

Balanced scorecard: 30 years of scientific production under the light of social network analysis

Balanced scorecard: 30 anos de sua produção científica à luz da análise de redes sociais

Henrique César Melo Ribeiro¹ⁱ, Orcid: <https://orcid.org/0000-0002-0704-1812>

1. Universidade Federal do Delta do Parnaíba (UFDPAr)-Parnaíba-PI-Brasil. E-mail: hcmribeiro@gmail.com

Abstract

This study aims to map and to investigate the development and the structure of the scientific production social networks about the Balanced Scorecard theme published in the Brazilian national scientific journals that are indexed by the Scientific Periodicals Electronic Library (SPELL). Methodologically, this research made use of the Social Network Analysis techniques under the perspectives of the one-mode and two-mode social network analysis. The main results are: Sérgio Murilo Petri is the most prolific author and with the highest degree; the Federal University of Santa Catarina is the most productive, and stood out in the degree centrality; the Electronic Journal of Strategy & Business is the most central scientific journal; the keywords: strategic planning, strategy, performance indicators, performance evaluation and strategic management are the ones with more degree relevance; and the most addressed themes by the authors are: strategic management, performance indicators, public management, strategic planning and performance evaluation.

Keywords: balanced scorecard, scientific production, scientific journals, SPELL, social network analysis.

Resumo

O objetivo deste estudo foi mapear e investigar o desenvolvimento e a estrutura das redes sociais da produção científica do tema Balanced Scorecard publicada nos periódicos científicos nacionais brasileiros indexados na biblioteca eletrônica Scientific Periodicals Electronic Library (SPELL). Metodologicamente, esta pesquisa apropriou-se das técnicas de Análise de Redes Sociais sob as perspectivas da análise de redes sociais one-mode e two-mode. Os principais resultados foram: Sérgio Murilo Petri foi o autor mais proífico e com o maior degree; a Universidade Federal de Santa Catarina foi a mais produtiva, e, obteve destaque na centralidade de grau; a Revista Eletrônica de Estratégia & Negócios foi o periódico científico mais central; as palavras-chave: planejamento estratégico, estratégia, indicadores de desempenho, avaliação de desempenho e gestão estratégica, foram as que tiveram mais relevo no degree; e os temas mais abordados pelos autores foram: gestão estratégica, indicadores de desempenho, gestão pública, planejamento estratégico e avaliação de desempenho.

Palavras-chave: *balanced scorecard*, produção científica, periódicos científicos, SPELL, análise de redes sociais.

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1 Introduction

The Balanced Scorecard (BSC) is a performance measurement system that combines the use of financial and non-financial indicators in a coherent way; it helps to improve the



organizational performance (Galas & Forte, 2005) and, consequently, to reinforce the organization strategy, aligning resources with the organization strategic goals (Kaplan & Norton, 1996; Wanderley & Souza, 2018), contributing to a more efficient strategic management and to a better decision-making by the manager (Mirailh, Albano & Lampert, 2021).

The four BSC perspectives that measure organizational performance are: financial, customer, internal processes and learning and growth. That way, they allow companies to track not only the financial performance, but simultaneously to monitor the process of building resources and acquiring the intangible assets needed for future growth (Silva & Callado, 2018). Based on that, since the BSC was introduced by Robert Kaplan and David Norton in 1992, it has received considerable attention in scientific research (Faraji, Ezadpour, Dastjerdi & Dolatzarei, 2022).

The BSC has been studied in the following several fields and/or sectors: innovation (Lopes, Kniess & Ramos, 2015), corporate social responsibility (Oliveira & Giroletti, 2016), small companies (Kawai, 2017), cooperative (Kruger, Simionato, Zanella & Petri, 2018), service (Beuren, Souza & Portulhak, 2018), coffee (Lemos & Teixeira, 2019), public (Fares, Bastos & Fortunato, 2019), accounting (Rengel, Monteiro, Petri & Schnorrenberger, 2020), health (Éckeli, Barbosa & Barbosa, 2020), civil construction (Bandeira & Callado, 2021), trade (Paula, Almeida, Silva, Portulhak & Paula, 2020), technology (Ribeiro, Faria, Freitas & Ladeira, 2019), livestock (Mirailh, Albano & Lampert, 2021), education (Lourenço & Petenuci, 2022), tourism (Pederneiras, Silva, Menezes & Soares, 2022).

Therefore, the BSC of Kaplan and Norton is seen as one of the best evaluated, consolidated and legitimized concepts in the field of Strategy knowledge (Oliveira, Martins, Silva & Ferreira, 2021), resulting in the continuous interest of many teachers and researchers in exploring the BSC. In other words, the BSC has been frequently used in the scientific research, influencing its evolution in the academia, and, at the same time, making the investigations to become quite interdisciplinary (Faraji *et al.*, 2022).

Based on that, we highlight the bibliometric studies already published in the academia that focus on mapping the scientific research production on the BSC theme, by investigating co-authorship networks, journals, Higher Education Institutions (HEIs), countries, citations and geographic areas (Rocha & Lavarda, 2011; Picoli, Abib & Fonseca, 2012; Ferreira & Diehl, 2013; Ensslin, Lacerda, Chaves, Lima & Lima, 2014; Assis & Teixeira, 2015; Quesado, Guzmán & Rodrigues, 2016; Veroneze, Andrade, Antonialli, Cavazza, Gandia & Antonialli, 2017; Coelho, 2019; Sousa, Melo, Oliveira, Lourenço, Guerrini & Esposto, 2020; Oliveira *et al.*, 2021; Faraji *et al.*, 2022).

Although those investigations have provided useful insights, we observe that they have not been able to map the conceptual structure of the BSC by means of the Social Network Analysis (SNA). Therefore, the present study aims to fill this gap in the scientific literature via SNA by approaching the actors involved in the process of building scientific knowledge about the BSC, in the context of the Brazilian national academia. That way, we look to improve the current understanding of the conceptual structure of the BSC scientific research either in the international scope as well in Brazil.

We remark that the current research aims to cover the BSC theme state of the art in the Brazilian national scenario (Oliveira *et al.*, 2021), but also, in particular, we look at how those studies were constructed, disseminated and socialized during its first 30 years of life (Faraji *et al.*, 2022). Therefore, this research can help BSC scholars to understand and, a posteriori, to realize the emerging trends in this field in order to adjust their respective future research. Besides, our research can encourage other professionals to explore this theme in the academia.



That way, this study brings one of the first attempts to investigate the scientific production of the BSC theme, predominantly via SNA, that is, using the collaboration networks of the actors (periods, researchers, HEIs, journals, keywords and themes) to contribute to a better understanding of this phenomenon in the area of Strategy knowledge at the Brazilian national scope. Thus, we state here our research question for this study: What are the social networks formed by the scientific production about the BSC theme, published in the Brazilian national scientific journals that are indexed by the SPELL electronic library?

