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Bibliometric analysis of the academic production on governance in honey supply chains

Análise bibliométrica da produção acadêmica sobre governança nas cadeias produtivas do mel

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ABSTRACT

This study aimed to perform a bibliometric analysis of the academic production that establishes connections between governance and the honey supply chain. Forty articles were analyzed, 15 of which were in the Web of Science and Scopus® databases, and 25 were taken from the bibliographic references of the articles selected in the Scopus database. The data analysis revealed that the main theories used to investigate the existing relationships between governance and the honey supply chain were: transaction cost theory; economic theory of conventions; productive arrangements theory; and

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organizational theory of the beekeeping sector. Regarding the authors, no production concentration in research groups was found. The most recurrent themes refer to training, management, and sustainability. The study revealed the scarce participation of family farmers in the beekeeping chain, and the fragility of governance structures in the beekeeping sector.

Keywords: bibliometric analysis, supply chains, governance structures.

RESUMO

Este estudo teve como objetivo realizar uma análise bibliométrica da produção acadêmica que estabelece conexões entre governança e a cadeia produtiva do mel. Foram analisados 40 artigos, sendo 15 nas bases de dados Web of Science e Scopus®, e 25 foram retirados das referências bibliográficas dos artigos selecionados na base Scopus. A análise dos dados revelou que as principais teorias utilizadas para investigar as relações existentes entre governança e cadeia produtiva do mel foram: teoria dos custos de transação; teoria econômica das convenções; teoria dos arranjos produtivos; e teoria organizacional do setor apícola. Em relação aos autores, não foi encontrada concentração de produção em grupos de pesquisa. Os temas mais recorrentes referem-se à formação, gestão e sustentabilidade. O estudo revelou a escassa participação dos agricultores familiares na cadeia apícola e a fragilidade das estruturas de governança no setor apícola.

Palavras-chave: análise bibliométrica, cadeias produtivas, estruturas de governança.

1 INTRODUCTION

Given our planet's accelerated degradation, the current generations need to adopt survival strategies associating improvement of local communities' living conditions and nature preservation, ensuring the same conditions for future generations. In this scenario, bees are strategic partners in maintaining biodiversity thanks to their ability to pollinate and maintain natural species, which makes beekeeping an ecologically correct and self-sustainable alternative to explore not yet degraded natural environments, or to recover areas threatened by genetic erosion (E. A. Silva, 2010).

According to Vidal (2020), Brazil has the largest organic honey production capacity in the world. In particular, the Northeastern region is highly competitive in the global market of beekeeping products. The differential of Northeastern honey is the low contamination by pesticides, and antibiotic residues since a large percentage of the honey produced in this region comes from native vegetation. In addition, the low air humidity

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hinders the onset of diseases in the hives, which makes the use of medications unnecessary.

Thus, it is notorious that the beekeeping sector has been standing out as an attractive option for income generation and rural occupation since its supply chain creates jobs and income flows throughout the year, especially in family farming, contributing to improving human life quality and settlement in rural areas (Arruda, Botelho, & Carvalho, 2011).

On the other hand, it is worth noting that the honey supply chain comprises family farming actors and entrepreneurs in the beekeeping sector (Figueiredo, Meuwissen, Van der Lans, & Lansink, 2016). However, according to Alonso, Kok, and O'Shea (2020), the relationship between these links is not always in harmony and may compromise the chain's performance and expansion as a whole.

In this context, understanding the chain's governance processes can contribute to the analysis of how to seek greater balance in these relationships. Therefore, a bibliometric study addressing the relationship between governance and the honey chain is a strategic analysis alternative capable of substantially contributing to identifying the problems arising from the existing connection between these links, and also the research gaps around this theme.

In light of the above, this study aimed to perform a bibliometric analysis of the academic production that establishes connections between governance and the supply chain to identify this theme's state of the art. The study proposes the following specific objectives: to analyze the focus of the studies; the main theories used to analyze the relationship between governance and the honey supply chain; the methodological approaches; the main authors who produce in this area; and the most significant results regarding this debate.

