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REVIEW ARTICLE

A meta-analysis on the trust in agrifood supply chains

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Abstract

The agrifood literature suggests that trust is one of the most prominent and critical aspect for not only the effectiveness of collaboration, but also for improving sustainability performance. In this sense, the understanding of how trust works in agrifood supply chains is essential to find better paths to improve the functioning of those structures. The purpose of this article was to carry out a meta-analysis on the relationships of trust among the stakeholders in agrifood supply chains, to obtain data on previous publications as well as to justify future research on the search topics. For the bibliometric study, the R software in RStudio and the R packages *bibliometrix* and *biblioshiny* were used. The documents were extracted from the Scopus and Web of Science databases. Documents related to the researched topics, that were published in the last 11 years, were collected to the following meta-analysis. Of 277 documents published from 1995 to 2021, 11 review articles and 74 papers were analyzed. From these publications, we obtained data on the main authors and sources related to trust among the stakeholders in agrifood supply chains, on the methodologies used, as well as on trends for future researches. The present work brings forward data in a unique and up-to-date way.

KEYWORDS
agriculture, collaboration, food, governance, meta-analysis, relationship, supply chain, sustainability, trust

1 | INTRODUCTION

To achieve more sustainable agrifood systems, stakeholders must build political alliances and coalitions beyond food and agriculture. The integrated and transformative nature of the 2030 Agenda for Sustainable Development of the United Nations requires policies that systematically consider intersetorial linkages and support cross-sectoral communications and collaboration. In particular, the food and agriculture sector must take an integrated approach to sustainability that includes mapping and analysing synergies and trade-offs between the economic, social, and environmental spheres, assessing the state of the sustainability of food systems and agriculture and identifying key issues, their causes and driving factors (FAO, 2018).

The value chain is a key concept in the development of sustainable agrifood systems, which must improve while aiming to be economically, socially, and environmentally sustainable: the so-called triple bottom line of profit, people, and planet. Value chains, as engines of growth, create added value such as salaries for workers, a return on assets (profits) to entrepreneurs and asset owners, tax revenues to the government, a better food supply to consumers, and a net impact on the environment, positive or negative (Neven, 2014).

The agrifood literature suggests that trust is one of the most important supply chain drivers in order to reach collaboration (Dania et al., 2018). In this sense, trust is the most prominent and critical aspect for not only the effectiveness of collaboration, but also for improving sustainability performance (Chen et al., 2017; Touboulic & Walker, 2015). Azevedo et al. (2018) point out some controversial studies on the relationship between collaboration and sustainability, such as Hubeauet et. al. (2017), León-Bravo et al. (2017), and Walker et al. (2014), but they suggest that trust is fundamental to understand individual's behaviors in the social network and how social actors are related to each other to implement collaboration initiatives to improve supply chain sustainability.

Trust is dynamic, relational, and difficult to define—there are many definitions, each highlighting different aspects depending on the context (Fleming et al., 2020). Most definitions convey something about accepting vulnerability, as well as making a 'choice' and weighing risks rationally and/or emotionally, and making judgments about character and potential risks and benefits from granting trust (Boschetti et al., 2016).

Paluri and Mishal (2020) reviewed the literature on trust and commitment in supply chain management, in all fields, mainly aiming at identifying the antecedents and consequences of the two topics. According to Trienekens et al. (2018), trust and commitment, as constructs of informal relationships, can contribute to the three constructs of market orientation, namely, intelligence communication (by increasing the willingness of actors to share information), responsiveness (by increasing the willingness of actors to dedicate time, effort, and resources to the value chain), and intelligence generation (via their contribution to relationship quality and related information exchange).

Panahifar et al. (2018) indicate that a trading partner is willing to rely on exchange of information with other partners in whom it trusts. As trust enables the exchange of large amounts of information among trading partners, it facilitates the implementation of collaboration. Ghosh and Fedorowicz (2008) observed that trust, as a governance mechanism, plays a crucial role in sharing information among business partners. Important to remind that information is one of the main drivers in supply chain management, being the basis upon which to make decisions regarding the other supply chain drivers. It is the connection between all the activities and operations in a supply chain (Hugos, 2018).

Fleming et al. (2020) observed that trust was recognized as being hard to obtain, but nevertheless an essential and unavoidable process for the range of actors involved to start to develop further. Additionally, Kwon and Suh (2004) highlighted an important issue on the topic; they stated that a lack of trust among supply chain partners often results in inefficient and ineffective performance as the transaction costs (verification, inspections, and certifications of their trading partners) mount. This is another important point to consider, as it directly involves companies' profits.

