TRENDS AND RESEARCH LINES ON TRIPLE BOTTOM LINE: A BIBLIOMETRIC ANALYSIS OF THE MANAGEMENT AND BUSINESS AMBIT

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Abstract *– Purpose: to analyze the evolution of research on the "Triple Bottom Line" between the years 2000 and 2022. Design/methodology/approach: a bibliometric analysis was performed with 455 Web of Science's articles, that containing at least one of the keywords considered (triple impact management*, triple bottom line* or b corp*). VOSviewer software was used to analyze the data. Findings: The research on this topic has evolved increasingly. The last time period (2012-2022) concentrates 88.8% of all scientific productivity, as well as 62.7% of authors, 87.9% of journals, 68.7% of institutions and 61.5% of citations. The lines of research that can be detected, and on which work should continue, are: triple bottom line management models, green supply chain performance, innovation strategy for sustainability, and, sustainability, corporate social responsibility and financial performance. Originality: There are no publications that indicate the most relevant lines of research on Triple Bottom Line.*

Keywords: *triple bottom line; sustainability; b corp; bibliometric analysis; Web of Science.*

1. INTRODUCTION

Research based on bibliometric methodologies has increased and has extended to many fields of study (Gómez & Luna, 2022) such as: economics and finance (Coelho et al., 2022; Truc et al., 2021); marketing (Hassan et al., 2022); health and medicine (Huang et al., 2022; Zhang et al., 2020); emerging markets (Kumar et al., 2022); operations management (Pandey et al., 2022); governance (Singh & Zhang, 2022); legal doctrines (Tubarad et al., 2022); mathematics (Richard & Sun, 2021); computing (Serafin et al., 2020); social sciences (Thanuskodi, 2017); tourism (Yilmaz, 2020); innovation (Ebrahim & Bong, 2018; Zeng et al., 2021); entrepreneurship (Rey, 2016); management and organization (Zupic & Čater, 2015); biotechnology (Dalpe, 2002); and psychology (Hjorland, 1981); among others.

The first bibliometric analyses date back to the 1950s (Wallin, 2005), and of the fields of study where they have become most-used is in the context of organizations (Altamirano, 2022; Donthu et al., 2021; Carmona et al., 2019; Alvarez et al., 2017). In this area, one of the aspects that is particularly relevant for the competitiveness of organizations is sustainability which, according to Carter & Rogers (2008), must consider not only economic performance, but also the impact that their activities have on the environment and society. Elkington (1998) called this the "Triple Bottom Line" or "Triple Bottom Result" and points out that governments and citizens are increasingly demanding that companies effectively manage the impacts of their behavior on a variety of areas, reflecting economic, social and environmental performance (Verrier et al., 2016).

Research on Triple Bottom Line (TBL) has grown in the last two decades, and from a methodological perspective, it has evolved from more descriptive (Elkington, 1998) to causality studies based on empirical evidence, which have sought to determine the triple impacts that the decisions and actions of organizations have on the surroundings in which they carry out their economic activity (Hall et al., 2022). However, from a bibliometric perspective, there used to be insufficient literature that would have enabled us to characterize what has been addressed in this topic thus far, whether collaboration networks between authors and organizations exist, and how associations between keywords have evolved as research progresses (Tseng et al., 2020).

Therefore, the aim of this work is to analyze the evolution of research on TBL and thus determine the evolution of the subject, co-authorship networks, keywords employed and research trends. It seeks to answer the following research questions: i) how has scientific productivity on TBL published in the WoS evolved?; ii) what are the most relevant contributions from the scientific community on this topic?, and; iii) where do the trends and lines of research on TBL point? To do so, all articles on

TBL that were indexed in the Web of Science (WoS) from the year 2000 (the year of the first publication regarding TBL) until 2022 were selected. Based on these data and the use of Excel and VOSviewer software, bibliometric indicators were calculated to identify the current state and evolution of research on the topic.