In order to answer the aforementioned research question, this study provides useful information about the structure of the BSC research, which can help researchers to follow developments in this field (Faraji *et al.*, 2022). The objective of the current study is also to map and to investigate the development and the structure of the scientific production social networks on the BSC theme, published in the Brazilian national scientific journals and indexed by the SPELL electronic library.

The argument for using the library SPELL is that it is maintained by the National Association of Postgraduate Studies and Research in Administration (ANPAD). Until the date of 07-07-2022, its Brazilian scientific collection had around 61,000 documents published by 123 scientific journals in the areas of Administration, Accounting and Tourism. Since its creation, in 2012, until that date, there have been over 42 million accesses and more than 15 million downloads of texts made available in the aforementioned database (Guimarães, Motta, Farias, Kimura, Quintella & Carneiro, 2018; SPELL, 2022). SPELL is being considered one of the most important, relevant, and on the rise library in the Brazilian academia in Applied Social Sciences, especially in the themes of Administration (Rossoni, 2018; Atamanczuk & Siatkowski, 2019; Pinheiro & Almeida, 2020). That way, our academic work contributes to and enables a better understanding of the whole panorama involving the scientific research publications about the BSC in Brazil under the light of bibliometric techniques and SNA.

This current research also contributes to the scientific literature in the area of strategy by investigating the scientific production of the BSC research, from the SNA perspective, and highlighting the one-mode and two-mode social networks of the actors responsible for propagation and development of the referred theme in the academia. This contribution will broaden and strengthen the theme, through information and scientific knowledge. Besides, we expect that this study provides opportunities for the emergence of new paths to future studies regarding this subject, and, with that, the expansion of the BSC knowledge by motivating and mobilizing senior or beginning researchers who wish to contribute to the theoretical development of this theme in the Brazilian national scientific literature or, perhaps, in the international one.

This study is subdivided into five sections, as follows: the first section is the Introduction that presents the research question, the objective of the article, and the justifications inherent to this scientific study; the second section emphasizes the theoretical framework, which approaches the BSC as investigation object of this research; the Methodological Procedures are covered in section three of this study; section four presents the Analysis and Discussion of the Results. And, finally, in section five, the Conclusions are evidenced together with the contributions, limitations and suggestions for future studies.

2 Balanced scorecard

In the 1990s, the traditional methodologies used to calculate the organizational performance began to be questioned for their effectiveness. This was due to the fact that such methods were almost always made up of accounting and financial indicators from companies;



therefore, there was no macro consideration of other potential performance indicators (Ribeiro, Ladeira & Faria, 2018). In 1992, the BSC emerged with the role of proposing the integration among objectives, indicators, targets and actions by means of four performance perspectives, namely: financial, customer, internal processes and learning and growth. Such indicators are also used to communicate the strategy to the entire company, promoting organizational strategic alignment (Kaplan & Norton, 1997; Montenegro & Callado, 2019; Ribeiro et al., 2019).

The financial perspective is formed by indicators that are related to the financial performance of the organization, while the customer perspective is composed by indicators that interact with customer satisfaction and loyalty. In regard to the perspective of internal processes, this brings together the indicators that measure the brand, leadership in the market in which it operates, product quality and other structural aspects of the company. And, finally, there is the learning and growth perspective that focuses on employee management and the numerous aspects linked to the quality of the workforce and leadership. Consequently, by using such perspectives, the BSC identifies the organizational strategy, the strategic objectives and the cause and effect relations by means of a strategic map generation (Rivera, León, Pérez, Rivera & Nariño, 2009; Garcia, Lopes, Tatsch & Neitzke, 2013; Lourenço & Petenuci, 2022). Therefore, in the strategy map panel, it is possible to represent a chain of cause and effect. The example below demonstrates how the cause and effect connections occur in a given strategy map (Falsarella & Jannuzzi, 2017).

The time extension of the portal availability and the personal training improvement (Learning and Growth Perspective) can contribute to increasing the efficiency of the sales process stages, and also to reduce the time to close deals (Internal Processes Perspective). The same way, the success of the results previously described may lead to a higher number of customers accessing the portal and an increase in the acceptance degree of the new sales process (Customer Perspective), which will contribute to a higher value of revenue and profitability (Financial Perspective) (Falsarella & Jannuzzi, 2017, p. 618).

In essence, the strategy map helps organizations to outline their strategies in a complete, connected and systematic manner, serving as a basis and direction to the management control system. That said, in addition to the illustrated perspectives (financial, customers, internal processes, learning and growth), it is necessary to provide information that effectively helps in this process; this is done by constructing a panel of performance indicators, which includes the perspectives, strategic objectives, performance indicators, goals and the suggested actions to achieve the results (Igarashi, Igarashi, Gasparetto & Martins, 2007). Then, the performance indicators panel is made up of a set of measures considered key to assess the accomplishment of the strategic objectives (Borges, Coelho & Petri, 2018).

To sum up, the strategic map defines the strategic objectives based on the BSC four perspectives; however, in order to convey the intentions to the entire team and to evaluate future performances, the company needs to define the performance priority indicators and the goals for every objective through a performance dashboard. Therefore, the strategic map and the performance panel based on the BSC, not only are able to provide information so that managers can control and take more assertive decisions, such as guiding the preparation of a strategic planning, for example, but also can help either in the institutional integration and alignment, as well as in the refinement of the BSC itself (Giustina, Petri & Lunkes, 2019; Rengel *et al.*, 2020; Costa & Petri, 2021). In general, the BSC, via the strategic map and the indicators panel, helps the company to organize the steps in order to comply with the implemented strategies, and also to validate management controls and strategic planning (Borges, Coelho & Petri, 2018).



3 Methodological procedures

This study aims to map and investigate the development and structure of the scientific production social networks about the BSC theme, published in the Brazilian national scientific journals that are indexed by the electronic library SPELL. To this end, this study uses SNA techniques under the one-mode and two-mode perspectives.

We emphasize that, in order to be able to enter the SNA, and simultaneously to create its matrices of one-mode and two-mode social networks, it needed to use bibliometrics in the first stage of this research; that choice is a consequence of this method being popular and rigorous to explore and investigate scientific data, thus allowing to unveil the evolutionary nuances (Urbizagástegui-Alvarado & Restrepo-Arango, 2021; Hassanein & Mostafa, 2022) of the BSC theme on the scientific production basis of the mentioned topic.

To better understand the SNA, there are priority elements (Severiano Junior, Cunha, Zouain & Gonçalves, 2021), that means, ways of observing the structure and the relationships of a social network (Francisco, 2011; Favaretto & Francisco, 2017), among which the following stand out: the nodes, i.e., the actors. The links established by actors in a given context, thus defining connection patterns, and interaction dynamics (Allegratti, Moysés, Werneck, Quandt & Moysés, 2018). The “giant component” is the largest connected element of a given social network, where the vertices of that set of actors are all connected to each other (Bordin, Gonçalves & Todesco, 2014; Sampaio, Sacerdote, Fonseca & Fernandes, 2015; Dias, Moita & Dias, 2019; Kohler & Digiampietri, 2021). The degree of density or diffusion of the network is understood as the set of actors' connections (Williams dos Santos & Farias Filho, 2016).