The agrifood area is very specific; it presents a lot of informality and is vulnerable to different types of crises, such as sanitary, climate, supply, and others. In this sense, the understanding of how trust works in agrifood supply chains is essential to find better paths to improve the functioning of those structures. Specific review works in this field of study are scarce and research of this type can be of interest because they help in the development of research papers; optimize the work of researchers in the search for related articles; provide information on the main methodologies used; help in deciding on the specific fields and subfields to be studied; and enhance productivity.

Within this scope, the objective of this study was to carry out a meta-analysis on trust among the stakeholders in agrifood supply chains in order to justify future studies and to obtain data on the development of the research on the topic, methodologies used, the main documents and authors, and sources related to the subject, as well as on trends in this field of study.

2 | MATERIALS AND METHODS

The meta-analysis review is used to combine results of studies conducted independently of each other, made by different researchers, on a specific subject and reinterpret this information. With that, these results help to build knowledge about the situation in which research in a particular field of study finds itself (Huseyin, 2018).

In this way, a meta-analysis on a sample of documents published about the trust relationship in agrifood supply chains was carried out. The methodology used in bibliometrics was based on the work of Cardoso et al. (2020) and the methodology applied in the analysis of the documents was based on the work of Auler et al. (2017).

2.1 | Data collection

In December 2021, articles and reviews published in sources indexed in the Scopus and Web of Science databases, in all years, were searched. The search in Scopus was made using the terms "Trust" and "Supply Chain," in the article title, abstract, and keywords. After finding 2.642 documents, the "Agricultural and Biological Sciences" area was selected, which culminated in a provisional base of 201 documents (182 articles and 19 reviews).

The main search in Web of Science included the same words, "Trust" and "Supply Chain," with 2.272 documents initially found. Subsequently, we selected the categories "Food Science Technology" (92 documents), "Agricultural Economics Policy" (72 documents), "Agriculture Multidisciplinary" (29 documents), "Agronomy" (11 documents), "Fisheries" (eight documents), "Agriculture Dairy Animal Science" (eight documents), and "Horticulture" (one documents). Therefore, the total number of documents found in Web of Science was 172, with 159 articles and 13 reviews. The data collection process is illustrated in Figure 1.

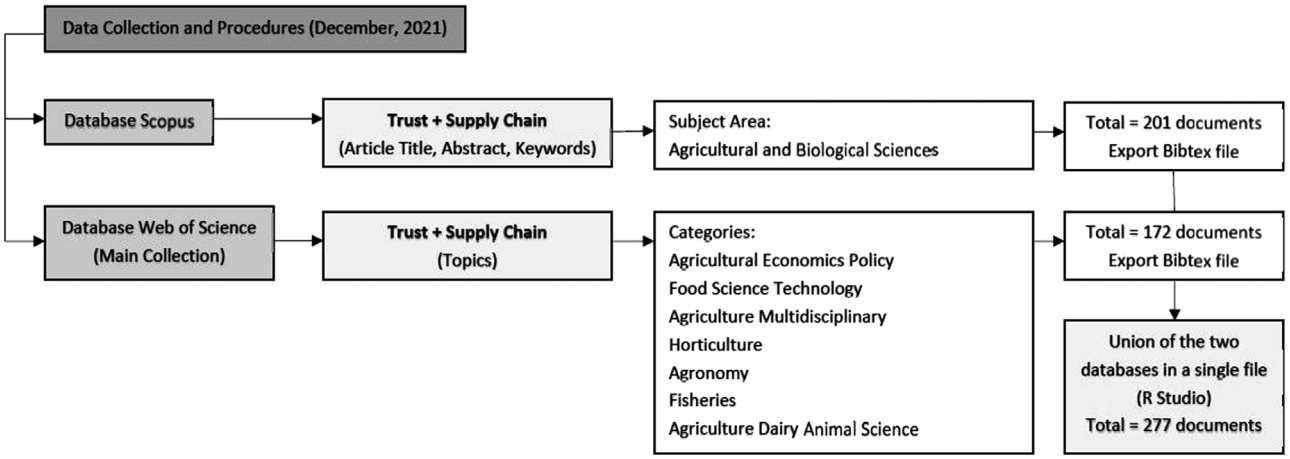

FIGURE 1 Data collection process

```
library(openxlsx)
detach("package:openxlsx", unload=TRUE)
library(bibliometrix)

WW <- readFiles("C:/R/TRUSTSCWOS.bib")
SS <- readFiles("C:/R/TRUSTSCSCO.bib")

MWW <- convert2df(c("C:/R/TRUSTSCWOS.bib"), dbsource = "isi", format = "bibtex")
MSS <- convert2df(c("C:/R/TRUSTSCSCO.bib"), dbsource = "scopus", format = "bibtex")
M <- mergeDbSources (MWW,MSS, remove. Duplicated=TRUE)

save(M,file = "REV4.RData")
library(bibliometrix)
biblioshiny()
```