2 BIBLIOGRAPHIC REVIEW

2.1 BIBLIOMETRIC ANALYSIS HISTORY

The use of metric techniques dates back to the 19th century, evolving in fundamentals, techniques, and applications of bibliometric methods. In 1869, Galton tried

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to identify eminent researchers by using criteria such as the mention of their names in selected bibliographies. In addition, Campell, in 1896, analyzed the dispersion of topics in publications using statistical methods. (Medeiros & Vitoriano, 2015).

Thus, bibliometry was originally known as "statistical bibliography", a term introduced by E. Wyndham Hulme in 1923, and the contemporary nomenclature was introduced in 1934 by Paul Otlet in his "*Traité de Documentacion*". (C. A. Araújo, 2006).

Therefore, bibliometric analysis is configured as an Information Science area that aims to analyze scientific production. It is a meritorious tool in managing recorded information, available to researchers in several human knowledge areas. (Rostirolla, 2014).

According to Medeiros and Vitoriano (2015), bibliometry is based on three laws, which are considered its structure's cornerstones: Bradford's Law (journal productivity), Lotka's Law (scientific productivity of authors), and Zipf's Law (word frequency). Accordingly, Glänzel (2003) identifies three modern bibliometry components: for practitioners, which is the basic research domain; for scientific courses, aimed at certain groups with their specialties; and for management in science and technology, aimed at research evaluation.

Nevertheless, according to Giusti, Campos, Peixe, and Trierweiller (2011), this tool has the following objectives: analysis and mapping of authorship and co-authorship, collaboration, and networks; evaluation and description of the literature, impact, and indicators; production and productivity, visibility of authors and institutions; and citation and co-citation studies.

Therefore, the results obtained after bibliometric analysis can cover the following elements: i) identification of trends and the knowledge growth in an area; ii) productivity prediction and identification of the influence of individual authors, organizations, or countries; iii) measurement of new themes emergence; iv) analysis of citation and co-citation processes, among other topics (Giusti et al., 2011; Medeiros & Vitoriano, 2015).

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2.2 HONEY CHAIN DYNAMICS

According to Magaña, Sanginés-García, Lara y Lara, Barrientos, and Morales (2017), the supply chains concept becomes broader, being part of a greater complexity process in agricultural development, through which agriculture starts to have a set of increasingly close relations and dependence with other conditions for its execution, such as the use of industrialized inputs (synthetic fertilizers, machinery, equipment, pesticides, medicines, and others) for the production itself.

Thus, the focus on supply chains enables the analysis of the dependence and relationship of the links within the system as a result of the market structure or external forces (Fernandes & Silva, 2016). Regarding the commercialization of beekeeping products, it is understood that most of the transactions are carried out between the beekeeping links – regional middlemen. Usually, this sale to the regional middleman is made in bulk, in buckets, cans, canisters, or metal drums (Dorneles, Binotto, Silva, & Rodrigues, 2014).

It is worth noting that these actors in the supply chain have their physical structures (warehouse and office) in the municipalities' headquarters, and the only improvement they implement to the product refers to the packaging in metal drums suitable for honey transport (coated inside with special varnish or plastic). Then, they are stacked in the storage environment until the shipping date, which is usually performed by trucks to their delivery destination (J. L. P. Araújo, 2014).