Centralities, which are the most used network properties, provoke the characteristics related to the relevance or visibility of an actor in a social network (Rossoni & Guarido Filho, 2007; Farias & Carmo, 2021). Among the centralities, a distinction is made between the centrality of degree or location, which is the property that highlights the relational activity of an actor (Balestrin, Verschoore & Reyes Junior, 2010; Ribeiro & Corrêa, 2018; Ribeiro, 2019), by inferring the number of connections of each actor in a graph (Alves, Pavanelli & Oliveira, 2014); in other words, the number of partnerships in creation and publication of a scientific study (Pessoa Araújo, Mendes, Gomes, Coelho, Vinícius & Brito, 2017). In this study, we highlight that we chose to focus on degree centrality; this choice is justified by the fact that this structural connection is the most common and the most direct measure of centrality (Cunha & Piccoli, 2017; Ribeiro, 2022).

In short, social media analysis can be: one-mode and / or two-mode. The one-mode network is characterized when members of a social network have connections with other members of the same category, as for example, a social network composed only of researchers. The two-mode network is characterized when its actors have interactions with members of other categories, as for example, researchers and their respective institutions of origin. That said, in Brazil, it is uncommon to find works that investigate the two-mode networks, i.e., studies of one-mode social networks far exceed, in quantity, studies of two-mode social networks at the international level. According to the scientific literature, the number of scientific studies published about the two-mode social networks is around 80% less than the studies about one-mode social networks (Tomaél & Marteleto, 2013).

The context of our investigation highlights all the articles from scientific journals available in the SPELL electronic library, from the areas of Administration, Accounting, Economics and Tourism. The selection process of the studies sample occurred as follows: a) choice of keywords applied in the search filter of the SPELL database; b) data collection in the



SPELL database; c) search for keywords in the titles, abstracts and keywords of the studies; d) definition of the sample by reading the titles and/or abstracts of each article.

In the SPELL data platform, we placed a filter with the keyword “*Balanced Scorecard*”. The use of this keyword is justified by the fact that it is the most used to identify studies focusing on the Balanced Scorecard (Faraji *et al.*, 2022). This keyword was searched in the title, abstract and keywords of each article, in a non-simultaneous way, thus allowing all articles on the investigated topic to be identified and listed.

As a result, the sample was composed of 262 studies, in a time frame from 2000 to 2022. The analyzes of those 262 articles is based on the following SNA indicators: (i) two-mode social network of periods and articles; (ii) co-authorship networks; (iii) HEI collaboration networks; (iv) two-mode social network of scientific journals and authors; (v) social network of keywords; and (vi) two-mode social network of themes and authors. The mentioned data and information were obtained from the respective studies, and in sequence, we started the procedures for measurement of the symmetric and asymmetric matrices, followed by the graphic visualization of the respective one-mode and two-mode collaboration networks of the actors. Figure 1 shows the start and end dates for each initiative. The bibliometric data (first stage of this study) were measured using the software *Bibexcel* and *Microsoft Excel 2007*; the SNA indicators were measured using the software *UCINET* and *NetDraw*.

Action	Start date	End date
Search for articles in the SPELL electronic library	06/27/2022	06/29/2022
Tabulation of papers (bibliometric data)	06/29/2022	
The matrix construction and graphic visualization of the co-authorship networks	06/29/2022	06/30/2022
The matrix construction and graphic visualization of the HEI collaboration networks	06/30/2022	07/01/2022
The matrix construction and graphic visualization of the two-mode social network of periods and articles	07/01/2022	
The matrix construction and graphic visualization of the two-mode social network of journals and authors		
The matrix construction and graphic visualization of the two-mode social network of themes and authors	07/02/2022	
The matrix construction and graphic visualization of the keywords' social network	07/02/2022	07/03/2022

Figure 1: Dates

Source: Elaborated by the author (2022)

4 Results analysis and discussion

This section addresses the analysis and discussion of the 262 researches about the BSC, subdivided into six sections described in the last paragraph of the Methodological Procedures section of this study.



Figure 2 illustrates the two-mode social network that is composed of 23 years of publications on the BSC theme and the 262 articles identified in this research.

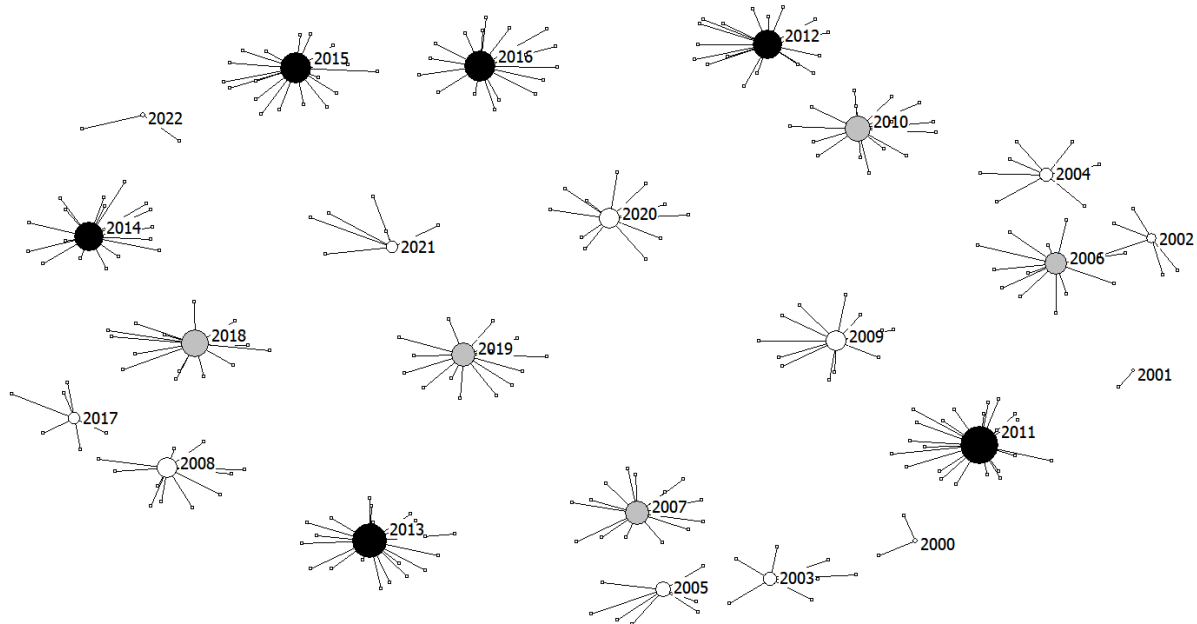


Figure 2: *Two-mode* social network of the periods and articles
Source: Research data (2022)

Looking at Figure 2, the following six periods are highlighted (in descending order, and in terms of degree): 2011, 2013, 2015, 2016, 2012 e 2014. We call attention to the fact that those are six continuous years, what shows that scholars pursued continuous investigations on BSC, later publishing them in the Brazilian national scientific journals indexed by SPELL in those mentioned years. This result is also confirmed in regard to the publications about the BSC, i.e., in the relevant periods, which are the ones that gathered more articles on the investigated topic, following the same order of the years that had the greatest centrality degree. Those periods published together 112 studies, which correspond to 43% of the amount of 262 articles identified in this research. Research that focused on articles indexed by international databases, such as the Web of Science (WoS), similarly corroborated the findings of this subsection (Veroneze *et al.*, 2017; Coelho, 2019; Sousa *et al.*, 2020).