FIGURE 2 R script

2.2 | Using the R software

"R" is a language and environment for statistical computing and graphics. The software provides a wide variety of statistical (linear and nonlinear modeling, classical statistical tests, time-series analysis, classification, clustering, etc.) and graphical techniques, and is highly extensible. "R" is available as Free Software under the terms of the Free Software Foundation's GNU General Public License in source code form. It compiles and runs on a wide variety of UNIX platforms and similar systems (including FreeBSD and Linux), Windows, and MacOS (The R Foundation, 2021).

The collected data were downloaded in two different files in the BibTeX format. Afterward, the R software was used (version 4.1.2 from 2021-11-01) in the RStudio Integrated Development Environment (IDE) to eliminate duplicate documents and create a single database. The bibliometrix R package had to be installed.

The R script is illustrated in the Figure 2. The BibTeX file extracted from Scopus was named "C: /R/TRUSTSCSCO.bib," while the one from Web of Science was named "C: /R/TRUSTSCWOS.bib." The single file with the data from the two databases, excluding duplicate documents, was named "REV4.RData." We loaded the data to analysis on the "biblioshiny for bibliometrix" website, according to what was established by Aria and Cuccurullo (2017).

The final database comprised 277 documents (255 articles and 22 reviews) published in 105 different sources. The publication period runs from 1995 to 2021. The documents were published by 836 different authors, with 37 single-authored documents and an average co-authorship of 3.44.

Based on the sample collected, the bibliometric analysis consisted of evaluating the annual scientific production; the main sources of publication; the representativeness of the main authors, their productivity, longevity, affiliations, and the countries of the corresponding author's; the most global cited documents; and the conceptual structure in both a factor and network analysis, considering the Keywords Plus.

2.3 | Analysis of documents

The analysis in the documents of the last 11 years was carried out, that is, published from the year 2011 on. Initially, the documents not written in English were excluded.

Second, the review articles were analyzed and, after that, the other documents were read. Articles that were of direct interest to our research were selected; in other words, those that somehow assessed trust among stakeholders in agrifood supply chains. The documents that did not address this issue in any way were excluded.

The abstracts of all documents were evaluated and, in case this part did not contain all the desired information, a more in-depth evaluation of the document was carried out. In the analysis, the types of documents were classified, with information such as the type of research approach and the method used.

3 | RESULTS

3.1 | Bibliometric

The most important bibliometric data for the purpose of this work are shown below. More extensive bibliometric data can be viewed in the Supplementary File.