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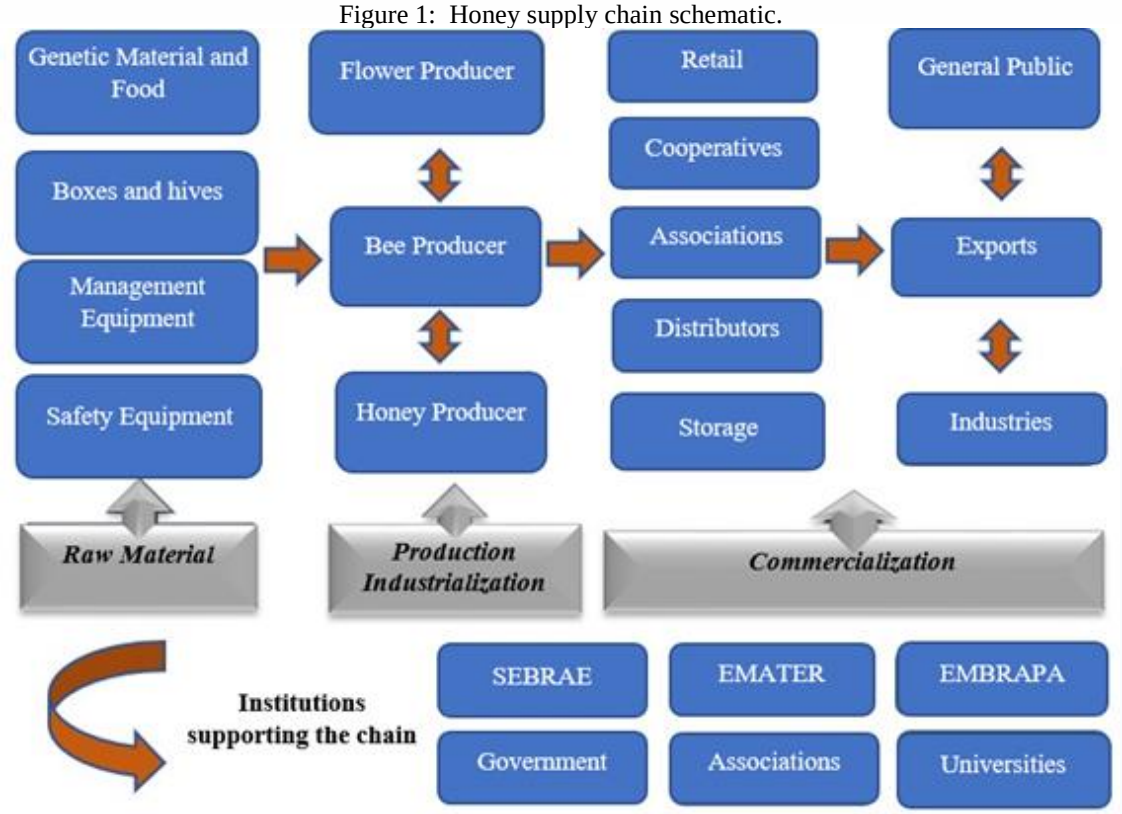
Figure 1: Honey supply chain schematic.



Source: adapted from Fernandes and Silva (2016).

We can see that business organizations, such as distributors and retailers, appear in the honey chain only at the time of commercialization. Therefore, the family farmer's relevant role in the chain's operation is evident.

Governmental institutions' support is also prominent in this chain, both in the formalization and legalization of procedures and also in the farmers' training.

3 METHODOLOGY

The articles were selected from the Scopus® (from Elsevier) and Web of Science databases using the search terms "beekeeping chain" and "governance structures of the bee sector". Thus, the study found 90 articles, 80 from Scopus® and 10 from the Web of Science.

However, only 15 were in accordance with this study's scope. Therefore, we analyzed the bibliographic references of the articles selected from the Scopus® database

