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Balanced scorecard for evaluating the performance of supply chains: A bibliometric study

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ABSTRACT

As supply chain management involves several criteria, its performance evaluation is a challenge for industrial managers. Researchers have proposed several approaches for such evaluations, among them are Balanced Scorecard (BSC) highlights. Academic papers on BSC applications for evaluating supply chain performance have been expressively increased in recent years. Considering that examining published papers on a topic is a way of monitoring the emergence of a new field, this study aims to explore, through Bibliometrics, papers published in indexed journals (SCOPUS and Web of Science databases). This paper weaves an overview of academic production and study trends on BSC for performance evaluation of supply chains. Findings help researchers and managers understand the state-of-the-art, to identify gaps and to identify future trends. The results also showed the maturation of studies over the years. The predominance of publications in journals with impact factor (Thomson Reuters) also has been noticed. The development of the theme in emerging countries can be useful for increasing the competitiveness of their companies. In summary, this study is helpful for influencing future studies and publications of researchers interested in performance evaluation of supply chains based on BSC and may orient new researchers so that they directly know which journals to consult and which technical procedures to explore.

Keywords: Balanced Scorecard; Supply Chain Management; Performance Evaluation; Bibliometry; Emerging Countries.

INTRODUCTION

Globalization, growing competition, has contributed to highlighting the importance of business management, principally Supply Chain Management (SCM). Supply chains are a set of industrial installations, supplies, clients, goods, and methods of monitoring inventory, purchasing, and distribution that link suppliers and customers (Xu et al., 2009). An efficient supply chain provides essential benefits for a world of global competition, such as reduced costs, growth in sales and market share, and sustainable relationships with customers and suppliers (Shafiee et al., 2014).

Performance evaluation of supply chains is considered an important element of companies' accomplishment, as well as one of the broader strategic decision issues (Dath et al., 2010). Decision-makers and manager are expected to formulate effective SCM and share information with the whole chain so that they can mitigate the bullwhip effect (Shiau et al., 2015).

Performance evaluation of supply chains aims to obtain information on activities and to identify opportunities for improvement. Information is crucial when activities are not suitable to the defined targets, in order to reorient their movement. Both information and opportunity identification are critical when performance is below the goal and it needs attention for not impacting upon financial results.

The integration of the performance of all its members increases the efficiency of a supply chain (Shafiee et al., 2014). Consequently, the performance evaluation of supply chains is a complicated task, because this evaluation involves several actors who are seeking to obtain better logistical and strategic goals (Estampe et al., 2013).

Several approaches have been developed to evaluate the performance of supply chains, and some of the most prominent ones are Balanced Scorecard (BSC), criteria for measurement system design, Economic Value Added (EVA), fuzzy-set approach, measurement system of supply chains, performance measurement matrix, performance measurement questionnaire, process-based measurement, and SCOR (Brun et al., 2009; Piotrowicz and Cuthbertson, 2015; Shafiee et al., 2014).

Park et al. (2005) state that some studies in SCM just propose a common framework for its metrics and there is need for a more integrated perspective between financial and non-financial aspects. The BSC is one of the most simple and comprehensive performance evaluation tools. It embraces simultaneously internal and external business measures, financial and non-financial factors, and long- and short-term plans of action (Shafiee et al., 2014). According to Bronzo et al. (2013), among the contemporary performance evaluation systems, BSC is the methodology that has gained more acceptance in academic communities and business models. In recent years, companies are stimulated to adopt BSCs for measuring supply chain performance (Chang et al., 2013).

BSC is a cause and effect method used to reveal in which parameters an organisation is a leader and, simultaneously, in which parameters it presents a low performance (Eskafi et al., 2015). It is a tool that reflects the strategy and the mission of an organisation into a set of unbiased and measurable indicators. BSC is composed of four distinct perspectives: customers, financial, internal business processes, and learning and growth (Kaplan and Norton, 1996, Tsang et al. 1999). For Wu and Chang (2012), BSC is appropriate to overcome the performance evaluation-related issues in supply chains, and its acceptance as a method for implementing business strategies has significantly increased (Zimmermann and Seuring, 2009).