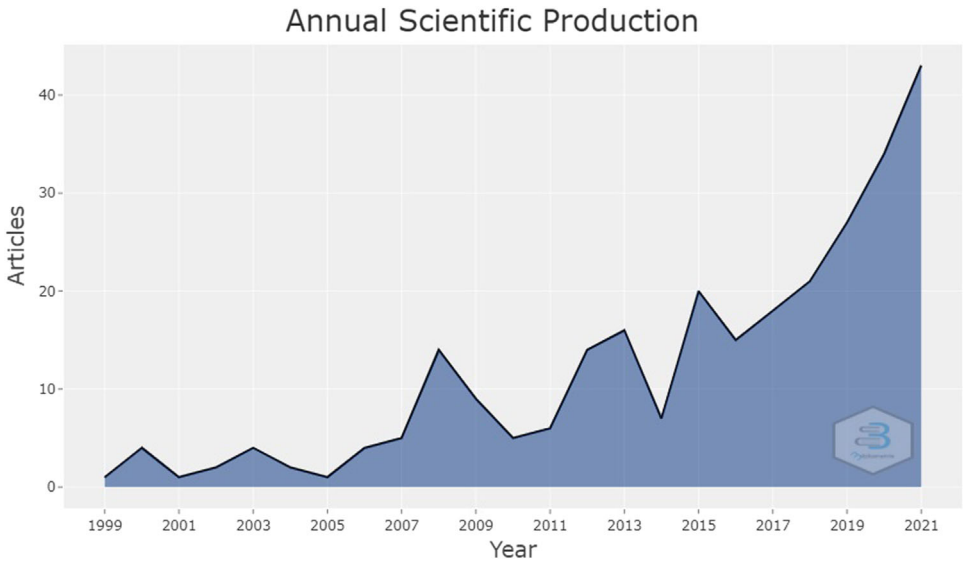

FIGURE 3 Annual scientific production

3.2 | Annual scientific production

According to the databases searched, publications on the terms "Trust" and "Supply Chain" started in 1995, with one paper. Between 1998 and 2017, there were upward fluctuations in the number of published works, and from then on, the rise was more evident, culminating in a maximum number of publications in the year 2021, with 43 works on the terms of the combined subjects researched. The annual growth rate is 18.64% and the graphical representation of the annual scientific production can be seen in Figure 3.

3.3 | Sources

Of the 118 sources found, the one with the most publications was the British Food Journal, with 36, followed by Food Control with 11, Agrekon with 8, and New Medit with 7. Regarding the number of citations, the British Food Journal obtained 633, again leading the list, but this time followed by the Agriculture and Human Values, Food Quality and Preference, and Food Policy, with 299, 249, and 222 citations, respectively.

The British Food Journal also showed a higher value of the h-index and its derivative, g-index, followed by Food Control in these two impact indicators. With regard to m-index, the journal Foods showed the highest value, followed by Food Control and British Food Journal.

3.4 | Authors

Of the 836 authors, Manning L. stands out as the most relevant in the present research, with eight articles published, followed by Gellynck X. and Molnar A. with six articles. The fractionalized counting of Manning L. was also the higher (4.42) but, in this regard, this author was followed by Kirsten J. (1.92) and Canavari M. (1.87).

In terms of longevity, the production of Manning, Kirsten, and Trienekens stands out. Manning published eight articles on the studied subject from 2006 to 2021; the longest production gap was between the years of 2008 and 2019 and this author published four articles in the last 2 years. Kirsten J., who produced five papers on the topics studied during 14 years, from 2003 to 2017, presented a long hiatus of publication between 2007 and 2017. Trienekens, who produced his first article on the subjects in 2008, published another paper in 2009 and had a long production gap after that, from 2009 to 2017. The top 20 author's production over time can be seen in Figure 4. The lines represent the author's timelines, bubbles sizes are proportional to the number of documents published, and the color intensity is proportional to the total citations per year.

Regarding affiliated research institutions, the University of Ghent stands out with 17 publications on the combined searched terms. In second place, we see the University of Sheffield, with 11 publications, followed by the China Agricultural University, with 10 publications. The Universities of Bologna, Bonn, Gottingen, and Saskatchewan are close behind with eight publications each. The top 20 affiliated institutions that have published documents on the subject at hand are represented in the Figure 5.

In the sample of 277 documents, the countries that most presented documents with corresponding authors were Italy and United Kingdom, with 31 documents each, followed by Australia, the United States, and China, with 20, 19, and 17 documents, respectively. Italians and British also obtained the largest number of single country publications, with 24 and 23 articles, respectively. On the other hand, the country that presented the most multiple country publications—MCP—was the United Kingdom with eight documents, followed by Italy with seven documents.