Yet about Figure 2, it reveals that the years 2018 and 2019 also had a certain relevance, both in degree centrality, as well as in usefulness of studies on the BSC, showing that, even if the investigated subject has reached its peak in the years 2011 to 2016, this is a subject that calls the scholars attention to their publications. With this, we understand that the theme in focus is timeless, which means, even reaching its peak in the periods from 2011 to 2016, the same period for the results of this research, it denotes to have a tendency in researchers to continue incorporating the BSC concept in their respective scientific works; that confirms its importance, relevance and prominence for the scientific knowledge of Strategy (Ribeiro & Corrêa, 2018; Oliveira *et al.*, 2021; Faraji *et al.*, 2022), as well as for other fields of knowledge, such as accounting (Assis & Teixeira, 2015; Ribeiro, 2019).

Figure 3 shows the co-authorship networks detected in this study, which are formed by 617 nodes and 1,696 ties.

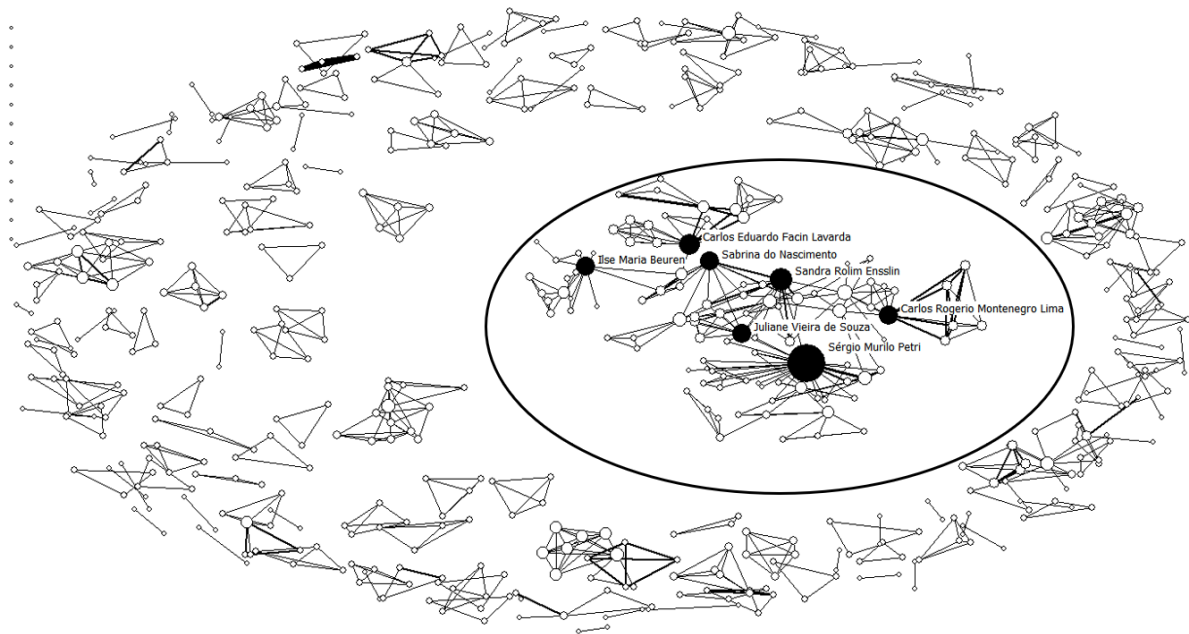


Figure 3: Co-authorship networks
Source: Research data (2022)

In this study, the author with the highest degree is Sérgio Murilo Petri, followed by the scholars: Sandra Rolim Ensslin, Carlos Eduardo Facin Lavarda, Carlos Rogerio Montenegro Lima, Sabrina do Nascimento, Juliane Vieira de Souza and Ilse Maria Beuren. These researchers are considered the ones with the greatest relationship actions with other academics in the mentioned cooperation network; this is explained as a result of their partnerships in the publications of BSC studies (Balestrin, Verschoore & Reyes Junior, 2010; Alves, Pavanelli & Oliveira, 2014; Pessoa Araújo et al., 2017; Ribeiro, 2019), which contribute to the generation of scientific value through information and academic knowledge about this theme, thus influencing its greater proliferation and dissemination in the Brazilian scientific literature.

In addition to the scholars highlighted in Figure 3, there are other researchers who, although not emphasized in the aforementioned Figure, had a satisfactory emphasis on the degree centrality; they are: Lúcia Maria Portela de Lima Rodrigues, Vicente M. Ripoll Feliu, Patrícia Rodrigues Quesado, Marcelo Medeiros da Rosa, Beatriz Aibar Guzmán, Jair Antonio Fagundes, Cristina Crespo Soler, Jonas Duarte da Silva, Leonardo Ensslin, Cristina Martins, Gustavo Vanzo Odebrecht, Pollyanna Gerola Giarola, Fernanda Marques de Almeida Holanda, Maria Naiula Monteiro Pessoa, Augusto César de Aquino Cabral, Marcelo da Costa Borba, Fúlvia Fernanda de Lima, Sandra Maria dos Santos, Fábio Frezatti, Marcelo Bronzo Ladeira, Josefa Ediliede Santos Ramos, Fernando A. Ribeiro Serra e Rodolfo Araújo Moraes Filho.

In regard to partnerships, the most common are between the following authors: Lúcia Maria Portela de Lima Rodrigues and Patrícia Rodrigues Quesado published six times together; Beatriz Aibar Guzmán and Lúcia Maria Portela de Lima Rodrigues released five studies together; and Beatriz Aibar Guzmán and Patrícia Rodrigues Quesado also showed five collaborations in researches. We remark that even though these researchers have published studies on BSC, jointly and intensely, and with that, influencing strong ties between them, it was not enough to make them to stand out in regard to the degree, since this centrality measure is more equivalent to the number of partnerships with more authors, and not with specific scholars, as it is the case of the authors cited in this paragraph. However, the interaction between

the authors had an impact on their respective productivity on the BSC theme, in the Brazilian academic scenario.

