essentials to be cited in any BSC research.

Cluster 2 and 3 show a similar pattern in their distribution. First, both can be separated in three blocks: the top one, a second with strong links, and a third with poorest strengths comparing with the other two. And second, both have few works on top, with a remarkable gap from the rest. This implies that, although all works play a crucial role in
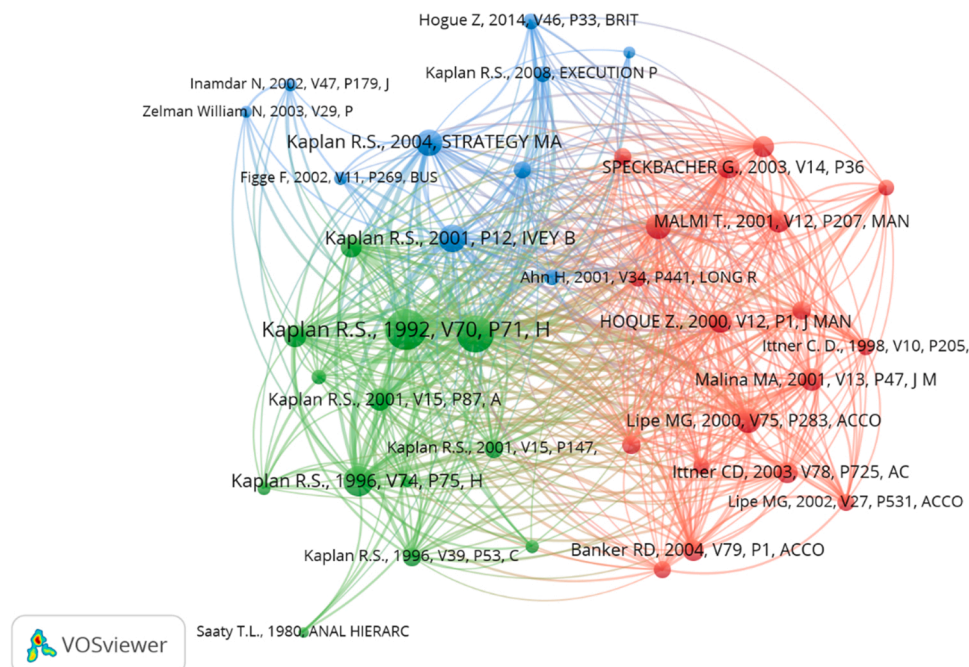
Graph 5. Article co-citation map, with 3 clusters and 41 items.

Table 8
Article co-citation clusters and items.