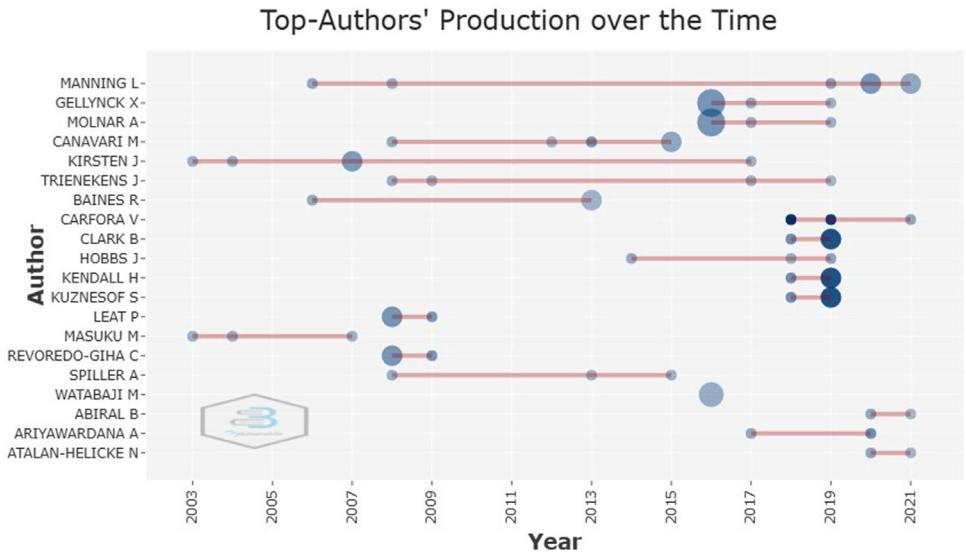

FIGURE 4 Top 20 author's production over time

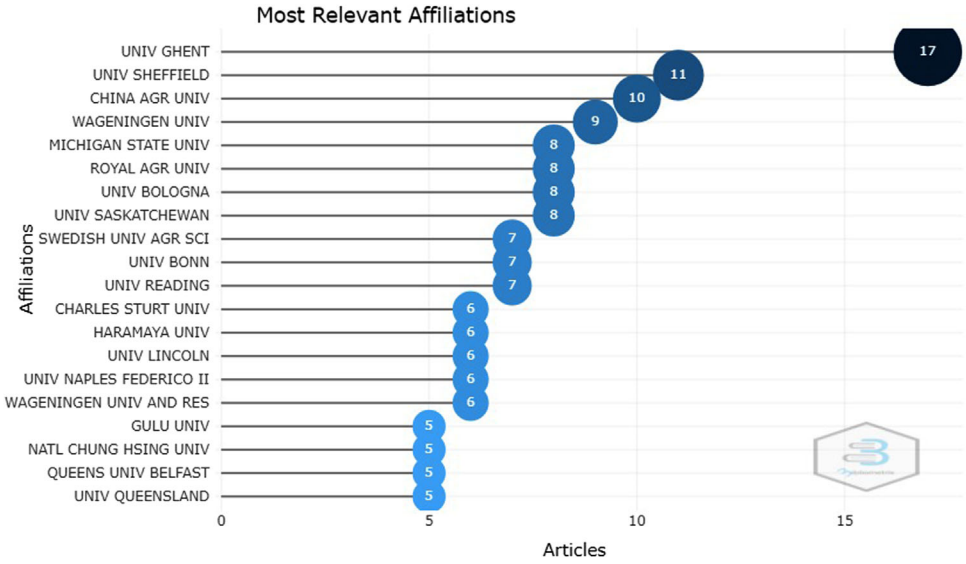

FIGURE 5 Top 20 affiliated institutions

The MCP ratio is the ratio between the MCP and the total number of publications in each country. The countries that showed the highest MCP ratio were Belgium and Brazil, with rates of 0.714 and 0.375, respectively. Netherlands, Indonesia, Ireland, and Switzerland occupied the third position in the MCP ratio, with rates of 0.333 each.

3.5 | Documents

Regarding the most cited articles in the entire database, the publications of Pelletier (2008), Smith (2008), Friedmann (2007), and Jarosz (2000) can be highlighted with 132, 128, 122, and 113 global citations, respectively. However, when the citation rate per year is evaluated, other documents stand out and, considering this parameter, the most cited publication was from Giampietri (2018), with a rate of 21 citations per year. The research tht comes next, with a rate of 18.67 citations per year, is from Carfora (2019), and the publication that obtained the third highest annual citation rate was that of George (2015), with 14.14 citations per year.

Looking at the most representative journals in the list of the top 20 most cited articles, we observed that Food Quality and Preference and British Food Journal were responsible for publishing three documents each, followed by the Agriculture and Human Values, Food Policy, and Computers and Electronics in Agriculture, with two articles each.

3.6 | Conceptual structure

To begin an analysis of the conceptual structure of the documents listed in this work, it was opted to study the occurrences of the main