In reference to researchers who have more interaction with other scholars, the following stand out: Sérgio Murilo Petri (connected with 25 other researchers); Sandra Rolim Ensslin (interaction with 14 authors); Carlos Eduardo Facin Lavarda (with 12 scholars); Carlos Rogerio Montenegro Lima, Ilse Maria Beuren, Juliane Vieira de Souza and Sabrina do Nascimento, all interacting with 11 other authors. This fact corroborates the highlight of these authors as the most central researchers in this study. We also emphasize the following scholars: Leonardo Ensslin, who partnered with nine other scholars; Fernanda Marques de Almeida Holanda and Fernando A. Ribeiro Serra, both interacting with eight other authors.

Those scholars are also highlighted in regard to the usefulness of the BSC studies; thus, corroborating and substantiating the degree centrality measure, and, therefore, validating the degree of importance, prominence and relevance of those researchers in the dissemination and socialization of the BSC theme, for the Brazilian national scientific field. By analyzing Figure 3, we see that the mentioned researchers appear, and in a macro way, they compose a more accentuated group in the mentioned co-authorship network. This typifies the “giant component” element in nomenclature, which comprises and indicates the existence of researchers groups who publish separately (Bordin, Gonçalves & Todesco, 2014), and that reflects the presence of a more concentrated flow of scientific information among those authors (Kohler & Digiampietri, 2021) on the BSC theme.

That component helps to understand and to identify whether a given cooperation network is cohesive or sparse, and / or divided into small groups of actors (Sampaio, Sacerdote, Fonseca & Fernandes, 2015; Dias, Moita & Dias, 2019), impacting the density of the mentioned network (Bordin, Gonçalves & Todesco, 2014), which is formed by the 617 researchers found in this study. Therefore, in Figure 3, the density of the co-authorship network is 0.0049, which means that only 0.49% of the interactions are actually achieved, among the 617 in that network; thus, it impacts on the weak ties (Williams dos Santos & Farias Filho, 2016) and, in a flow of low knowledge throughout the co-authorship network, in regard to the BSC subject.

In a similar way, the co-authorship network of this study does not reflect the intersections between the distinguished research group of scholars in Figure 3, although the existence of prominent and important researchers for validation and growth of the BSC theme, in the national scientific scope. Therefore, in order to the density of any network to evolve, more specifically the researchers network in Figure 3, it is a *sine qua non* condition that scholars in highlight interact in a more precise and dynamic way, in regard to the degree and its respective applicability. Even if not across the entire network, but these scholars should interact with other authors who, via their respective HEIs, can serve as a “bridge” to strengthen interactions among those who form the collaboration network in Figure 3. This will contribute to the density optimization of the co-authorship networks of this study, and, concomitantly, to broaden the flow of scientific information and knowledge on the BSC subject, in the Brazilian scientific literary panorama.

Figure 4 shows the collaboration networks of the institutions in this research, being structured by 155 nodes and 408 ties. The HEIs that got more distinction in terms of degree centrality are: Universidade Federal de Santa Catarina (UFSC), Universidade de São Paulo (USP) and the Universidade do Rio Grande do Sul (UFRGS). The following institutions are also highlighted: Universidade de Valencia, Universidade do Vale do Rio dos Sinos (UNISINOS), Universidade Federal de Minas Gerais (UFMG), Universidade de Brasília (UnB), Universidade do Minho, Universidade Federal do Paraná (UFPR) and Universidade Regional de Blumenau (FURB). Of these HEIs, five are from the Southern Region of Brazil;



two are native from the Southeast Region; one from the Midwest Region; and two are from abroad.

There are also other HEIs that, although not highlighted in Figure 4, they are important and had an acceptable measurement in their respective degree centralities; they are: Universidade Presbiteriana Mackenzie (UPM), Universidade de Santiago de Compostela, Instituto Politécnico do Cávado e do Ave, Universidade Federal do Rio de Janeiro (UFRJ), Universidade do Vale do Itajaí, Campus Itajaí (UNIVALI), Universidade Federal da Paraíba (UFPB), Universidade Federal do Rio Grande (FURB), Universidade Federal de Viçosa (UFV), Universidade do sul de Santa Catarina (UNISUL) and Universidade Estadual do Oeste do Paraná (UNIOESTE).

Considering this panorama, we deduce that the mentioned HEIs visualized in Figure 4 are the most important and relevant in terms of degree perspectives, that is, the dynamics of partnerships with other HEIs. This happens via their respective researchers and in the scientific production context of studies focusing on the BSC, inside the Brazilian scientific panorama, and being supported by foreign institutions, in particular, those that are in focus in Figure 4. In regard to the Brazilian HEIs, the studies that focus on the BSC scientific production (Ferreira & Diehl, 2013) similarly confirm the findings of this subsection.

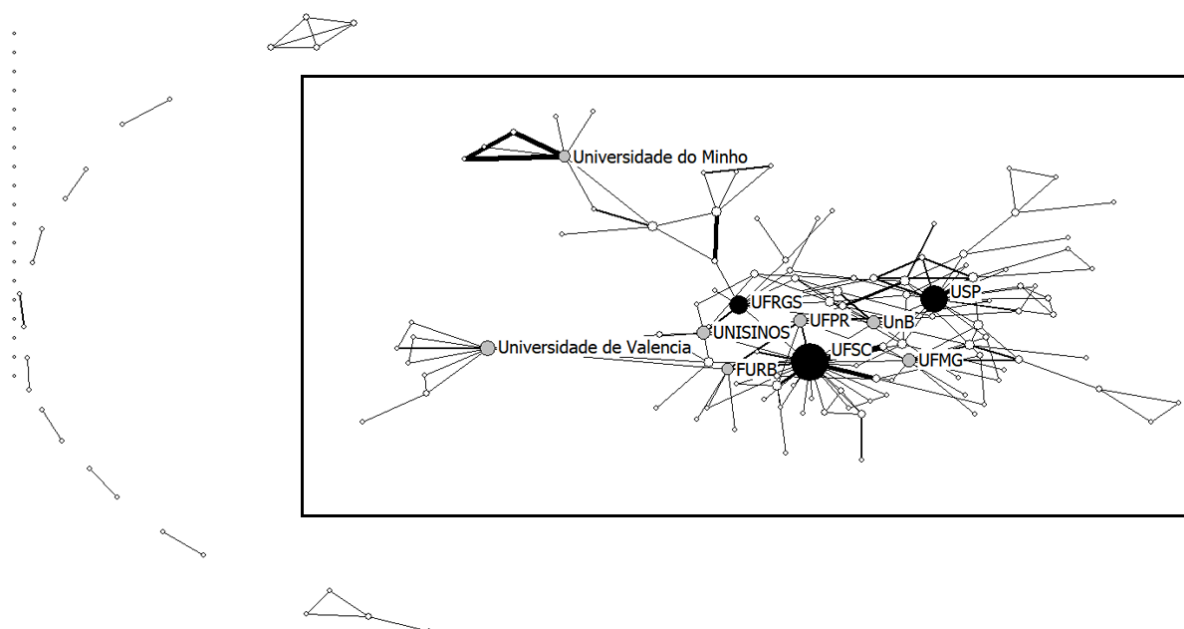


Figure 4: HEI collaboration networks
Source: Research data (2022)

As it will occur in the co-authorship networks portrayed in Figure 3, we consider that Figure 4 also shows the emergence of connections among a large number of HEIs, bringing to light a giant component composed of all the HEIs highlighted in Figure 4, which provides an enlargement and strengthening of information and knowledge about the BSC theme, in the national academic scope.