BSC evaluates performance considering six dimensions of integration: (1) customer, (2) internal process, (3) measurement, (4) relationship, (5) supplier services with material supply, and (6) technology with planning (Chang, 2009). By linking these dimensions, BSC supports managers to perceive and understand the associations and trade-offs among optional performance degrees, thus leading to enhanced decisions (Rajesh et al., 2012).

Through a bibliographical search in SCOPUS and Web of Science databases (detailed information under section 2 Method), we found 100 published studies on performance evaluation of supply chains based on BSC. The first paper about the theme was published in 2002, then the theme has been consistently increasing in recent years. Therefore, it is important to have an overview of the academic production on the theme.

The bibliometric studies can collaborate in the task of systematizing the research carried out in a certain field of knowledge and addressing problems to be investigated in future research. In this way, the bibliometric research provides the basis for the gradual development of scientific knowledge. Several academic disciplines in the area of management have analysed their researches under the optical of bibliometric characteristics (Hsieh and Chang, 2009) because analysis through bibliometric tools is usually powerful for detecting emerging and established topical areas (Fahimnia et al., 2015). Shiau et al. (2015) state that performance measurement in SCM is a relevant research topic that needs to be better addressed in the literature. Hence, the purpose of this research is to examine the literature related to performance evaluation of supply chains based on BSC.

It is possible to assess the literature by journals, citations, countries, and technical procedures, using bibliometric methods. This study is helpful for influencing future studies and publications of researchers interested in performance evaluation of supply chains based on BSC and aims to orient researchers who are new in the research field so that they know which journals to consult and which technical procedures to explore when studying this theme.

This study is divided into 4 sections. Section 2 provides detailed information about the adopted methodology. The results, according to the analysed criteria (journal, authors' affiliation country, and applied technical procedures), are under section 3. Conclusion, limitations, and recommendations for future researches are under section 4.

METHODOLOGY

The used method aims to obtain results capable of addressing the academic researchers progress on the use of Balanced Scorecard for the performance evaluation of supply chains. Considering that it is complicated to have an explicit distinction between publications with high-quality level and those that are not and that not all publications have the same value to scientists, this work restricted its bibliographical sources to SCOPUS and Web of Science databases. They were selected due to their broad utilization and impact on the international academic community (Romo-Fernández et al., 2011). The bibliographic search ended in January 2017, and following the directions recommended by Carnevalli and Miguel (2008) and Ngai et al. (2008), we selected only studies published in journals, as they are considered as studies of the best scientific level. In the searches, following the directions recommended by Charvet et al. (2008), we used the keywords "supply chain*" and "Balanced Scorecard" in the title, abstract, and author-supplied keywords to collect worthwhile information. At total, 100 studies truly related to the proposed theme were found. For the analyses presented in this manuscript, only papers published until December 31, 2016, were included.

Bibliometric technics are indispensable tools for measuring scientific progress, as they simultaneously summarize the dominant trends and points knowledge gaps (Blank et al., 2013). Bibliometrics may be used as a base for qualitative evaluation, but it is worth remembering that it is a quantitative tool by nature (Du et al., 2015).

The application of bibliometric techniques permits carrying out different analysis, e.g., main authors (Willett, 2007), emerging topics and contemporary developments in a research field (Shafique, 2013), and the influence of researchers (Ferreira, 2011). Baumgartner and Pieters (2003) assess the importance of different journals in bibliometric studies. Other authors focus on the affiliation of authors (Podsakoff et al., 2008) or on the intellectual framework of an area (Ramos-Rodriguez and Ruiz-Navarro, 2004). According to Bornmann and Marx (2015), considering the methodology of an approach has its own advantages and disadvantages, which manifest for or against its use, a researcher using bibliometric indicators in a study must know which approach to adopt. In this research, the bibliometrics was used to evaluate the chronological growth of scientific production, main journals diffusing papers, and distribution of the papers among countries, in order to check whether studies are predominant in emerging or advanced economies.