Cluster	Item	Links	Total link strength
1 (red)	Norreklit H, 2000, V11, P65, MANAGE ACCOUNT RES, DOI DOI 10.1006/MARE.1999.0121	40	722
	Lipe MG, 2000, V75, P283, ACCOUNT REV, DOI 10.2308/accr.2000.75.3.283	40	677
	Speckbacher G., 2003, V14, P361, MANAGEMENT ACCOUNTIN, DOI DOI 10.1016/J.MAR.2003.10.001	40	592
	Malina MA, 2001, V13, P47, J MANAGEMENT ACCOUNT, DOI DOI 10.2308/JMAR.2001.13.1.47	40	562
	Malmi T., 2001, V12, P207, MANAGEMENT ACCOUNTIN, DOI DOI 10.1006/MARE.2000.0154	40	547
	Hoque Z., 2000, V12, P1, J MANAGEMENT ACCOUNT, DOI DOI 10.2308/JMAR.2000.12.1.1	40	541
	Banker RD, 2004, V79, P1, ACCOUNT REV, DOI 10.2308/accr.2004.79.1.1	40	495
	Ittner CD, 2003, V78, P725, ACCOUNT REV, DOI 10.2308/accr.2003.78.3.725	40	484
	Norreklit H, 2003, V28, P591, ACCOUNT ORG SOC, DOI 10.1016/S0361–3682(02)00097–1	39	482
	Ittner CD, 2003, V28, P715, ACCOUNT ORG SOC, DOI 10.1016/S0361–3682(03)00033–3	40	379
	Davis S., 2004, V15, P135, MANAGEMENT ACCOUNTIN, DOI DOI 10.1016/J.MAR.2003.11.001	40	376
	Libby T, 2004, V79, P1075, ACCOUNT REV, DOI 10.2308/accr.2004.79.4.1075	40	345
	Lipe MG, 2002, V27, P531, ACCOUNT ORG SOC, DOI 10.1016/S0361–3682(01)00059–9	38	344
	Ittner C. D., 1998, V10, P205, J MANAGEMENT ACCOUNT	38	327
	Braam GJM, 2004, V37, P335, LONG RANGE PLANN, DOI 10.1016/j.lrp.2004.04.007	40	317
	Ahn H, 2001, V34, P441, LONG RANGE PLANN, DOI 10.1016/S0024–6301(01)00057–7	40	299
	Banker RD, 2000, V75, P65, ACCOUNT REV, DOI 10.2308/accr.2000.75.1.65	40	285
	Otley D., 1999, V10, P363, MANAGEMENT ACCOUNTIN, DOI DOI 10.1006/MARE.1999.0115	36	284
2 (green)	Kaplan R.S., 1992, V70, P71, HARVARD BUS REV	40	1859
	Kaplan R.S., 1996, BALANCED SCORECARD TRANSLATING STRATEGY INTO ACTION	40	1549
	Kaplan R.S., 1996, V74, P75, HARVARD BUS REV	40	1010
	Kaplan R.S., 1993, V71, P134, HARVARD BUS REV	40	592
	Kaplan R.S., 2001, V15, P87, ACCOUNT HORIZ, DOI 10.2308/ACCH.2001.15.1.87	40	554
	Kaplan R.S., 2000, V78, P167, HARVARD BUS REV	40	485
	Kaplan R.S., 1996, V39, P53, CALIF MANAGE REV, DOI 10.2307/41165876	39	406
	Kaplan R.S., 2001, V15, P147, ACCOUNT HORIZ, DOI 10.2308/ACCH.2001.15.2.147	40	362
	Kaplan R.S., 2004, V82, P52, HARVARD BUS REV	40	260
	Niven P. R., 2002, BALANCED SCORECARD S	40	212
	Martinsons M, 1999, V25, P71, DECIS SUPPORT SYST, DOI 10.1016/S0167–9236(98)00086–4	37	199
	FORNELL C, 1981, V18, P39, J MARKETING RES, DOI 10.2307/3151312	37	179
	Saaty T.L., 1980, ANAL HIERARCHY PROCE	32	126
3 (blue)	Kaplan R.S., 2001, P12, IVEY BUSINESS JOURNAL	40	882

Table 8 (*continued*)

Cluster	Item	Links	Total link strength
	Kaplan R.S., 2004, STRATEGY MAPS CONVERTING INTANGIBLE ASSETS INTO TANGIBLE OUTCOMES	40	744
	Kaplan R.S., 2006, ALIGNMENT USING BALANCED SCORECARD TO CREATE CORPORATE SINERGIES	40	343
	Kaplan R.S., 2008, EXECUTION PREMIUM LINKING STRATEGY TO OPERATIONS FOR COMPETITIVE ADVANTAGE	38	303
	Hoque Z, 2014, V46, P33, BRIT ACCOUNT REV, DOI 10.1016/j.bar.2013.10.003	39	275
	MOORAJ S., 1999, V17, P481, EUROPEAN MANAGEMENT, DOI DOI 10.1016/S0263–2373(99)00034–1	40	269
	Inamdar N, 2002, V47, P179, J HEALTHC MANAG	39	196
	Figge F, 2002, V11, P269, BUS STRATEG ENVIRON, DOI [10.1002/bse.339, DOI 10.1002/BSE.339]	39	194
	Zelman William N, 2003, V29, P1, J Health Care Finance	38	159
	Kaplan R.S., 2000, HARVARD BUSINESS SCHOOL PRESS	37	152

researchers, the weight of their influence fall on few ones; and therefore, the BSC intellectual structure of the theory and the theoretical analysis, mainly falls on key works.

However, Cluster 1 shows a more balanced distribution: as Clusters 2 and 3, few works are place at top, but contrary to them, in Cluster 1 the rest are closely behind, and those occupying the last positions show stronger links than the others –as can be easily seen with red colour in Graph 5. The balance in the cluster which represents the practical application of the BSC, comes to the surface that there are no key authors into the scholar community who stand significantly over the rest, contrary to what happens in Clusters 2 and 3. This confirms that this part of the BSC intellectual structure is developed by many different authors around the world, and not by a few.