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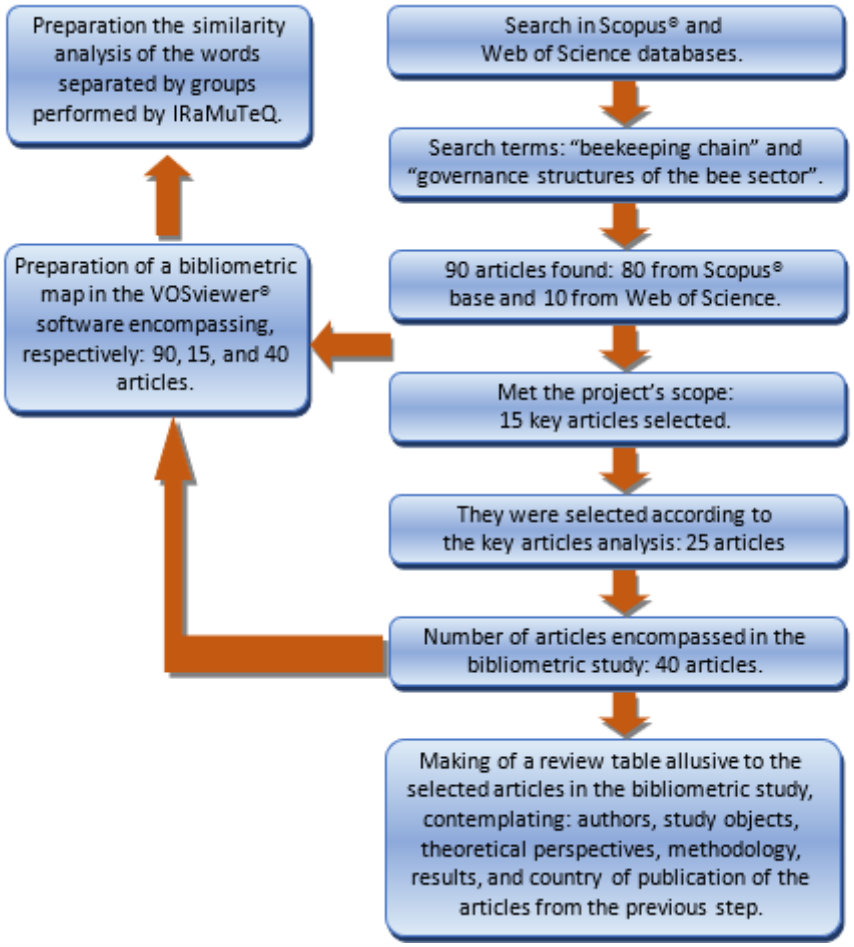
to increase the number of articles for the research, which allowed the identification of another 25 articles.

Hence, a total of 40 articles were reviewed for the state of the art, which were selected for further analysis to identify the gaps in research and the main theoretical arguments portrayed by the authors. Next, a similarity analysis of the words separated into four groups was performed: Articles' objectives, methodology, results, and perspectives. Data interpretation was carried out through a descriptive approach considering the analysis of the authors, objectives, methodology, and main results.

Figure 2: Flowchart referring to the methodological procedure.



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4 RESULTS AND DISCUSSIONS

In order to examine the 40 articles in the bibliometric study, we conducted an analysis covering the identification of the article's authors, the research institution, country of publication, and the respective database through which they were found.

The data presented in Figure 3 reveal there is no production concentration in research groups since the authors published only one article, without repetition. However, the production on the theme is well distributed worldwide across the continents. We notice a certain emphasis on the production from Brazil, but this concentration may have been the result of the way the articles were selected from the bibliographic references of the studies found in Scopus and Web of Science since there is no concentration of articles in the countries in these databases. Therefore, we conclude that the production is dispersed, but of interest to various nationalities.

Figure 3: Density view of the bibliometric map allusive to the articles found in the databases.