BIBLIOMETRIC ANALYSIS

The first paper that published BSC for evaluating the supply chains performance appeared in SCOPUS and Web of Science databases in 2002. Table 1 lists the annual quantity of studies and in which journal the papers were published. Table 1 presents that, with some variations, there was a growth over the years of studies that address the use of BSC for evaluating the performance of supply chains, considering that in 2002 only 1 paper was published and in 2012, the highest number of papers published increased to 15.

The 100 papers on the theme published in SCOPUS and Web of Science databases were presented in 72 journals, pointing that the research field does not yet have established channels for presenting its works, a typical demonstration of it being in a 'growing' state. Consolidated fields tend to have their papers published in a smaller quantity of specialised journals, ensuring less 'dispersion' of knowledge and more assertive search methods for a particular theme (von Krogh et al., 2012).

Looking at Table 1, 82% of journals published just one paper on the theme; 8.3% published two papers; and 5.55% published three papers. Only three journals published more than three papers, i.e., Production Planning and Control (7 papers; 7% of the total), Benchmarking (5 papers; 5%), and International Journal of Production Research (5 papers; 5%).

Looking for trends over time, Figure 1 clearly shows that the quantity of publications in journals with and without an IF has varied clearly from 2004 onwards. Whereas the participation of journals without an IF increased, the number of papers published in journals with an IF has increased simultaneously. Considering the relative novelty of the theme, the increase of publications in journals with an IF might be a sign of increasing academic attractiveness, as such occurrence originates higher-quality researches, and states topic is 'publishable' in the perception of the editors-in-chief, editorial board, and reviewers.

Table 1. Yearly distribution of published papers.

Journal[1]	Impact factor (2015)	Year															Total
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Production Planning & Control	1.532						1		2			1		3			7
Benchmarking	-								2	1				1		1	5
International Journal of Production Research	1.693	1								1		1			1	1	5
International Journal of Productivity and Performance Management	-												1		2		3
Industrial Management & Data Systems	1.278									1				1	1		3
International Journal of Computer Integrated Manufacturing	1.319								1		1				1		3
Sustainability	1.343														2	1	3
Computers & Industrial Engineering	2.086						1					1					2
Computers in Industry	1.685				1								1				2
Decision Support Systems	2.604											2					2
Journal of Cleaner Production	4.959															2	2
Journal of Manufacturing Technology Management	-										1				1		2
Measuring Business Excellence	-					2											2

[1] Although the paper of Brewer and Speh (2000) has received many citations and had a great influence on the advance of the topic, it was not included because it was not indexed in the SCOPUS and Web of Science.

Accounting Review	1.953											1					1
Advance Journal of Food Science and Technology	-														1		1
Advances in Information Sciences and Service Sciences	-										1						1
Agricultural Systems	2.867															1	1
Applied Mathematical Modelling	2.291													1			1
Asia Pacific Journal of Marketing and Logistics	-							1									1
Computers in Human Behavior	2.880															1	1
Ecological Economics	3.227								1								1
Espacios	-												1				1
European Journal of Industrial Engineering	0.718								1								1
European Journal of Information Systems	2.892				1												1
European Journal of Operational Research	2.679			1													1
Facilities	-									1							1
IEEE Systems Journal	2.114											1					1
Indian Journal of Science and Technology	-															1	1
Industrial Engineering & Management Systems	-													1			1
Ingeniería y Universidad	-											1					1
International Journal of Business Excellence	-										1						1

International Journal of Business Information Systems	-											1					1
International Journal of Business Performance Management	-															1	1
International Journal of Engineering and Technology	-															1	1
International Journal of Engineering Business Management	-												1				1
International Journal of Health Care Quality Assurance	-				1												1
International Journal of Industrial Engineering Computations	-														1		1
International Journal of Information Management	2.692												1				1
International Journal of Logistics Research and Applications	0.933								1								1
International Journal of Logistics Systems and Management	-											1					1
International Journal of Management and Enterprise Development	-								1								1
International Journal of Operations and Quantitative Management	-				1												1
International Journal of Physical Distribution & Logistics Management	2.101							1									1
International Journal of Production Economics	2.782											1					1
International Journal of Quality & Reliability Management	-													1			1
International Journal of Supply Chain Management	-														1		1
Journal of Bionic Engineering	1.466												1				1
Journal of Business Research	2.129														1		1
Journal of Computational Information Systems	-													1			1