4.3.2. Keyword co-citation analysis

As same as happened in Section 4.3.1, in BibExcel and on the basis of the 'out' and 'cit' files previously obtained, a new 'coc' file was created but restricting the cit-file taking into consideration those keywords with 14 or more citations –shown in Table 3. And from it, two new files were created to be used in VOSviewer software: 'net' and 'vel'.

Once in VOSviewer, and on 'net' file, a minimum total link strength of an item of 15 was applied, obtaining 21 items divided into 5 clusters, distributed as shown in Graph 6.

Again, and as expected, 'Balanced Scorecard' is at the centre of the map, clearly standing out form the rest. Clusters leading by 'Performance/Management Measurement', 'Strategy', 'Sustainability' and 'Management' follow it. Table 9 shows the whole items identified in the co-citation map, including their links and the total link strength of each one, justifying the circle-size of the five lead-keywords.

As Graph 6 and Table 9 show, cluster 3 (blue) clearly stands out from the others, linking BSC with the concept of strategic management and management control, as well as linking the BSC with non-financial and performance measures (Kaplan & Norton, 1993; Kaplan & Norton, 1996b; Malmi, 2001; Wiersma, 2009). Cluster 2 (green) is in second place, showing the relationship between the BSC and the concept of PMS. Cluster 4 (yellow) reflects the relationship between the BSC and the concept of strategy, with strategy maps and cause-and-effect relationships as a key tool to translate the firm's strategy at all levels (Antonsen, 2014; Banker, Chang, & Pizzini, 2011; Glykas, 2013; Hoque, 2014; Jassbi, Mohamadnejad, & Nasrollahzadeh, 2011; Kaplan & Norton, 2000; Kaplan, 2012; Lucianetti, 2010; Madsen & Stenheim, 2015). Cluster 1 (red) confirms the importance that sustainability concept is
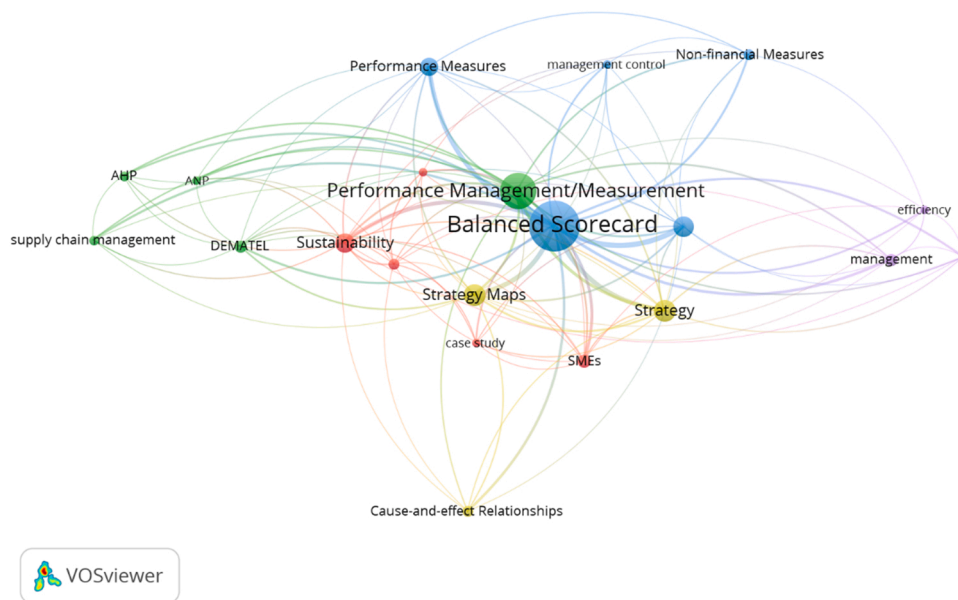
Graph 6. Keyword co-citation map, with 5 clusters and 21 items.

Table 9
Keyword co-citation clusters and items.