2. TRIPLE BOTTOM LINE: LITERATURE REVIEW

Achieving company competitiveness in the market requires greater efforts every day from their strategists (Ruokonen & Temmes, 2019; Adomako & Dong Tran, 2022). Currently, not only must economic goals be fulfilled, but also social and environmental issues, which are increasingly requested by interest groups, must also be met (Kirst et al., 2021; Poponi et al., 2019; Jiang & Zhu, 2013; Carter & Easton, 2011). Therefore, companies are expected to give credibility that, when consuming or purchasing their products, there will be a genuine positive impact on the environment and society (Bianchiet al., 2020).

Based on prior evidence, the concept of organizational sustainability was born, which, according to Carter & Rogers (2008) is composed of three elements: the environment, society and economic performance. This coincides with the well-known concept developed by Elkington (1998), in which a balance between economic, environmental and social goals is considered. The above also considers organizational sustainability or TBL as a fundamental principle of intelligent management (Cañas et al., 2022; Silva et al., 2019).

The idea behind this paradigm, for Norman & MacDonald (2004), Barauskaite & Streimikiene (2020), Shahzad Shabbir & Wisdom (2020), and Rehman et al. (2021) is that the success and health of a corporation should be measured not only by financial results, but also by social and environmental performance. Those who are in favor of this ideal defend this approach by following a management model focused on a triple impact that will not only generate benefits for society and nature, but also long-term benefits and a competitive advantage for companies (Haro, 2022; Carter & Rogers, 2008). Furthermore, such supporters propose that proactivity by companies to implement sustainable practices should minimize the risk when facing new regulations, which could otherwise negatively impact the costs of their activities (Dai et al., 2021; Negri et al., 2021).

Despite all the arguments in favor regarding TBL, it is not without controversy. Although Milne & Gray (2013) argue that the incorporation of economic, environmental and social performance indicators of an entity in its management and reporting processes has become synonymous with corporate sustainability, they also indicate that TBL and sustainability reporting are, by themselves, insufficient for organizations to contribute to the sustainability of planetary well-being. They base their assertion on the fact that there is still a lot of work to do, since organizations rarely produce reports that provide information on social and environmental issues to the same depth and quality as when financial details are reported (Blanco et al., 2022; Turzo et al., 2022).

For Norman & MacDonald (2004), the apparent novelty of the triple impact lies in the assertion that the overall fulfillment of obligations to communities, employees, customers and suppliers (to name just four stakeholders) must be measured, calculated, audited and reported, just like the financial performance of companies, which remains nothing more than an exciting promise. This is based on the fact that, on the one hand, different supporters of triple impact conceive it in different ways, without there being a consensus regarding the issue; and second, they argue that it is rarely clear exactly what most people mean when they use the language of TBL or what specific actions are being referred to (Banerjee, 2008). Isil & Henke (2017) further indicate that although most documents by proponents of triple impact present readers with the concept in order to convince them of its virtues, it is challenging to find anything that resembles a precise definition, and much less a methodology or formula that allows it to be implemented with the same rigor as the calculations in a corporate financial balance statement.

In response to the authors' criticisms, Pava (2007) indicates that if financial performance cannot be summarized with a single objective number, then one certainly should not expect to sum up social and environmental performance in the same way. Along these lines, he states that it would be absolutely illogical to evaluate a company without taking into account elements such as operating flows and risks, in addition to net profit, and by virtue of this he raises the question: "is there any way to integrate net profit, cash flows from operations, and risk?". This is why Pava (2007) does not

agree with the assertions of Norman & MacDonald (2004), regarding the loss of value that TBL could have, simply because of the lack of objective indicators to measure it.

For Elkington (1998), organizations are on the verge of entering a new era in their interactions with their stakeholders. The author proposes that the way to effectively and efficiently achieve TBL will be given by the development of much broader and deeper relationships with interest groups. The above would imply that companies and non-government organizations (NGOs) will increasingly be attracted to the government-industry-NGO symbiosis, thus boosting this virtuous circle.