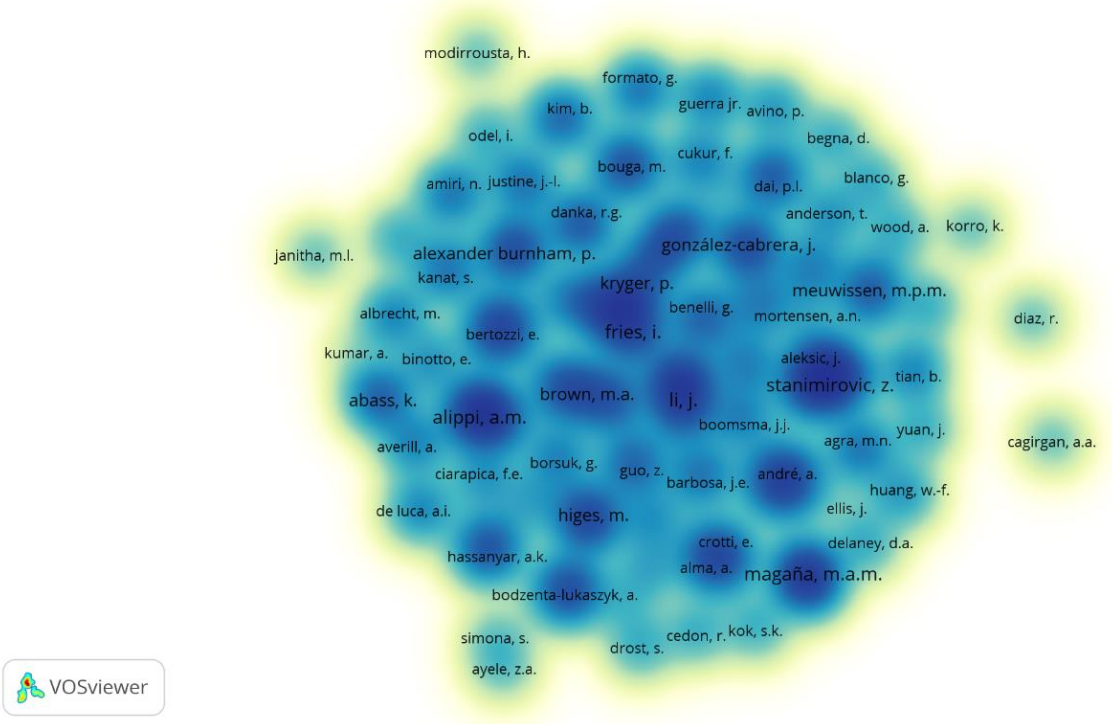

Figure 4 identifies the similarity of words separated by the groups "objectives", "methodologies", "results", and "theoretical perspectives" in the articles analyzed.

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Figure 4 shows that the "objectives" group focused on aspects related to the management of the honey chain regarding economic, production, governance, and market development aspects. Obviously, the selection criteria based on the keywords governance and supply chain favored this focus, as did the elimination of articles dealing with technical aspects of honey production. Thus, 4 word set groups were created. The purple word group represents the objective of studies concerning the honey chain and its relationship with the market and its dynamics, and also the objective of verifying the establishment of strategies by beekeepers and companies. The pink word group represents the research objectives concerning beekeeping development in municipalities and its impacts on the region/municipalities in a sustainable way. The green word group represents the objectives concerning honey chain governance studies with organizational focus and chain structure. The blue word group represents the study objectives focused on production, commercialization, and economic impacts.

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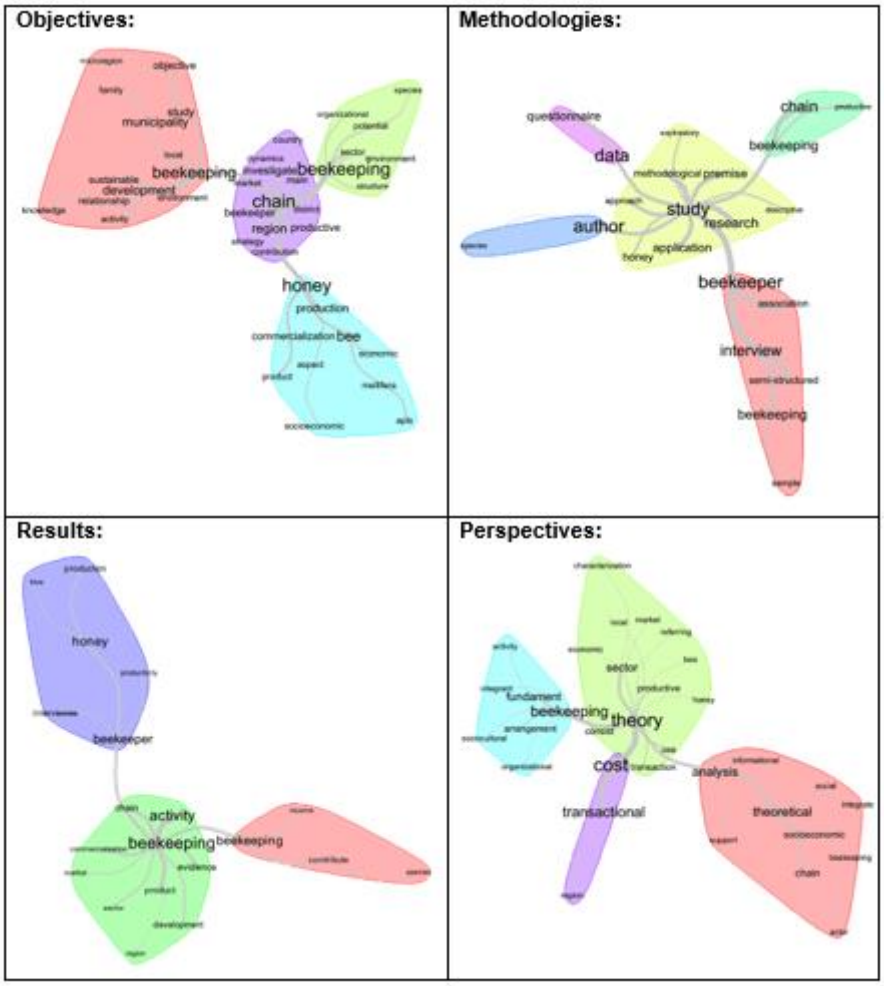
Figure 4: Objectives, methodologies, results, and theoretical perspectives.