Cluster	Keyword	Links	Total link strength
1	Sustainability	17	63
(red)	Sustainable Balanced Scorecard	12	22
	SMEs	10	31
	Corporate Social Responsibility	6	14
	Case study	7	15
2	Performance Management/ Measurement	20	225
(green)	DEMATEL	11	24
	Supply Chain Management	7	19
	AHP	7	18
	ANP	7	15
3	Balanced Scorecard	20	422
(blue)	Strategic Management	13	72
	Performance Measures	13	59
	Non-financial Measures	8	20
	Management Control	8	15
4	Strategy Maps	15	80
(yellow)	Strategy	14	83
	Cause-and-effect Relationships	7	22
5	Management	8	28
(purple)	Indicators	7	19
	Efficiency	7	14

taking in the BSC for the past years (Ferreira da Cruz & Cunha Marques, 2014; Falle, Rauter, Engert, & Baumgartner, 2016; Huang, Pepper, & Bowrey, 2014; Hristov, Chirico, & Appolloni, 2019; Jong Na, Chang Lee, Uk Choi, & Tae Kim, 2020; Kalender & Vayvay, 2016), as well as the role that SMEs are playing too (Dudic, Dudic, Gregus, Novackova, & Djakovic, 2020; Falle, Rauter, Engert, & Baumgartner, 2016; Madsen & Stenheim, 2015). Eventually, cluster 5 (purple) show the straight BSC relationship with concepts like management, indicators and efficiency.

Contrary to Section 4.3.1, only two items of the five clusters clearly stand over the rest: 'Balanced Scorecard' with 422, in Cluster 3; and 'Performance Management/Measurement' with 225, in Cluster 2. The former is clearly justified by itself; and the latter, because it is widely accepted to consider the BSC precisely as a performance management or measurement system. Therefore, it can not be surprised that these two words appear as the most remarkable keywords regarding this issue.

Following these two words, although far from them, a second set of keywords can be identified: those with a link strength around 83 and 59.

First, 'Strategy' with 83 and 'Strategy Maps' with 80, both in Cluster 4, confirms the bonds between the BSC with strategy and how important is one of its features, strategy maps, by itself, as a visual representation of the strategy (Kaplan & Norton, 2004a) and considered for many authors as the most important element of the BSC (Jassbi, Mohamadnejad, & Nasrollahzadeh, 2011; Lucianetti, 2010; Madsen & Stenheim, 2015). Second, 'Strategic Management' with 72 and 'Performance Measures' with 59, both in Cluster 3: the former because the BSC, as a management tool designed to translate the strategy at all levels, it is a way to manage the strategy and so, can be identified for such keyword; and the latter, because, when building a BSC, it helps in identifying precisely the key measures that reflect the firm's strategy: in other words, the performance measures. And third, 'Sustainability' with 63 in Cluster 1, showing how this issue is playing a remarkable role for the past years with the evolution of the BSC into a Sustainable Balanced Scorecard (SBCS): in a SBSC research is logical to use generic keywords as 'Sustainability' and 'BSC', as it is confirmed.

And third, the rest of the keywords, spread out in the five clusters, showing how the BSC can be found in an extend range of words.

It is interesting to be remarked the importance that the BSC features have by themselves: non-financial measures, included in cluster 3 with the BSC; and strategy maps and cause-and-effect relationships, included in cluster 4. This implies that much research have been developed tackling specifically these features, confirming that the study of the BSC covers a wide range of issues.

Eventually, Graph 6 shows clusters 3 (blue) and 2 (green) clearly occupying the central position in the 'intellectual space', while the others are placed in the periphery, very specially cluster 5 (purple). This structure reflects how scattered these words are showing how balanced are the keywords, apart from 'Balanced Scorecard' and 'Performance Management/Measurement'.

5. Conclusions and future research

This research has used the bibliometric technique as the best tool to fill the existing gap in the BSC literature review, contributing not only to increase the insight of this issue but especially in this specific type of analysis. This technique complements the traditional literature reviews, allowing the proper identification of the most prolific and the most impacting works, authors and reviews, as well as identifying patterns of co-citations between works and between authors.