3. METHODOLOGICAL BACKGROUND

The data to carry out this study was obtained from articles indexed in the Web of Science (WoS). The search was carried out in July 2022 from the WoS Core Collection, taking into account the citation indexes in which published works were found, that is: Social Sciences Citation Index (SSCI), Emerging Sources Citation Index (ESCI) and Science Citation Index Expanded (SCI-EXPANDED). The entire period for which results are available (2000-2022) was considered. A search equation focused on the "topic" criterion was used, which allows exploration of the title, abstract and keywords of the articles. The keywords that were included in the search were the following:

"triple impact management*" or "triple bottom line*" or "b corp*"

The search generated 3,773 results, of which 3,347 were articles. Subsequently, the results were refined, selecting the following research areas: Management, Business, Economics, Business Finance and Public Administration, reducing the scope to 641 articles. The articles selected by research area were manually-reviewed one by one to corroborate the presence of the keywords used either in the title, in the abstract, in the keywords or in the body of the document, leaving a final total of 455 articles which were subsequently analyzed in depth (Figure 1).

Search in the WoS: 3,773 results	→	Articles: 3,347	→	Filter by interest áreas: 641	→	Excluded articles: 186	→	Selected articles: 450

Figure 1. Process of inclusion and exclusion of data

The publication data (authors, publications by year, publications by journal and research areas) were incorporated into an Excel file and exported to a text file. This was subsequently examined by the VOSviewer software, which creates maps based on network data for further analysis (van Eck & Waltman, 2017). Then, the methodology proposed by the research of Ortiz et al. (2018) was implemented, producing a descriptive study that analyzed the evolution of research on this topic over time. In addition, bibliometric indicators such as the number of authors per article, the number of articles per journal and the number of authors per organization were calculated.

In the next step, the main journals were analyzed, in addition to identifying the most relevant authors on the topic, considering the number of citations received by each one. The collaboration networks between the authors were also defined, using the criterion that at least one shared article has been published, in order to represent the co-authorship networks between all researchers on the topic.

To observe publishing trends in terms of scientific discourse and the strength of the representative terms used, the keywords of the different manuscripts were examined. Based on Huang & Ho (2011), through this analysis, information about the issues that most concern researchers on the subject are highlighted. This analysis considered the keywords of each article (Keywords), the keywords used by the authors (Author Keywords) and those indicated by WoS (Keywords Plus). For the analysis of keywords, the VOSviewer software was again used, considering a minimum occurrence of words equal to 14 (Keywords), 12 (Author Keywords) and 11 (Keywords Plus). In this case, following the Pareto distribution (Radson & Hancock, 1997), 20% of the total occurrences per keyword are represented by the minimum occurrence established for each keywords analysis (Kalibatiene & Miliauskaité, 2021).

To identify future lines of research, an analysis of the Keywords Plus was carried out, which are words that frequently appear in the titles of references, but do not appear in the title of the article

itself. Based on a special algorithm from Clarivate databases, KeyWords Plus improves the power of cited reference searching by searching all articles that have cited common references (Clarivate, 2022; Liu, 2021). Given that Keywords Plus have been present since 1991, they constitute an interesting parameter to identify relevant research trends that are suggested in this article as lines of future research, taking into account the scarcity of research on this topic. To name each line of research, those words that were found most strongly were considered according to the number of occurrences in each cluster.

4. RESULTS AND DISCUSSION

Analysis of research on TBL

Research on TBL has been published since 2000 in WoS, when the first article "Ethical business and investment: A model for business and society" by Spiller, affiliated to the New Zealand Center for Business Ethics, appeared in print. Since this first publication, research has evolved increasingly, reaching a first peak in 2011, with 15 articles in 14 different journals. Then, in 2012, there was a 26.7% fall in publications (11 articles published in 11 journals). However, since then, the number of publications has steadily increased, such that in 2021, 86 articles appeared in 69 journals, which represents an increase of 682% between 2012 and 2021 (Figure 2).

Figure 2. Evolution of research on TBL: published articles and journals by year.