TABLE 1 Top 50 Keywords Plus and their respective cluster

Keyword plus	Cluster	Ocurrences	Dim.1	Dim.2	Keyword plus	Cluster	Ocurrences	Dim.1	Dim.2
Trust	1	56	0.31	0.07	Management	2	21	−0.43	−0.57
Quality	1	27	−0.32	0.73	Impact	2	13	−0.5	−0.42
Supply chain	1	14	−0.17	0.09	Supply chain management	2	13	−0.06	−0.33
Food	1	13	0.85	0.21	Market	2	11	0.5	−0.92
Traceability	1	11	−0.25	0.58	Model	2	11	−0.45	−0.44
Economics	1	10	0.96	−0.22	Supply chains	2	11	0.13	−0.57
Standards	1	8	−0.22	0.16	Framework	2	10	−0.61	−1.03
Determinants	1	7	−0.25	0.13	Performance	2	10	−0.45	−0.77
Sustainability	1	7	0.55	−0.32	Governance	2	9	−0.32	−0.54
Agriculture	1	6	0.84	0.21	Networks	2	8	−0.42	−0.53
Challenges	1	6	0.06	0.15	Integration	2	7	−0.57	−1.47
Knowledge	1	6	−0.13	−0.14	Satisfaction	2	7	0.26	−0.73
Products	1	6	−0.07	0.88	Systems	2	7	−0.51	−0.76
Information	3	19	−0.23	1.76	Commitment	2	5	−0.65	−1.45
Safety	3	18	−0.44	1.5	Embeddedness	2	5	−0.49	−1.75
Attitudes	3	13	0.03	1.44	Industry	2	5	−0.29	−0.73
Willingness to pay	3	13	−0.32	1.9	Organization	2	5	0.05	−0.43
Preferences	3	12	−0.23	1.67	Relationship quality	2	5	−0.54	−1.31
Perceptions	3	10	−0.13	1.89	Behavior	4	10	1.34	1.42
System	3	9	−0.05	1.26	Food safety	4	10	1.45	0.7
Consumption	3	7	−0.24	1.44	Risk	4	8	1.11	0.94
Risk perception	3	6	−0.47	1.12	Human	6	7	4.18	−0.29
Choice	3	5	−0.34	1.22	Article	6	5	4.25	−0.25
Perception	5	9	1.91	0	Consumer	6	5	4.62	−0.26

Keywords Plus in the search. The Keywords Plus are generated by an automatic algorithm and consist of words that appear frequently in the titles of the article's references and not necessary in the title of the articles or as Author's Keywords. In addition to the term *trust*, which appeared 56 times, the words *quality* and *management* stood out, with 27 and 21 occurrences, respectively. Then came the words *safety*, *supply chains*, *attitudes*, and *food*, with 18, 14, 13, and 13 occurrences, respectively.

The keywords have been related to subfields of study and have had specific correlations. Therefore, we decided to divide the Keywords Plus into six clusters to better study the main themes and their correlations. Cluster 1, with topics such as *trust*, *quality*, *supply chain*, *food*, *traceability*, *economics*, and *standards*, leads us to believe that it is a group related to trust relationships among the stakeholders of a given supply chain, or business-to-business relationships (B2B). Cluster 2, presented themes like *management*, *impact*, *supply chain management*, *market*, *model*, and *supply chains*, signals that the documents are also related to B2B relations, but at a more managerial level. Cluster 3, on the other hand, presented topics such as *information*, *safety*, *attitudes*, *willingness to pay*, *preferences*, and *perceptions*, implies that it is a group of documents related to trust relationships between consumers and sellers, or business-to-consumers (B2C) relations.

Clusters 4, 5, and 6 were less representative and had few Keywords Plus in the top 50. The list of the 50 keywords that had more occurrences in the present research, as well as their position in each cluster, are listed in Table 1.

After that, the conceptual structure of the six selected clusters was mapped. Factor analysis was used to reduce the dimensionality of the data and represent them in a low-dimensionality space. The analysis using the Multiple Correspondence Analysis (MCA) method was performed. In this model, the words are close to each other due to a greater proportion of articles that treat then together and are distant from each other when a small fraction of articles uses them together. The origin of the map represents the average position of all column profiles and therefore represents the center of the research field, meaning common and large shared topics (Aria & Cuccurullo, 2017). That way, it was possible to identify the clusters of documents that express common concepts in a two-dimensional map, represented in Figure 6. Each color represents a cluster of words (topic) and hierarchical clustering identifies the clusters.

When analyzing the map of the Keywords clusters, it can be noticed that clusters 4, 5, and 6 are not very representative and move away from the central point of the document axis (Dimension 1). It also could be noticed that cluster 3 (green) is smaller than clusters 1 and 2, and