Journal of Humanitarian Logistics and Supply Chain Management	-													1			1
Journal of Managerial Issues	-							1									1
Journal of Modelling in Management	-											1					1
Journal of Optimization Theory and Applications	1.160												1				1
Journal of Polymers and the Environment	1.969											1					1
Journal of Technology Management & Innovation	-														1		1
Journal of Testing and Evaluation	0.423															1	1
Journal of the Operational Research Society	1.225		1														1
Journal of Workplace Learning	-												1				1
Kybernetes	0.637								1								1
Logistics Research	-												1				1
Mathematical Problems in Engineering	0.644															1	1
Omega	3.962											1					1
Packaging Technology and Science	1.292		1														1
Problems and Perspectives in Management	-												1				1
Resources, Conservation and Recycling	3.280										1						1
Revista Técnica de la Facultad de Ingeniería Universidad del Zulia	0.047[2]															1	1

[2] Referring to the year 2013.

Service Business	0.985												1				1
Technological Forecasting & Social Change	2.678													1			1
The International Journal of Advanced Manufacturing Technology	1.568										1						1
The Service Industries Journal	0.776								1								1
Transport and Telecommunication	-													1			1
Water Resources Management	2.437											1					1
Total		1	2	1	4	2	2	3	11	4	6	15	11	12	13	13	100

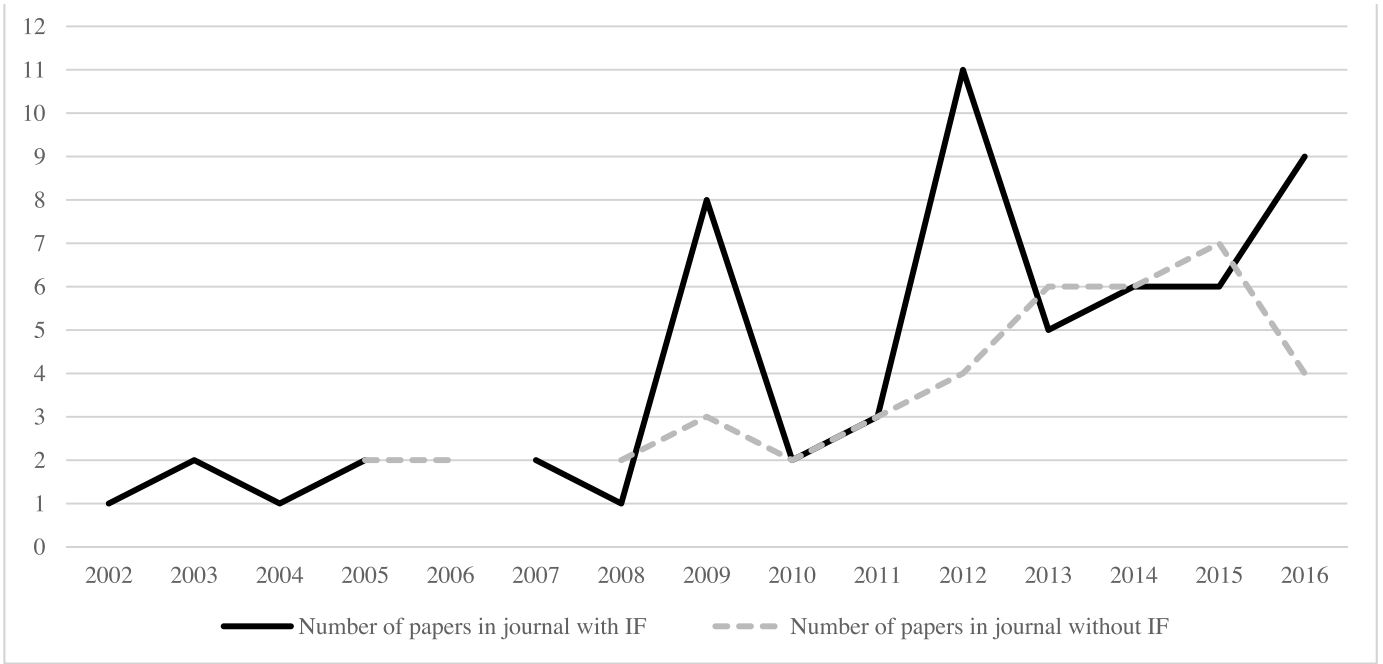

Figure 1. Publication volume, broken down into papers published in journals with and without an impact factor (IF).