In this case, similarly to what is observed in the co-authorship networks of this research, the knowledge flow about the BSC is restricted to this large group of institutions that connect themselves directly or indirectly, harmonizing in a full and precise way the greatest number of interactions and connections in the HEIs collaboration network. This motivates us to affirm that the information and knowledge constituted by the authors and, concomitantly by their

respective HEIs are almost entirely based and guided by the HEIs of this group highlighted in Figure 4, above all, by the most central institutions of this research.

Such result is confirmed by the HEIs network density, which was measured at 0.0213, corresponding to 2.13%. This number is similar to the one verified in the researchers' social networks of this study. Therefore, we see the importance of scholars in the dissemination and socialization of the scientific research that focuses on the BSC theme, by contributing a posteriori to a greater aggregation of scholars in order to enhance and strengthen the academic research on the investigated topic. This simultaneously influences the creation of scientific value for the theme and, consequently, gives rise to new studies by academics who wish to understand and study the BSC. All this together will promote the intensification of new studies, the creation of research groups, the optimization of links and connections, giving rise to greater density in co-authorship networks, and finally impacting the collaboration networks of HEIs in an essential manner.

Figure 5 captures the second two-mode social network of this research, which was conceived by the 85 located scientific journals, and by the 617 authors, thus generating a social network composed of 702 nodes and 747 ties.

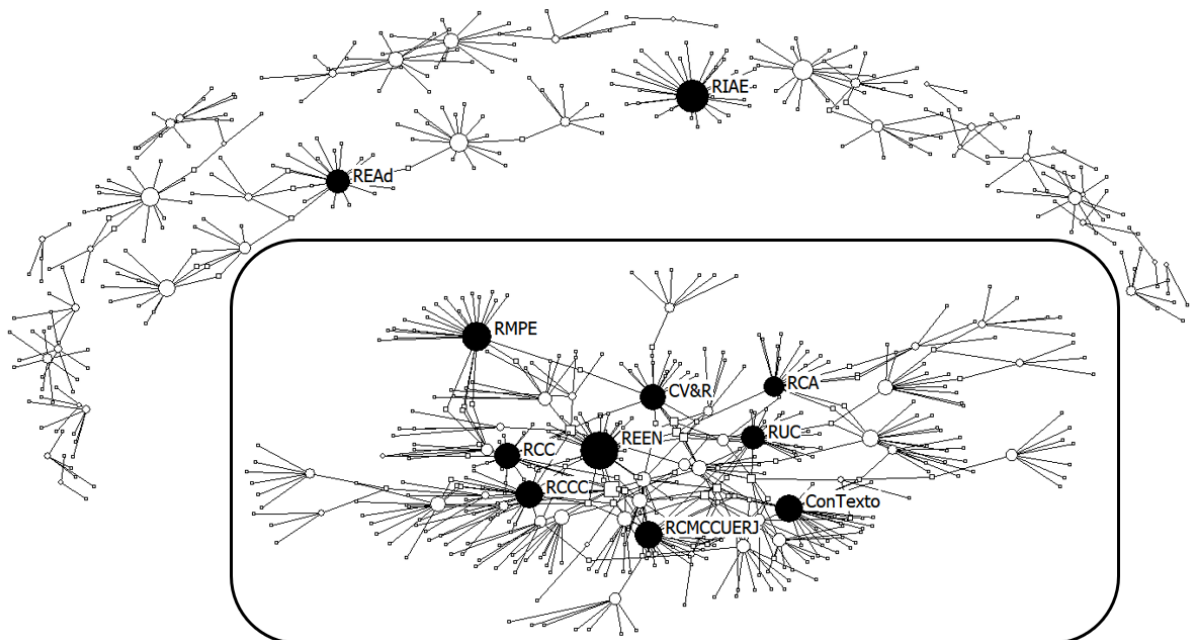


Figure 5: Two-mode social network of scientific journals and authors

Source: Research data (2022)

Therefore, these are the scientific journals in highlight: Revista Eletrônica de Estratégia & Negócios (REEN), Revista Ibero-Americana de Estratégia (RIAE), Revista da Micro e Pequena Empresa (RMPE), ConTexto, Revista Catarinense da Ciência Contábil (RCCC), Revista de Contabilidade do Mestrado em Ciências Contábeis da UERJ (RCMCCUERJ), Contabilidade Vista & Revista (CV&R), Revista Contemporânea de Contabilidade (RCC), Revista Eletrônica de Administração (REAd), Revista Universo Contábil (RUC) and Revista de Ciências da Administração (RCA). The amount of authors linked to each one of these scientific journals, for publication of their studies, is respectively: 31, 27, 23, 22, 22, 22, 20, 20, 19, 19 and 16.

This implies that the number of researchers directly influences the degree of those journals. We also remark that the magazines here cited and highlighted are the most propitious on the BSC theme, proving to be the most likely means of communication to disseminate the theme investigated here, as well as the inherent and/or analogous subjects to the aforementioned theme. That way, under the perspective of our research results, the scholars seek to evidence their findings and research contributions in the white literature that focus on BSC, in those journals highlighted in Figure 5.

Still approaching the prominence of these white literature media, there is a group of scholars and, consequently, of scientific journals that stood out in Figure 5. From that, a “giant component” arises again (Bordin, Gonçalves & Todesco, 2014; Sampaio, Sacerdote, Fonseca & Fernandes, 2015; Dias, Moita & Dias, 2019; Kohler & Digiampietri, 2021), considering that the journals native from HEIs with *Stricto Sensu* Graduate Programs in Accounting Sciences are those that draw more attention from the 617 researchers, or rather, from a large portion of those scholars; they are the ones involved in the process of building scientific knowledge about the BSC, intending for dissemination of their respective studies, findings and contributions, in the Brazilian national scientific literature.

However, we would like to evidence that there is a certain balance in regard to knowledge areas that guide and support those journals in a prominent way; that is, from eleven scientific journals highlighted in Figure 5, six are native to the area of Accounting Sciences, and five come from the knowledge field of Administration. This fact guides the understanding that the BSC theme is horizontal, especially in regard to the knowledge fields of Administration and Accounting, contributing to the theme under investigation to be more in-depth, disseminated and socialized in these areas that are complementary and have a strong intersection with the business environment of companies. Thus, this influences the performance dynamics of the BSC concept in the corporate market, which provides, a posteriori, the emergence and publication of subsidized research in different areas and sectors of the economy, grounded and guided by themes that make up the understanding and comprehension of the BSC as a strategic and performance management model for companies (Galas & Forte, 2005; Kawai, 2017; Borges, Coelho & Petri, 2018; Éckeli, Barbosa & Barbosa, 2020; Faraji *et al.*, 2022; Lourenço & Petenuci, 2022).