It was clear from the first approach, that the period to be studied must start from the first article published in 1992 (Kaplan & Norton, 1992), to the latest date possible, covering so the wider period of time possible –in this case, almost 30 years. And counting only with articles, as a standard practice to work with 'certified knowledge', guarantying the quality of the research (Callón, Courtial, & Hervé, 1993; García--Lillo, Úbeda-García, & Marco-Lajara, 2016; Ramos-Rodríguez & Ruíz--Navarro, 2004).

Quantity indicators reflect that: (1) the BSC still provokes high expectation into the scholar's community, specially from 2014, where an upturning point takes place with remarkable increasing in the number of articles published: 404 articles, representing the 52.40% –up to the half in only 7 years; (2) Kaplan and Norton are the most productive authors, although other follow them closely; (3) most productive reviews are concentrated in 3, but with different fields and scopes: 'management', 'systems' and 'sustainability', standing out the relevance that the two latter are playing for the past years; (4) regarding the Web of Sciences categories, 'Management' is at top, followed by others related with business, although 'sustainable' and 'healthcare' are gaining terrain; (5) USA occupies a clear first position in productivity, although it is interesting to be remarked that it is followed by 2 countries that do not have a Anglo-Saxon-background: Taiwan and Spain; and (6) 'Balanced Scorecard' is by large the most used keyword, although the most remarkable BSC features have an important presence by themselves.

Quality indicators, with 32,706 citations in total, reflect: (1) Kaplan and Norton occupy top positions, although not only with articles abut also with their 4 most successful books, as well as 'Harvard Business School', with the highest rates in citations and average; (2) most cited articles are published in reviews related with 'management' and 'accountability', with 'Harvard Business School' on a lonely top position.

In structural indicators, and regarding cited references it comes to light the 'co-existence' of a triple core-cluster, with an interesting pattern: cluster 2 (green) based on the BSC theory developed by Kaplan and Norton, cluster 3 (blue) focused on the theoretical analysis, and cluster 1 (red) mainly based on the practical application. However, regarding keywords, cluster 3 (blue) appears as a clear core-cluster, although closely followed by cluster 2 (green).

Regarding the three hypotheses set out in Section 2, the outcomes obtained answered them as follows.

H1 is confirmed, mainly by: Graph 1, where the evolution in the number of articles published shows that the BSC interest in the scholar community not only is maintained along the time, but also is increased along the years and especially in the last ones; the wide range of review's scopes shows in Table 2 and Graph 3, which confirms the interest that the BSC is waking in different areas of activity, no limiting it only to management or accounting fields but including sustainability and environmental issues in an progressive growing; and the author's nationalities displayed in Graph 4, ratifies that the whole scholar community around the world –wherever the country they are from, with different languages and cultures– is interested and committed in producing more research and studies focused on the BSC.

H2 is confirmed. Table 4 shows that, during the period of time covered by the study of 28 years, Kaplan and Norton are the most cited authors, being the only ones with more than 100 cites, occupying the sixth first positions –highlighting their first article (Kaplan & Norton, 1992) and book (Kaplan & Norton, 1996), with 420 and 340 citations respectively.

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H3 is confirmed. Graph 5 and Table 8 show that Kaplan and Norton works have the.

stronger 'total link strength' standing out over other authors, with five articles/books –1859, 1549, 1010, 882 and 774 links. These link-strengths evidences the weight that Kaplan and Norton still maintain over the rest of the researchers, being always presence as the key reference regarding the BSC and its features.

Eventually, these outcomes provide different theoretical and practical contributions to the conceptual structure of the BSC. The former, as it is displayed in Table 8, almost the whole BSC theory have been developed by Kaplan and Norton, with high presence and weight in all the research and being generally accepted by the scholar community, save from few works –that took place in its the first steps. Time has confirmed Kaplan and Norton within the scholar community as the only authorities in this field of the BSC.

And the latter, although Kaplan and Norton works are at the centre of most of the research, other authors are very close and even about to overtake them, and in many different countries around the world and in different fields of knowledge, ratifying that the BSC interest is widely spread out –as it is displayed in Table 1, Table 2, Graph 3 and in Graph 4. However, first Kaplan and Norton article (Kaplan & Norton, 1992) and book (Kaplan & Norton, 1996), are going to occupy always a preferent place in any study, because of their nature: it is not easy not to count with them when carrying out a research focused on the BSC, even if it is only to shortly introduce it –as shown in Table 4 and Table 8.