Considering these two time periods, 2012-2022 concentrates 88.8% of all scientific productivity regarding TBL, as well as 62.7% of all authors, 87.9% of all journals, 68.7% of all institutions and 61.5% of all citations (Table I).

Indicator	2000-2011	2012-2022	Total
No. of articles	51	404	455
No. of authors	119	200	319
No. of journals	48	349	397
No. of organizations	91	200	291
No. of citations	7,894	12,624	20,518
Number of authors per article	2.3	0.5	0.6
No. of authors per journal	2.5	0.6	0.8
No. of authors per organization	1.3	1.0	1.1

Table I. Bibliometric indicators of publications on TBL

Main journals that publish research on TBL

Of the main journals that have published most research on this topic, Business Strategy and The Environment (United Kingdom) leads with 25 articles (5.5%), which are classified in the WoS categories of *"Business"*, *"Administration"* and *"Environmental studies"*. This is followed by the Journal of Business Ethics with 22 articles (4.8%) concentrated in the *"Business"* and *"Ethics"* categories. In third place is Corporate Social Responsibility and Environmental Management with 19 published works (4.2%) in the categories *"Business"*, *"Administration"* and *"Environmental Studies"* (Table II).

Journal	WoS Categories	Impact factor	Quartile (Q)	Published articles
Business Strategy and The Environment	Business	10.801	1	25
	Environmental studies			
	Administration			
Journal of Business Ethics	Business	6.331	2	22
	Ethics		1	
Corporate Social Responsibility and Environmental Management	Business	8.464	1	19
	Environmental studies			
	Administration			
International Journal of Operations Production Management	Administration	9.36	1	9
Supply Chain Management and International Journal	Administration	11.263	1	9
Journal of Business Research	Business	10.969	1	8
European Journal of Operational Research	Operations Research and Management Sciences	6.363	1	7
International Journal of Physical Distribution Logistics Management	Administration	7.29	1	7
Sustainability Accounting Management and Policy Journal	Business, Finance	3.964	2	7
	Environmental studies		2	
	Administration		3	

Table II. Main journals that have published on TBL

For its part, the research areas defined by WoS for the 455 papers on TBL are dominated by *"administration and business"* with 58.5% of publications, *"environmental studies"* (9.1%), *"economics"* (6.4%), *"finance"* (4.5%) and *"ethics"* (3.4%). The remaining 18.1% of articles are distributed in other relevant research areas such as *"research sciences and operations management"*, *"industrial engineering"*, *"public administration"*, *"green and sustainable science and technology"*, *"ecology"*, and *"energy and fuels"*, among others.

Main authors and publications on TBL

Regarding the ten authors who have been cited most times in articles about TBL (Table III), Carter from Arizona State University stands out in first place, followed by Gleim from Auburn University, Wu from Liaoning Academy of Agricultural Sciences and Paul from the University of Puerto Rico. These 5 main authors are followed by Tate (University of Tennessee System), Milne (University of Canterbury), Normal (Duke University), Hubbard (Mississippi State University) and Hahn (ESADE Business School).

Author	WoS Citations	Total citations	Publications	H-index	Institution (Country)
Carter, Craig R.	2,441	2,480	2	29	Arizona State University (United States)
Gleim, Mark R.	673	680	2	8	Auburn University (United States)
Wu, Zhao-Hui	624	634	2	18	Liaoning Academy of Agricultural Sciences (China)
Paul, Justin	622	630	1	29	University of Puerto Rico (Puerto Rico)
Tate, Wendy L.	492	501	3	25	University of Tennessee System (United States)

Milne, Markus J.	475	482	1	20	University of Canterbury (New Zealand)
Norman, Wayne	443	456	2	13	Duke University (United States)
Hubbard, Graham	373	386	1	7	Mississippi State University (United States)
Hahn, Tobias	359	361	1	21	ESADE Business School (Spain)