The performance of journals

Tables 1 and 2 present the IF of the journals where the studies were published. For Hsieh and Chang (2009), the value of publications is usually evaluated by the classification of the journals in Journal Citation Report (JCR). As IF is an influential tool in modern academia, it is used to evaluate the relative importance of a paper. Tables 1 and 2 list IF of journals using information from Thomson Reuters 2015. The IF helps evaluate the journal's relative importance among similar journals. It can be argued that most of the papers have been presented in journals with high IF, considering that of the 100 papers analysed, 61 were published in journals with JCR.

According to Kim and McMillan (2008), although the citation analysis is based on counting citations, this process is much more complex than simple counting. The analysis points to influent centres (Fetscherin and Usunier, 2012) and maps out the connections among papers of a research area (Kim and McMillan, 2008). Therefore, an analysis of citations demonstrates the suitability of the study to other academic researchers in related fields of knowledge (Fetscherin and Heinrich, 2015). As done in Michels and Schmoch (2014), it was assumed that there are no methodologies to judge the quality of the papers published on a large extent. According to Michels and Schmoch (2014), the most common ways to obtain many citations are as follows:

- Submitting a paper to a multidisciplinary journal, considering the number of pages, because these journals and their papers tend to be more frequently cited than smaller ones.
- Submitting the paper to an US-American journal. According to Michel and Schmoch (2014), American journals have a broader readership comparatively to the world average.
- Submitting the paper to journals with high and updated IF, i.e., journals that, independently of their national origin, are very cited.
- Aiming at co-publications with researchers who are very cited, especially, American ones.

Table 2 presents the relation of citations received by each journal of the sample of 100 papers related to the theme. Papers of journals of the sample were considered connected if one of them mentions the other in their references. Tables 1 and 2 showed different results. Production Planning & Control, Benchmarking, International Journal of Production Research took the first places in the publications and also received many citations, revealing its relevance for the theme development. Although Computers & Industrial Engineering, European Journal of Information Systems, and Computers in Industry have published few papers, they received many citations.

According to Wohlin (2009), with regard to the w index, the papers having at least 5 citations are seen as successful. For Kosmulski (2013), papers that receive at least 10 citations have a greater impact than papers with 5-9 citations, while papers with at least 20 citations have a greater impact than those with 10-19 citations, and so on (Kosmulski, 2013). Despite their high impact factor, journals as Journal of Cleaner Production, Omega and Ecological Economics were not significantly cited, so they ranked lower in relation to the quantity of publications. This implies that these journals have a good level of relevancy with studies on Balanced Scorecard for performance evaluation of supply chains, but not on their ability to deliver impacts.

Table 2. Citation analysis of the publications.

Journal[3]	IF (2015)	Citations by pear															Total
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Computers & Industrial Engineering	2.086						1		3	1	1	5	2	3	5	4	25
Production Planning & Control	1.532						1		1	2		4		4	5	5	22
International Journal of Production Research	1.693								2	1	1	2	2	1	5	4	18
Benchmarking	-													1	6	8	15
European Journal of Information Systems	2.892									1		2	1	2	3	3	12
Computers in Industry	1.685						1		2			2			1	1	7
European Journal of Operational Research	2.679				1				1	1		1		1	1		6
Facilities	-													1	2	3	6
Journal of the Operational Research Society	1.225				1					1	1	1			2		6
Asia Pacific Journal of Marketing and Logistics	-													1	3	1	5
Measuring Business Excellence	-										1	1		1	1	1	5
Applied Mathematical Modelling	2.291														1	2	3
International Journal of Computer Integrated Manufacturing	1.319											2			1		3

[3] Only indexed journals that have published papers on the topic and also received citations from other indexed papers.