5.1. Limitations and future research

By using the Web of Science Core Collection as the unique source, we are restricting the wide spectrum of sources that can be found in the scientific community (Albort-Morant & Leal-Rodriguez, 2017; Dzikowski, 2018; Ramos-Rodríguez & Ruíz-Navarro, 2008), although for many authors this data base provides the best choice to reach a minimum quality in the final results –something that we share and justify the why of this election (Di Stefano, Peteraf, & Verona, 2010; Dzikowski, 2018; de Sousa, et al., 2020; García-Lillo, Úbeda-García, & Marco-Lajara, 2016; Rialti, Marzi, Ciappei, & Busso, 2019).

On the other hand, the fact to limit the sample only to articles, ruling out the participation in the research of books, book chapters, case-studies, or conference papers (Di Stefano, Peteraf, & Verona, 2010), lets behind an important amount of works, although the justification to do so is based on the 'certified knowledge' concept (Callón, Courtial & Hervé, 1993; García-Lillo, Úbeda-García, & Marco-Lajara, 2016; Ramos-Rodríguez & Ruíz-Navarro, 2004), providing an additional quality filter as they have passed a double-peer-review. However, it should be pointed out that, with this criterion, Kaplan and Norton's five key works under book-format have been excluded: 'The Balanced Scorecard: Translating Strategy into Action' (1996), 'The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment' (2000), Kaplan & Norton (2004), Kaplan & Norton (2006), and Kaplan & Norton (2008).

Bibliometric technique not necessary guaranties the quality of the sample finally selected, as many articles and cites have been used just due to the relevance or so-called relevance of the authors and not as a consequence of their reading and analysis (Albort-Morant & Leal-Rodriguez, 2017; Dzikowski, 2018; Ramos-Rodríguez & Ruíz-Navarro, 2004); or just responding an authors' strategy in incorporating certain works previously published in the review in which they are trying to publish and not attending to quality reasons (García-Lillo, Úbeda-García, & Marco-Lajara, 2016). However, this limitation is partially balanced during the peer-review process carry out in 'article'.

Latest published papers are at a disadvantage regarding previous works, when referring about how many citations they have received –and taking into consideration that the number of cites shows an 'quality/impact' measure. The fact that the former has been less time available to the scholar community, minimizes their capacity to have any influence, reducing their chances to be cited: the more closer the articles have been published to the sample-due-date, the more probably

to be not cited (García-Lillo, Úbeda-García, & Marco-Lajara, 2016; Ramos-Rodríguez & Ruíz-Navarro, 2004; Ramos-Rodríguez & Ruíz-Navarro, 2008); allowing to conclude that a minimum time is required to be exposed to the scholar community to gain some influence on it. And in particular for this research, this plays an important role due to the remarkable number of articles published in the last years: 2019, 59–7.65%; 2020, 65–8.43%, as shown in Graph 1. Future research should repeat the current one by using the same sample, in order to check the expected variation in the cites for the latest published articles.

Although all these limitations condition the research on the whole, we consider that the methodology employed is the best choice to reach the more accurate outcomes possible.

Eventually, and in order to avoid the huge amounts of errors and spelling mistakes identified during this research in fields like authors, articles, reviews, keywords and mainly in bibliography, authors should take especial care when introducing these data. In doing so, not only they are going to make easier this sort of research for other authors –not forcing them to waste hours and hours of 'unproductive' work–, but also and most important, they are going to make any search more accurate, something that should be of paramount importance for the scientific community. Tools like 'References' inserted/offered in word processors are very useful as they are especially designed to create an internal library of references, allowing their introduction properly through the presence of specific fields, as well as the insertion of citations within the paper and the bibliography at the end, always in accordance with the style required in each moment: APA, Chicago, GB7714, Harvard-Anglia….

Future research will check the evolution in the BSC articles, in order to verify the tendency line described in Graph 1 and analyse possible changes on it and the presence of new patterns.

Eventually, the fact that 95% of the articles are published in 443 out of 466 reviews of the sample, reveals that it is not clear the real reasons for those reviews to have published such articles. Many reasons can be identified, as not have a real interest in this issue, poor quality of the manuscripts received or not being into their aim and scope. Further research could be study in depth the why of this picture.

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