The analysis of the keywords' social networks has become popular among researchers, and many of them use it to map the conceptual structure of different research fields (Faraji *et al.*, 2022). Then, Figure 6 illustrates the keywords' social network, which was architected with 445 nodes and 2,346 ties. Observe that the nodes represent the keywords and their sizes are proportional to their recurrence in the analyzed data set, and the ties simulate the connections among keywords (Guimarães *et al.*, 2018). We also remark that the 445 occurrences of keywords are unique, since “only the criterion of not distinguishing between uppercase and lowercase letters was maintained – the singular and plural words were kept different” (Favaretto & Francisco, 2017, p. 376).



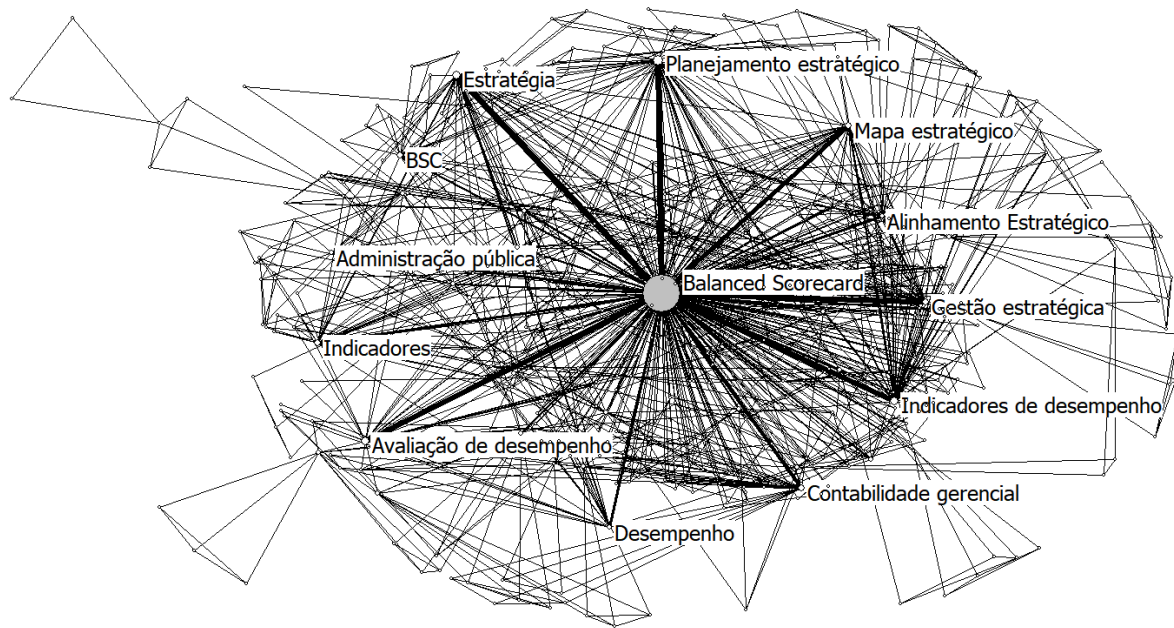


Figure 6: Keywords' social network
Source: Research data (2022)

That said, except for the keyword Balanced Scorecard, which is the keyword used to search for articles in our study, and if included, it would inevitably and undoubtedly be highlighted in this research, the keywords that stood out are: strategic planning, strategy, performance indicators, performance evaluation, strategic management, indicators, managerial accounting, BSC, strategic map, performance, strategic alignment and public administration. The introduction of BSC by Kaplan and Norton in 1992 led to an increase in research interest about BSC; however, when observing the most central keywords, it appears that there was no significant change in the hotspots during this period (Faraji et al., 2022), i.e., from 1992 to 2022 under the perspective of Brazilian scientific publications.

Besides these keywords highlighted in Figure 6 in regard to degree, the following keywords are also highlighted: management, organizational performance, knowledge management, information technology, public management, stakeholders, organizational culture, performance measures, intellectual capital, people management, managerial control, competitive advantage, controllership, planning, Higher Education Institution, strategic administration, Institutional theory and strategic panel. This finding may point to researchers who focus their studies on subjects that are in more relevance at companies, influencing the insights for new research under the light of the BSC concepts (Faraji et al., 2022).

We also highlight the most frequent keywords links that occurred in the 262 studies identified in this research; they are: Balanced Scorecard with strategic planning and with strategy, occurring 18 times; Balanced Scorecard with performance indicators, happening 16 times; Balanced Scorecard with strategic management and performance evaluation, running 15 times; and Balanced Scorecard with strategic map, occurring 12 times. Being then these keywords the most suitable for future researchers to investigate consistent material about the BSC theme (Oliveira et al., 2021).

Therefore, the highlighted keywords occupy relevant positions and exert central influences in the thematic and theoretical informational flow (Francisco, 2011; Favaretto & Francisco, 2017) of the BSC subject, in this study. In general, either the keywords that were

highlighted in Figure 6, as well as the other keywords that were contemplated, reveal a certain tendency of researchers in this field of knowledge towards studies focused on themes that explore or connect with those highlighted keywords (Faraji et al., 2022). This shows that the keywords outlined in this research and simultaneously their respective occurrences may confirm the main research topics and/or published studies (Francisco, 2011; Favaretto & Francisco, 2017) on the BSC theme, at the Brazilian national level. The published state of the art studies (Coelho, 2019; Oliveira et al., 2021; Faraji et al., 2022) are aligned with the findings contemplated in this subsection of this study.

Figure 7 shows the third two-mode social network in this study, which covers the 58 identified themes and the 617 researchers, thus constituting a social network with 675 nodes and 731 ties. Therefore, the themes that stood out, in descending order, are: strategic management (with 69 authors publishing), performance indicators (55 researchers), public management (51 scholars), strategic planning (47), performance evaluation (46), HEI (37), management accounting (29), management control (29), technology (28), implementation (26), scientific production (21), micro, small and medium-sized enterprises – MSMEs (20), cooperative (19), knowledge management (14) and innovation (with 13 researchers publishing).