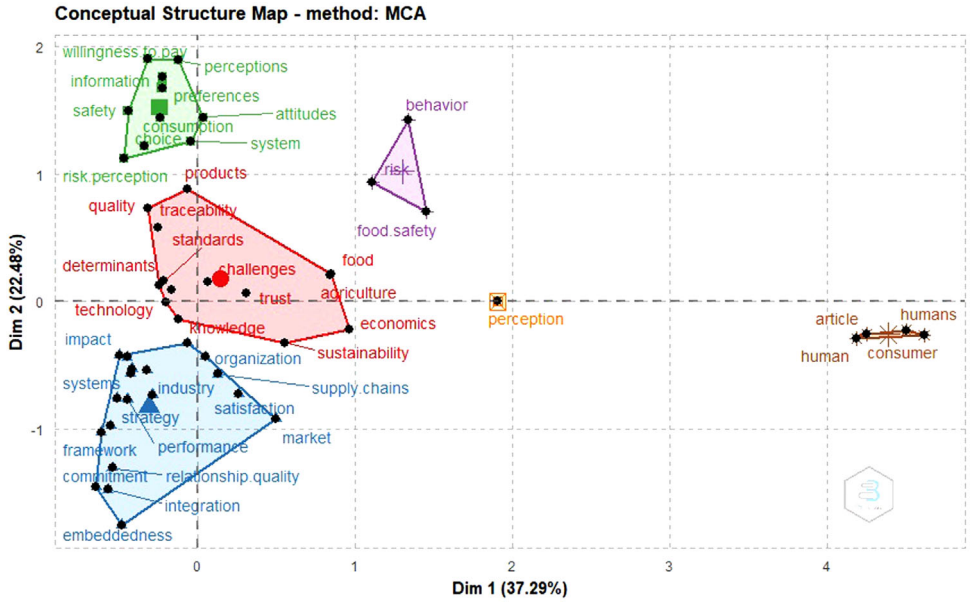

FIGURE 6 Clusters of documents

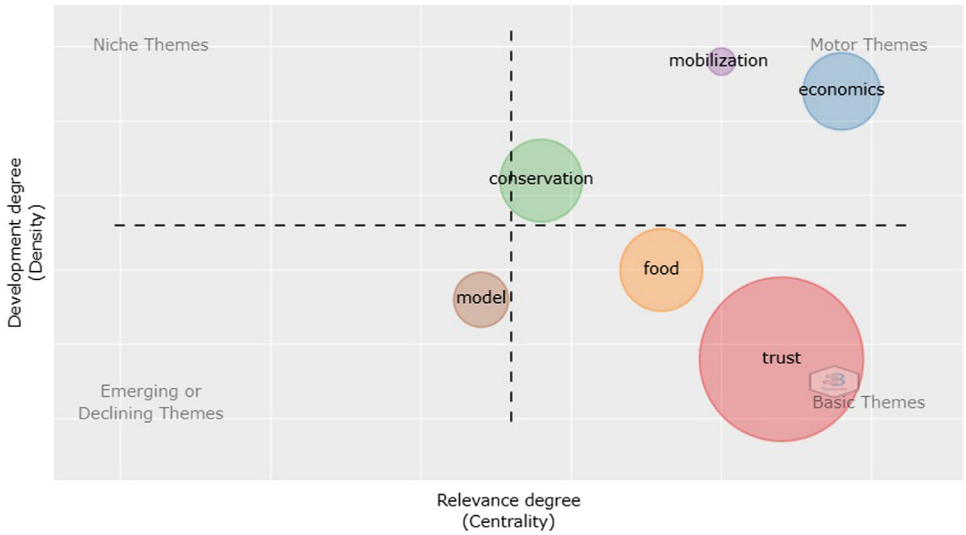

FIGURE 7 Thematic evolution—2011 to 2015

despite being in a central position on the documents' axis, moves away from the center of the keywords' axis (Dimension 2). Cluster 1 (red) is the most central, followed by cluster 2 (blue), and they have similar sizes on the chart.

The next step was to create the thematic map for the present search by applying a clustering algorithm on the keyword network, to highlight the different themes on the studied field. According to Cobo et al. (2011), each cluster or theme can be represented on a particular plot known as *Strategic* or *Thematic Map*, where the centrality is read as the importance of the theme in the entire research field and the density is read as a measure of the theme's development.

Three maps about the evolution of the themes were portrayed, covering the past 11 years of research. On the maps, each bubble represents a network cluster. The bubble name is the Keyword Plus with the higher occurrence in the cluster and the bubble size is proportional to the cluster word occurrences.

Figure 7 shows the first map and depicts the position of the topics in the period from 2011 to 2015. In it, we can see that the word *trust* has high centrality and medium-low density, and its bubble being in the quadrant where the themes can be considered basic and transversal. The topic *food* also appears in this quadrant. The term *economics*, on the other hand, displays high centrality and high density, located in the motor themes quadrant. In this quadrant, we also observe the words *conservation* and *mobilization*.