Table III. Authors with the most citations in TBL

When analyzing the collaboration networks between authors, four clusters are detected (Figure 3). The first cluster (red), with 44 links, is composed of: Svensson, Rodriguez, Otero-Neira, Lin, Lee and Chen. The second cluster (green), with 46 links, is made up of Ferro, Hogevold, Klopper, Petzer, Varela and Wagner. The third cluster (blue), with 30 links, is composed of Andersson, Karlsson, Laurell, Lindgren and Molina-Castillo, and the last cluster (yellow, 22 links), groups Padin, Hogevold, Sosa Varela and Dos Santos.
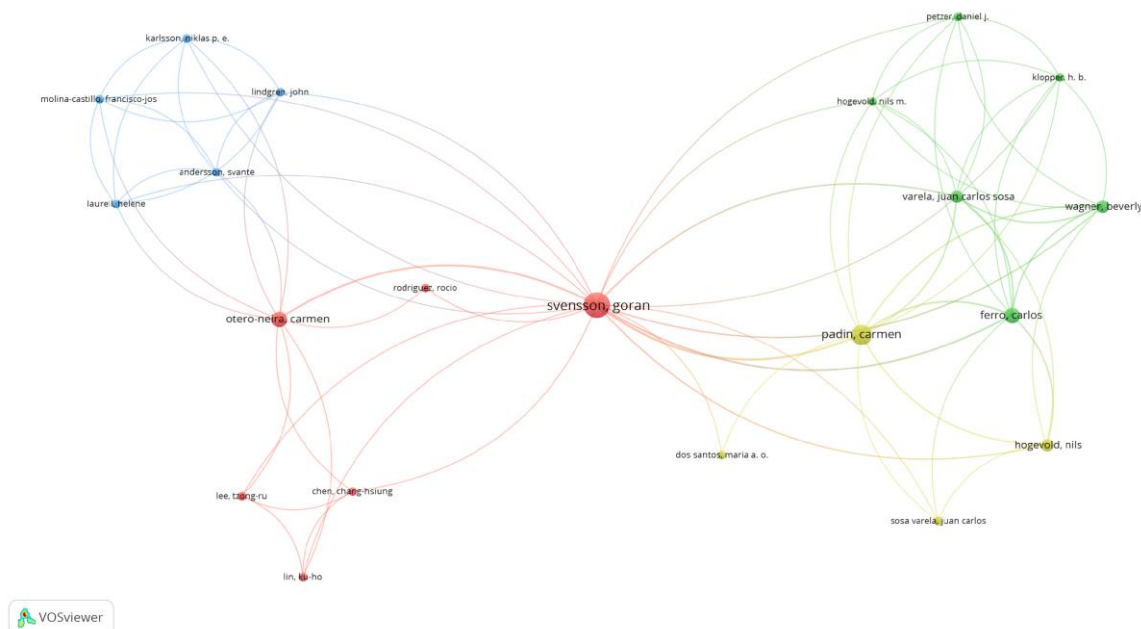
Figure 3. Collaboration between authors who research TBL

Regarding the articles that have a received the greatest number of citations (Table IV), these are concentrated within the field of "supply chain management". The one with the greatest impact, *"A framework of sustainable supply chain management: moving toward new theory"*, is a literature review that shows the relationship between economic, environmental and social aspects in supply chain management (Carter & Rogers, 2008). The second most cited article, *"Sustainable supply chain management: evolution and future directions"*, addresses sustainable management in logistics and supply chain management through a systematic analysis (Carter & Easton, 2011). In a similar vein, in fifth place in *"Balancing priorities: Decision-making in sustainable supply chain management"*, Wu & Pagell (2011) use case studies to explain decision making in green supply chain management.

The third most cited article is that of Paul *et al.* (2016), titled *"Predicting green product consumption using theory of planned behavior and reasoned action"*, in which the authors validate the Extended Theory of Planned Behavior and the Theory of Reasoned Action to predict the purchase intention of green products. For their part, Gleim *et al.* (2013), in *"Against the Green: A Multi-method Examination of the Barriers to Green Consumption"*, analyzed the individual barriers that

affect consumer evaluations of ecological products found on the market, where it was determined that by modifying informative signs, purchasing barriers for green products can be overcome.