The analysis methodologies focus on the economic performance profile. The main data collection procedures were questionnaires and semi-structured interviews (Alonso et al., 2020; Batt & Liu, 2010; Bender & Pereira, 2006; Dorneles et al., 2014; Duah, Segbefia, Adjaloo, & Fokuo, 2017; Jaffé et al. 2015; Janitha and Sunayana, 2018; Jeil, Segbefia, Abass, & Adjaloo, 2019; Lengler, 2008; Locke & Fries, 2011; Maderson & Wynne-Jones, 2016; Magaña, Moguel-Ordonez, Sanginés-García, & Morales, 2012; Matos, 2005; Pereira, Cario, & Souza, 2005; Ndyomugyenyi, Odel, & Okeng, 2015; Oliveira, Martins, Diniz Filho, Lira, & Pontes, 2007; Park & Yeo-Chang, 2012; Portes, 2003; Qaiser, Tahir, Taj, & Ali, 2013; Rosina, 2008; Shrestha, Partap, Islam, Bhuiyan, & Hussain, 2016; E. A. Silva, 2010; E. G. Silva, 2007; N. R. Silva, 2004; Visconde, 2016;

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Wahab, Othman, Othman, Jamari, & Ali, 2017). Still in Figure 4, referring to the word group of methodologies, we can see it was divided into five distinct groups. In other words, we can see the methodologies used in the research on the honey chain are carried out with an exploratory or descriptive approach, with the data being collected through questionnaires and/or semi-structured interviews.

The analysis methodologies involved differentiated approaches such as structure-conduct-performance (SCP) (Figueiredo et al., 2016); analyse de filière (or agro-industrial supply chain [ASC]) (Fernandes & Silva, 2016); factor analysis (Batt & Liu, 2010); focus groups (Shrestha et al., 2016); political ecology (Latour) (Lorenz & Stark, 2015); participatory diagnosis (Pinheiro, 2011); georeferencing and documentary research (Arruda et al., 2011); bibliographic and documentary research (Kohsaka, Park, & Uchiyama, 2017; Portes, 2003; Santos & Ribeiro, 2009; Souza, 2008); field observation (Santos, Kiill, & Araújo, 2006); PESTEL methodology (Virgil & Simona, 2020); case study (Belete & Ayele, 2020); Statistical Product and Service Solution (SPSS) version 18 and Microsoft Office Excel (Duah et al., 2017); bibliometry (Hung et al., 2017; Russo, 2016) and ex post indicators (Magaña et al., 2017).

Figure 4 also shows the word group “results” in which three distinct groups were formed. The yellow group shows the relationship between the honey chain activity and the impact on the market through the commercialization of honey products and the region’s development. The orange group refers to the beekeeping’s relationship with the income generated by the beekeeper, and the third group, in pink, refers to the results of studies involving productivity analysis in the honey chain.