International Journal of Engineering Business Management	-														2	1	3
International Journal of Physical Distribution & Logistics Management	2.101									1				1		1	3
International Journal of Production Economics	2.782														1	2	3
The Service Industries Journal	0.776												1		1	1	3
Decision Support Systems	2.604												2				2
Industrial Management & Data Systems	1.278														1		1
International Journal of Logistics Research and Applications	0.933												1				1
International Journal of Productivity and Performance Management	-														1		1
Journal of Bionic Engineering	1.466												1				1
Journal of Business Research	2.129															1	1
Resources, Conservation and Recycling	3.280															1	1

Publications by authors' affiliation country

The participation of countries may be gauged by analysing the author's affiliations. Table 3 shows the countries with respect to the quantity of published papers and its percentage, the papers of a single country, the number of papers that arose from the first author's country, and the number of internationally collaborated papers.

Table 3. Papers by authors' affiliation country and international collaborations.

Country	TP	TP (%)	SP	FP	CP
India	14	14	12	1	1
UK	12	12	5		7
China	9	9	8	1	
Taiwan	9	9	7	2	
Italy	9	9	7	1	1
Iran	9	9	7	1	1
Turkey	5	5	4	1	
Spain	5	5	4		1
USA	5	5	3		2
Germany	3	3	3		
Greece	3	3	3		
Singapore	3	3	2		1
Brazil	3	3	1	2	
South Korea	3	3	1	2	
Ireland	3	3	1	1	1
Malaysia	3	3	1	1	1
France	3	3	1		2
The Netherlands	2	2	2		
Canada	2	2	1		1
New Zealand	2	2		2	
Norway	2	2			2
Australia	1	1	1		
Chile	1	1	1		
Czech Republic	1	1	1		

Denmark	1	1	1		
Egypt	1	1	1		
Estonia	1	1	1		
Indonesia	1	1	1		
Portugal	1	1	1		
Slovenia	1	1	1		
Sweden	1	1	1		
Colombia	1	1		1	
Thailand	1	1		1	
Philippines	1	1			1
Saudi Arabia	1	1			1

TP: total papers; SP: single country papers; FP: papers with first author's country; CP: internationally collaborative papers.

Although investigations on SCM have made various improvements, there is a scarcity of information and academic contributions on the specific characteristics (similarities and dissimilarities) of supply chains that are in place predominantly in developing and emerging countries (Silvestre, 2015). Keeping in mind this gap and considering that bibliometrics has a key role in the analysis of scientific literature, with indicators that show the degree of development of an area of knowledge (Pereira et al., 2015), it is important to know which countries participated in the development of the published papers.

Based on Table 3, it can be stated that studies on BSC for evaluating the performance of supply chains that are in place mainly in developing and emerging countries have obtained great importance. Looking at Table 3, it is interesting to observe that the majority of the papers published were developed by researchers from India, China, Taiwan, Iran, Turkey, Singapore, Brazil, South Korea, Malaysia, New Zealand, Australia, Chile, Czech Republic, Egypt, Estonia, Indonesia, Slovenia, Colombia, Thailand, Philippines, and Saudi Arabia. This result contrasts with Kishida and Matsui (1997) who state that Gross Domestic Product (GDP) is strongly associated with the quantity of works. The finding also contrasts with other study fields of the supply chains literature. Zailani et al. (2015) stated that the majority of the literature on supply chain security practices have been written from the perspective and experience of developed countries (USA, Europe, and Japan), and few studies examining the context of emerging countries were developed. Spiegel et al. (2014) analysed the research field of supply chains integration and checked that 55.92% of the publications in Web of Science are from USA, Germany, England, Canada, Italy, and France. Taticchi et al. (2015) explored decision-support tools and performance management in the domain of sustainable SCM in the Web of Science database. They checked that 83.94% of papers about performance management are from USA, United Kingdom, Canada, Germany, Australia, France, Spain, and Italy; and 70% of papers about decision-support tools are from USA, Germany, United Kingdom, France, Australia, and Denmark.