Although the majority of articles seek to validate TBL within organizations, Milne & Gray (2013) in their article *"W(h)ither Ecology? The Triple Bottom Line, the Global Reporting Initiative, and Corporate Sustainability Reporting"*, raise an interesting criticism, in which they point out that TBL and the Global Reporting Initiative (GRI) are insufficient in themselves to either maintain Earth's ecosystems or generate a real impact on society, beyond simple reflections in company reports. Almost a decade earlier, Norman & MacDonald (2004) in their work *"Getting to the bottom of "Triple Bottom Line""* argued that, conceptually and practically, TBL was a useless addition to corporate social responsibility, citing misleading rhetoric and ineffectiveness in social and environmental performance reporting.

Regarding contributions to improve this topic, Hubbard (2009) in the work titled *"Measuring Organizational Performance: Beyond the Triple Bottom Line"* proposes a stakeholder-based Sustainable Balanced Scorecard (SBSC) conceptual framework, along with an Organizational Sustainability Performance Index, so that sustainable performance becomes both measurable and accessible to stakeholders. Hahn *et al.* (2015) in the paper *"Tensions in Corporate Sustainability: Towards an Integrative Framework"* propose a systematic framework for the analysis of tensions in corporate sustainability, considering an integrative vision of an organization's sustainability. For their part, Tate *et al.* (2010) in *"Corporate Social Responsibility Reports: A Thematic Analysis Related to Supply Chain Management"* focus on showing that concern for sustainability depends on the market situation and the demand of stakeholders.

Article	Authors	WoS Citations	Total Citations
A framework of sustainable supply chain management: moving toward new theory	Carter & Rogers (2008)	1,693	1,717
Sustainable supply chain management: evolution and future directions	Carter & Easton (2011)	749	764
Predicting green product consumption using theory of planned behavior and reasoned action	Paul, Modi & Patel (2016)	622	630
W(h)ither Ecology? The Triple Bottom Line, the Global Reporting Initiative, and Corporate Sustainability Reporting	Milne & Gray (2013)	474	481
Balancing priorities: Decision-making in sustainable supply chain management	Wu & Pagell (2011)	441	447
Getting to the bottom of "Triple Bottom Line"	Norman & MacDonald (2004)	427	440
Measuring Organizational Performance: Beyond the Triple Bottom Line	Hubbard (2009)	373	386
Tensions in Corporate Sustainability: Towards an Integrative Framework	Hahn et al. (2015)	359	361
Corporate Social Responsibility Reports: A Thematic Analysis Related to Supply Chain Management	Tate, Ellram & Kirchoff (2010)	358	365
Against the Green: A Multi-method Examination of the Barriers to Green Consumption	Gleim et al. (2013)	348	354

Table IV. Publications with the most citations

Keywords in publications about TBL

The most relevant keywords in articles about TBL are: *triple bottom line*, *sustainability*, *corporate social responsibility*, and *performance*. Regarding keyword networks, 5 clusters are detected. The first cluster (red) "TBL and Corporate Social Responsibility" contains the words: *triple bottom line, corporate social responsibility, management*, and *financial performance*, representing 34.5% of total occurrences. The second cluster (green) "operational performance and ecological impact" is made up of words such as: *performance*, *impact*, *supply chain management*, and *green*, corresponding to 9.7% of the universe of keywords. This grouping is followed by the third cluster

(blue) "innovation, corporate strategy and sustainable development" which contains: *sustainable development*, *strategy*, *innovation*, and *corporate sustainability* (11.4%). The fourth cluster (yellow) "design of sustainable systems" harbors: *systems*, *sustainability*, *framework*, and *design* (15.8%), whilst the final cluster (purple) "decision models for value addition in the industry" contains the words: *model*, *decision-making*, *values*, and *industry*, which make up 5.6% of the occurrences of these words (Figure 4).