In the “Perspectives” group, the main theoretical approach used in the studies was the transaction cost theory, which was used by eight of the articles analyzed (Arruda et al., 2011; Bender & Pereira, 2006; Magaña et al., 2017; Matos, 2005; Pereira, Cario, & Souza, 2005; Rosina, 2008; Santos et al., 2006; N. R. Silva, 2004).

Table 1 shows that the most recurrent themes refer to training, management, and sustainability. Regarding training, the authors show that the limitation or lack of it reduces beekeeping productivity and competitiveness, and hinders its market insertion. Inconsistent management reveals that it negatively impacts the commercialization

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processes, although some studies have revealed that in some locations it has been properly carried out and in this case it has generated good results regarding farmers' income.

Table 1: Summarizes the themes and main results of the analyzed studies.

Themes	Authors	Debate
Technical assistance	Figueiredo et al. (2016)	Reports technical assistance as an export facilitator.
Training	Lengler (2008)	Absence of training.
	Souza (2008)	Highlighted training progress.
	Bender and Pereira (2006)	Training contributed to increased productivity.
	Pereira et al. (2005)	Reduced technical knowledge.
	Figueiredo et al. (2016)	Certification as an export facilitator.
	Visconde (2016)	Absence of best production practices.
	Jaffé et al. (2015)	Training as a way to add value to the product.
	N. R. Silva (2004)	Limited knowledge of sanitation issues.
	Authors	Debate
	Maderson and Wynne-Jones (2016)	The experience and practical knowledge of beekeepers remain neutralized to scientific studies, such as entomological and ecological, which hinders the commercialization of beekeeping products.
	Ndyomugyenyi et al. (2015)	Due to the inefficiency of the honey harvesting and extraction procedures, many hives end up destroyed by beekeepers, which considerably decreases the beekeeping activity's financial return in the country.
	Lengler (2008)	Lack of professionalization because it is a secondary activity.
	Pereira et al. (2005)	The activity is considered secondary.
	Fernandes and Silva (2016)	Being a secondary activity reduces competitiveness.
	Jeil et al. (2019)	Secondary activity to supplement income.
	Dorneles et al. (2014)	Addresses the importance of associativism.
	Oliveira et al. (2007)	Absence of organization hinders management.
	Portes (2003)	Progress of the activity due to associativism.
	Maderson and Wynne-Jones (2016)	The associations are acting with interests different from those of the beekeepers.
	Pinheiro (2011)	Reports that sustainability actions are very limited.
	Santos and Ribeiro (2009)	Mitigation of environmental impacts depends on infrastructure.
	E. A. Silva (2010)	The current infrastructure does not contribute to sustainable development.
	Lengler (2008)	Few actions in the sustainability area.

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	Virgil and Simona (2020)	Plurality of components with stimulating and dragging effects stimulate the economic increase process and allow the strengthening of sustainability in rural development.
	Lorenz and Stark (2015)	Absence of incentives and preparation of informational policies, a fact that contributes to worsen the bee decline trend in this region.
	Arruda et al. (2011)	Evidences commercialization as a bottleneck.
	Pinheiro (2011)	Reports an absence of leadership.
	Rosina (2008)	Governance tools are efficient.
	Souza (2008)	Institutionalization negatively affected the chain by increasing tax costs.
	Oliveira et al. (2007)	Poor management skills.
	E. G. Silva (2007)	Absence of organizational activity structure.
	Matos (2005)	Proper use of productive technologies and limited use of management technologies.
	Virgil and Simona (2020)	Beekeeping development and the commercialization of beekeeping products comprise a plurality of components with stimulating and dragging effects.
	Janitha and Sunayana (2018)	Difficulty in obtaining production financing.
	Magaña et al. (2017)	Used four indicators called ex post. Thus, each of these conditioning factors indicated the competitiveness level, the trade ranking, and the apparent consumption.
	Qaiser et al. (2013)	Beekeeping activity benefits in Chakwal outweigh the production costs, and it was noted that beekeepers still make a profit, denoting a great business potential to be exploited.
	Magaña et al. (2012)	The beekeeping chain has made a significant contribution, favoring, through the commercialization of beekeeping products, the local economies and the well-being of Mexican families. The distribution of these products' added value becomes unequal due to the greater capacity of appropriation and power of different social actors along the chain.
	Batt and Liu (2010)	Key features that were most influential in the consumer's purchase decision: brand reputation, origin, and product value.
	Authors	Debate
	Alonso et al. (2020)	Appreciation for artisanal beekeeping and beekeeping as a leisure activity.
	Belete and Ayele (2020)	Women's empowerment.
	Jeil et al. (2019)	Women's active participation.
	Duah et al. (2017)	Beekeeping activity increased income levels and reduced poverty.
	Kohsaka et al. (2017)	Reported that urban beekeeping emerged in these two countries as a hobby and was later strengthened by marketing interests in bee products.
	Wahab et al. (2017)	Perceptions on bee honey as a complementary alternative for medicine.
	Shrestha et al. (2015)	In rural areas, where access to income is limited, small-scale commercial beekeeping can significantly contribute to livelihood security.