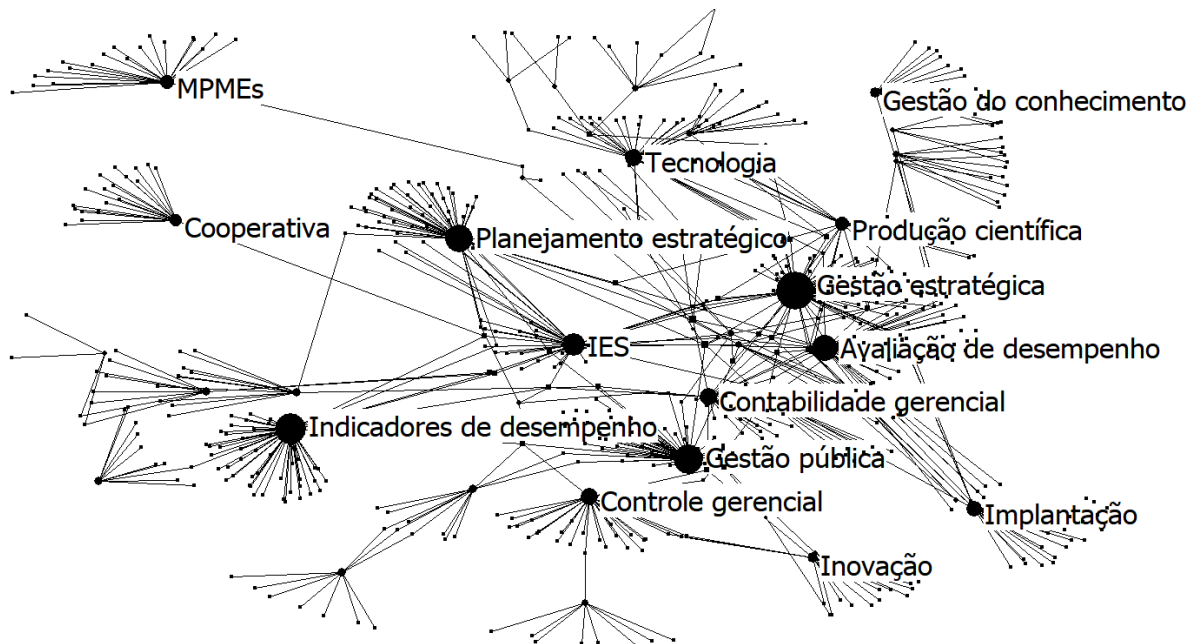


Figure 7: Two-mode social network of themes and authors

Source: Research data (2022)

Comprehensively, the themes highlighted in Figure 7 are in line with the keywords highlighted in Figure 6, particularly in terms of the following subjects: strategy, performance, planning, management; thus reinforcing the BSC concept as an essential management model for the alignment, management control, performance and strategic planning of companies (Galas & Forte, 2005; Rocha & Lavarda, 2011; Kawai, 2017; Borges, Coelho & Petri, 2018; Éckeli, Barbosa & Barbosa, 2020; Faraji *et al.*, 2022; Lourenço & Petenuci, 2022). With this, we observe how the 262 studies identified in our research interact in the correlation (Faraji et al., 2022) between those keywords and the main themes that underpinned these 262 studies. This confirms the importance of these concepts to the foundation and north of studies that focus

on the BSC, not only in the national scientific scope (Coelho, 2019; Oliveira et al., 2021), but also in the international scientific literary panel (Faraji et al., 2022).

Then, we can state that researchers in the national academic scenario correlate their respective studies with a focus on the premises and concepts that underlie the BSC, making those scientific works to become consolidated and legitimized in the academia, by providing and later enabling the publication of their respective studies; although, going into themes that are present and/or can be worked via the implementation of BSC perspectives, as it is the case of higher education, innovation, accounting, technology, MPMEs. As a result, the BSC theoretical collection tends to become robust and dynamic, contributing to broaden its conceptual roots in other topics, in the areas of management, business, finance, strategy, among others.

In addition to the themes highlighted in Figure 7, there are other subjects represented in this research, although not highlighted in the aforementioned Figure, i.e., in regard to the researchers' interaction with these themes, in consequence of their respective low scientific research production. Those themes are: organizational climate, competences, quality management, cost management, project management, corporate governance, internationalization, logistics, marketing, research and development, sustainability, third sector, tourism and resource-based view.

Therefore, such topics that are not often addressed in research on the BSC scope can be a relevant research opportunity for scholars who wish to expand their scientific knowledge about the BSC, by focusing on other topics that are directly connected to the concepts of the BSC, and/or for beginners academics who seek knowledge about the BSC, in particular, substantiated by themes that are still embryonic to the mentioned theme. In general, those incipient themes in the theoretical framework of the BSC, if disseminated by scholars in a more intense and precise way, will become prominent together with the already consolidated and legitimized themes that are inherent to the BSC, in order to impact a greater growth of research on the mentioned topic, especially for scientific purposes in the Brazilian academic scenario.

5 Conclusion

This study aimed to map and to investigate the development and structure of the scientific production social networks on the BSC theme, published in the Brazilian national scientific journals that are indexed by the SPELL electronic library. Therefore, this study brings two central contributions to the field of Strategy knowledge: the first is related to the BSC theme, and the second refers to the metric indicators of the SNA.

As a result, the study brings multiple research contributions to the Brazilian scientific literature on BSC theme, namely: (i) to offer new insights into the conceptual structure of the BSC studies through the SNA of actors that are involved in the process of building knowledge on the referred topic, especially the social networks of keywords and themes; (ii) the use of the Library SPELL as a comprehensive Brazilian national database for SNA, which provides a broad view of the Brazilian national literature on the BSC theme for senior researchers, and in particular, for beginners; thus being able to open paths for future studies, by revealing research gaps in the Brazilian scientific panorama; (iii) create opportunities for the emergence of new studies, in particular about themes that still need to be better studied and, consequently, published, contributing to the expansion and strengthening of BSC research in Brazil, and, perhaps in the International scope.

We conclude that our research brings contemporary information about the Brazilian national scientific production and its collaboration networks regarding the BSC theme; it produces a vision of the actors that are necessary and important for the construction of academic



knowledge and its aggregation of value in science; it provides the words that stood out in the 262 articles investigated, thus manifesting possible lines of study, themes, theoretical concepts and knowledge flows in the academic literature on BSC in Brazil.

In short, this research optimizes and contributes to the expansion of the current understanding on BSC theme for teachers, researchers and professionals in the field of Strategy; it focuses especially on scientific production under the light of formation of the one-mode and two-mode social networks, approaching the actors responsible for creating knowledge, disseminating and socializing the mentioned theme in the Brazilian national academia; this aspect thus provides a research agenda for future studies.

One limitation in our research is related to the fact that the survey was performed with the specific SPELL database only. Then, for future studies, we suggest an expansion of this study using other national platforms and especially international data platforms, such as SciELO, EBSCO, Web of Science and Scopus. In addition, we also suggest to make use of national and international scientific events, national and international scientific journals that are legitimized and consolidated in the academia, in the knowledge area of the BSC theme.

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ⁱ Doutor em Administração (UNINOVE). Pós-doutor em Administração (UNIFOR). Pós-doutorando em Administração (IPLEIRIA). Professor DE do curso de Administração (UFDP)