Figure 4. Keyword networks in publications about TBL

With respect to the Author Keywords, 8 can be found. The five most prevalent, in descending order, are: *corporate governance*, *sustainability*, *triple bottom line*, *corporate social responsibility*, and *corporate sustainability*. The abundance of these particular terms means that Author Keywords are more related to the way in which corporate governments incorporate social responsibility and TBL in the development of their businesses (Figure 5).

Figure 5. Author Keyword networks in publications about TBL

The frequency of occurrence of Keywords Plus, which are generated by an automatic computer algorithm and consider those words that appear most-often in the titles of references of articles on the subject (Zhang *et al.*, 2015), were also analyzed. Keywords Plus are divided into 4 clusters. The first cluster (red) "triple bottom line management models" contains words like: *management*, *framework*, *triple bottom line*, and *model*. The second cluster (yellow) "green supply chain performance" incorporates the words: *performance*, *impact*, *supply chain management*, and *green*. The terms *strategy*, *innovation*, *design*, and *organization* are present in the third cluster (blue) "innovation strategy for sustainability", whilst the final cluster (green) "sustainability, corporate social responsibility and financial performance" is made up of: *corporate social responsibility*, *financial performance*, and *business* (Figure 6).

Figure 6. Keyword Plus networks in publications about TBL

5. CONCLUSIONS

Research on TBL has increased and evolved from initially descriptive methodologies to contributions aimed at offering reference frameworks to effectively apply TBL in organizations. Geographically, Europe is the continent that has published the most articles, where England and Spain are the countries with the greatest number of works in the subject. However, given a greater concentration of publications per country, despite the fact that North America is the second continent with the most works on the subject, the United States leads the world in the number of articles on GTI. Africa and Latin America publish least on this topic.

The authors who have contributed the most publications on TBL are Svensson from Kristiania University College (Norway), Padin from the University of Vigo (Spain), and Carvalho from the University of São Paulo (Brazil). In relation to collaboration between authors, Svensson and Padin form networks in different clusters, while Carvalho does not appear in any of the largest clusters.

The keywords that define the trends in research on TBL are: *management*, *framework*, *triple bottom line*, *model*, *performance*, *impact*, *supply chain management*, *green*, *strategy*, *innovation*, *design*, *organization*, *corporate social responsibility*, *financial performance*, and *business*. This shows that there is still a need to continue research regarding TBL, in order to respond to the concerns raised by authors such as Isil & Hernke (2017) in relation to methodological definitions and models. According to these authors, the implementation of TBL in organizations should emanate from the field of corporate responsibility, and consider aspects such as sustainability, innovation, supply chain management, strategies, resource management and financial performance.

According to the analysis of keywords plus, the results are consistent with the contemporary literature, because the lines of research that can be detected, and on which work should continue,

are: i) triple bottom line management models (Khan *et al.*, 2021; Di Vaio *et al.*, 2020); ii) green supply chain performance (Han & Huo, 2020; Micheli *et al.*, 2020; Pinto, 2020); iii) innovation strategy for sustainability (Maier *et al.*, 2020; Pichlak & Szromek, 2021; Kotkova & Prokop, 2020), and; iv) sustainability, corporate social responsibility and financial performance (Barauskaite & Streimikiene, 2020; Okafor *et al.*, 2021; Awaysheh *et al.*, 2020).

A limitation of this research is the sample used, since although it includes three relevant WoS indices (SSCI, ESCI and SCI Expanded), it could be expanded even further by incorporating other indices and databases such as Scopus and Scielo. This would mean that even broader and even more representative results and conclusions could be obtained. Additionally, non-indexed journals and books could also be analyzed. In this way, it may be found that other innovative ideas are being divulged in non-traditional sources of information, as pointed out by Marques *et al.* (2018).

Finally, future research could introduce practical tools that advance TBL so that it is genuinely perceived as being effective not only for organizations, but also for different interest groups. Thus, whilst the overall objective is noble, there are still some questions regarding the actual impact of implementing TBL from an economic, environmental and social performance perspective.

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