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	Ndyomugyenyi et al. (2015)	Beekeeping contributes more to the families' income.
	Park and Yeo-Chang (2012)	There have been changes in people's understanding of native Korean beekeeping. The traditional knowledge that has been passed down through generations is still maintained, such as the use of adequate materials and locations for the hives, rituals practiced for successful beekeeping, and the use of honey and wax as food and for medicinal use.
	Batt and Liu (2010)	This study's findings indicated that in Perth, Western Australia, honey is mainly consumed as a paste or sweetener in breakfast cereals and porridge. However, honey is also used as a marinade, in cakes and cookies, and as a beverage.

Sustainability is another recurring aspect in the studies, and even though it is recognized that honey production has low environmental impact and contributes to other ecosystems. The studies reveal that actions in this direction are intuitive and that the absence of a more institutionalized approach can bring negative effects in the long run. Even though in some cases, institutionalization, materialized mainly by certification processes, may create barriers for farmers.

5 CONCLUSION

The articles selected in this study's bibliometric analysis identified the very low participation of family farmers in the beekeeping chain, and the fragility of the governance structures in the beekeeping sector.

In line with it, regarding information diffusion by social actors in developing beekeeping activities, scholars (Bender & Pereira, 2006; Dorneles et al, 2014; Fernandes & Silva, 2016; Figueiredo et al., 2016; E. A. Silva, 2010) pointed out that both are of utmost importance. However, they notice that such information is scarce and, in some moments, non-existent in the beekeeping chain, evidencing a pronounced fragility of the supply chain as a whole.

On the other hand, we verified that Brazil stands out in the international scenario regarding beekeeping research and studies, especially in the Southern and Northeastern regions. However, according to national researchers, although the Brazilian beekeeping chain has the largest organic honey production capacity on the planet, presenting high competitiveness in the world market of beekeeping products, some negative factors

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existing in the chain must be corrected (Bender & Pereira, 2006; Dorneles et al., 2014; Lengler, 2008; Matos, 2005; Oliveira et al., 2007; Pereira, Cario, & Souza, 2005; Portes, 2003; Rosina, 2008; E. A. Silva, 2010; E. G. Silva, 2007; N. R. Silva, 2004; Visconde, 2016).

These factors involve the implementation of informative policies and campaigns by the entities comprising the beekeeping chain, such as the provision of free training and capacitation allusive to the cultivation of bees, and information regarding safety measures and best manufacturing and production practices (Bender & Pereira, 2006; Dorneles et al., 2014; Figueiredo et al., 2016; Portes, 2003; E. A. Silva, 2010; Visconde, 2016).

Therefore, to make the beekeepers' activities feasible in the supply chain, it is essential to have prices for the commercialized beekeeping products attractive and advantageous to the family farmers as well. By doing so, Brazil will be able to reach even more audacious horizons, establishing itself as an international power in the production and commercialization of such products

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