It is important to state that, among the emerging countries, China has numerous participations in both research fields aforementioned. The observation of Table 3 is quite interesting, as, according to Yang (2014), a large number of products are produced in emerging economies and advanced markets, being significantly important to better understand the mechanisms of improving agility and performance of manufacturers and their supply chains for developed economies.

Technical procedures used for developing the papers

Table 4 shows the yearly distribution of papers in relation to the technical procedure used for developing it, classified by Nakano (2012) for the area of operations management (OM). The literature review is based on conceptual discussions on the main published works. The modelling uses mathematical techniques to illustrate how a production system operates fully or partially, while the simulation uses computational techniques to simulate operation. The case study conducts a detailed analysis of one or more objects of study without the active participation of the researcher in the collected results. The survey employs the use of the data collection instrument, making use of sampling and analysis techniques and statistical inference. Action research involves the production of knowledge-oriented practice, with the modification of a given reality that is part of the research process. Experimental research studies the causal association between two variables of a system under conditions controlled by the researcher.

Table 4. Classification and yearly distribution of papers in relation to the technical procedure that researchers used to develop it.

Technical procedure	Year															Total
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Case study		1	1	2		1		6	2	2	3	4	5	5	5	37
Survey		1			1	1	2	1			4	2	2	5	4	23
Literature review	1			1		1	1	2	2	1	1	3	2		1	16
Modelling								2		2	4	2	2	2	2	16
Experiment				1							1		1		1	4
Simulation										1	2			1		4
Action research																0

Looking at Table 4, it can be observed that the case study showed the highest incidence (37%), followed by the survey (23%), literature review and modelling (16%), and simulation and experiment (4%). Although the literature review is essential for developing any academic paper, in this study only the papers that adopted the conceptual approach in its development were classified as theoretical papers.

According to the classification proposed by Turrioni and Melo (2012), apparently, it is possible to state that the qualitative research (case study, literature review, and action research) has a certain predominance in the approach used for the development of papers, as 53% of the papers used methods nominally linked to this approach. However, it is important to state that the quantitative approach was more used, as, in addition to methods traditionally linked to it (modelling, survey, simulation, and experiment), most of the case studies have increased use of quantitative techniques. Case studies have used for diminishing the subjective character of the analysis and validating the modifications made in already established methods and new techniques and tools developed as Fuzzy logic, Supply Chain Operations Reference (SCOR) model, Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), among others.

This result corroborates the statements of Callado and Jack (2015), which state that use the BSC to evaluate supply chain performance has some limitations, such as approach top-down, the absence of a formal methodology for implementation, and subjectivity of the selection of metrics. The increasing use of quantitative techniques suggests that improvement gaps identified in various papers developed on the topic are being properly exploited (Agami et al., 2012; De Felice et al., 2015; Lin et al., 2014; Naini et al., 2011; Piotrowicz and Cuthbertson, 2015; Shafiee et al., 2014; Sharma and Bhagwat, 2007).

CONCLUSIONS

This paper brings advances for the literature of OM presenting a study that encompasses bibliometric analysis of the academic production on BSC for performance evaluation of supply chains and represents a starting point for researchers who want to improve the theme.

The bibliometric study revealed that although some oscillations have occurred, studies approaching the use of BSC for evaluating supply chains performance increased (keeping in mind that in 2002, researchers published only one paper). In 2012, the highest number of papers published increased to 15, and 49% of the publications occurred in the last four years.

As for the technical procedure used in the researches, it can be stated that the focus of the papers has matured, moving from a predominantly conceptual emphasis to real applications based on case studies, survey, and simulation. The predominance of the case study in the investigations reinforces the results of Barratt et al. (2011), Berto and Nakano (2000), Dooley (2016), Gattiker and Parente (2007), Miguel (2007), Pedraza-Acosta et al. (2016), and Walter and Tubino (2013), who state that this is the most used technical procedure in researches of industrial engineering and OM. In addition, taking into consideration the recent development of theme, this result reinforce Voss et al. (2002), who state that this methodological procedure is quite suitable for analyses of processes, in which experience is rare and context conditions are unknown, and Runfola et al. (2017), who state that certain specific managerial processes are very difficult of investigating using other methods.

The absence of the action research in the literature of performance evaluation of supply chains based on BSC corroborates the results of Avella and Alfaro (2014), who state that its use in literature of OM is not very extensive. Future papers may explore this technical procedure; as for Coughlan and Coghlan (2002), the action research is relevant for the field of OM because it can solve business problems and make relevant contributions to the theory.

Regarding the methodological approach, the predominance and growing increase of quantitative approach in the investigations reveal that several gaps raised by authors to improve the performance evaluation have been explored. So, the evaluation is becoming more effective and less subjective.

Researches about the theme are very relevant for the advance of science, as most of the publications are concentrated in journals that have an impact factor in Thomson Reuters. The fact that a journal is prestigious can persuade authors to cite that journal without reading the paper or analysing critically its content. Considering the citations index measures only the quantity, it can disregard the actual quality of the paper. Systematic literature review and bibliometrics, as the present paper, help analyse if the papers are really relevant.

From the analysis of author's affiliation country, it was observed that the results presented the contrast with other fields of supply chain management, bearing in mind that the studies on the theme are predominantly from emerging economies. This represents a new trend in the literature of SCM.

Limitations and research opportunities

It is important to highlight that the methodology used for developing this paper presents some limitations. Firstly, the sample of papers considered was extracted from only two databases, which may have disregarded relevant papers. Possibly a great number of papers about the theme were published in non-indexed journals; this means they are unavailable in the most used databases (SCOPUS and Web of Science). Secondly, despite only papers published in journals due to their greater relevance and quality, papers published in conferences can have important contributions to the development of the theme. Thirdly, the bibliometric study developed in this paper was based on the perceptions of authors, which may disregard aspects considered important from other points of view.

The development of this study was not intended to conclude the topics raised here. The focus of the paper was on the general characterisation of academic production on the theme. Additional future papers in this movement would detect various other contributions and possible shift core research fields. For further investigations, researchers could consider comparing the information and results obtained from other databases with those of this paper.

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بطاقة الأداء المتوازن لتقييم أداء سلاسل الإمداد: دراسة ببليومترية

تاليس بوتيلو دي سوزا، إيزوتيليا كوستا ميلو، بيدرو هنريك دي أوليفيرا، كايو مارسيلو لورينكو، فابيو مولر غيريني وكليبر فرانسيسكو إيسبوستو

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الخلاصة

نظراً لأن إدارة سلاسل الإمداد تتضمن العديد من المعايير، فإن تقييم أدائها يمثل تحدياً للمديرين الصناعيين. اقترح الباحثون عدة طرق لمثل هذه التقييمات، ومن بينها: بطاقة الأداء المتوازن (BSC). ازدادت الأبحاث الأكاديمية حول تطبيقات بطاقة الأداء المتوازن في السنوات الأخيرة لتقييم أداء سلاسل الإمداد. وباعتبار أن دراسة الأبحاث المنشورة حول موضوع ما هي وسيلة لرصد ظهور أي مجال جديد بخصوصه، فإن هذه الدراسة تهدف إلى استكشاف الأبحاث المنشورة في المجلات المُصنفة (SCOPUS و ISI) من خلال المراجع البحثية. يرسم هذا البحث نظرة عامة على الإنتاج الأكاديمي واتجاهات الدراسة في بطاقة الأداء المتوازن لتقييم أداء سلاسل الإمداد. تساعد النتائج الباحثين والمديرين على فهم أحدث التطورات لتحديد الثغرات والاتجاهات المستقبلية، كما أنها أظهرت تطور الدراسات على مر السنين. وقد لوحظ سيادة المنشورات في المجلات ذات عامل التأثير (طومسون رويترز). يمكن أن يكون تطوير الفكرة في البلدان الناشئة مفيداً لزيادة القدرة التنافسية لشركاتها. وباختصار، فإن هذه الدراسة مفيدة للتأثير في الدراسات والمنشورات المستقبلية للباحثين المهتمين بتقييم أداء سلاسل الإمداد اعتماداً على بطاقة الأداء المتوازن وقد توجه الباحثين الجدد لمعرفة المجلات التي يجب استشارتها والإجراءات الفنية التي يجب معرفتها.