In Figure 8, the second map depicts the position of the topics in the period from 2016 to 2020. The *trust* theme practically remained

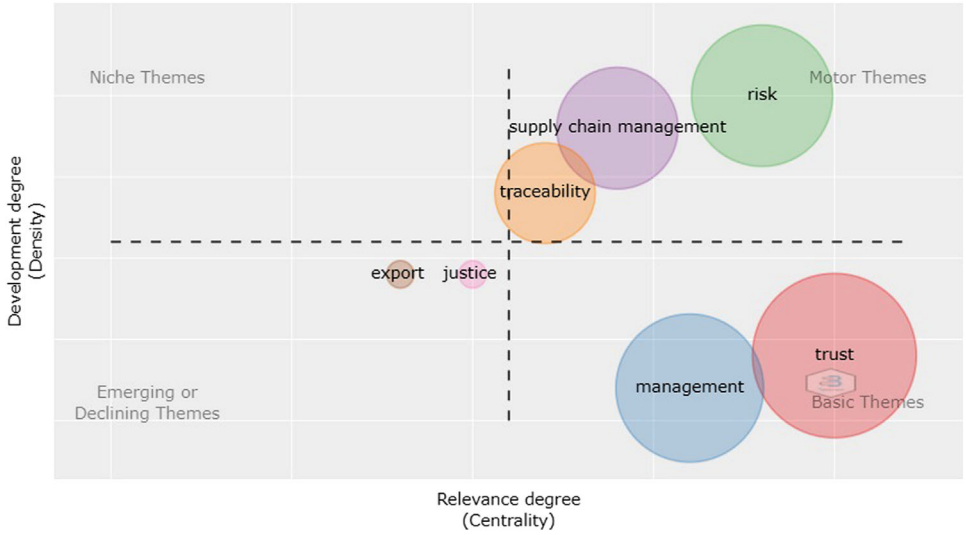

FIGURE 8 Thematic evolution—2016 to 2020

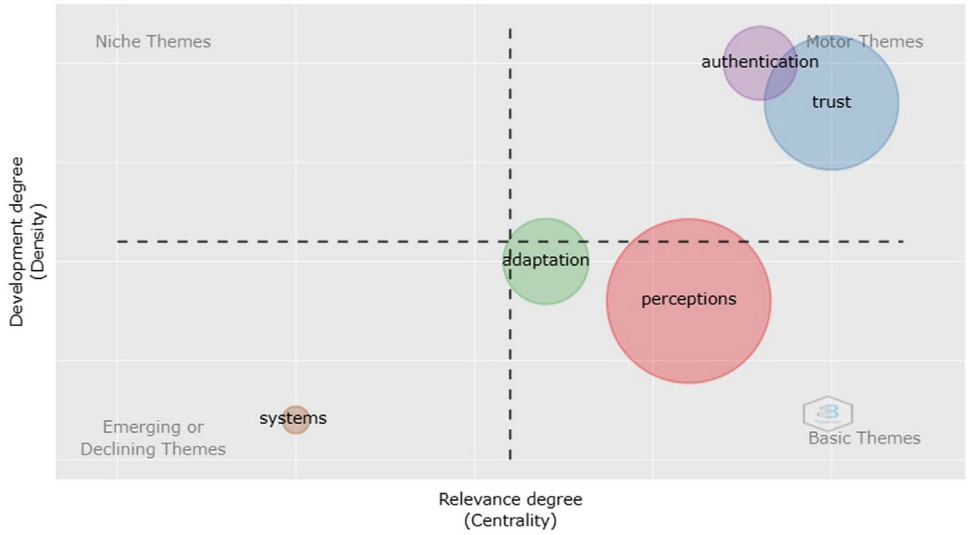

FIGURE 9 Thematic evolution—2021

in the same position as the previous 5 years, showing high centrality and medium-low density, keeping in the quadrant of basic and transversal themes. In this quadrant, the topic *management* comes up, but with lower centrality. The *supply chain management* theme appears in the motor themes quadrant, with medium-high intensity and density. In this map, we can also highlight the appearance of the words *risk* and *traceability*, both positioned in the motor themes quadrant.

Due to the high number of recent publications, it was decided to analyze the evolution of research on the themes of this study in the specific period of the year 2021. In this sense, Figure 9 shows a remarkable migration of the word *trust*, from the quadrant of basic and central themes to the quadrant of motor themes, mainly due to the increase in the theme study density. In this same quadrant, the word *authentication* appears, but with less centrality. We can also observe that, in the last year, the words *adaptation* and *perceptions* emerged as central topics, positioning themselves in the quadrant of basic themes.

3.7 | Documents analysis

Of the total sample of 277 documents, 174 were published in the last 11 years and these have been properly analyzed. First, the seven documents written in languages other than English were excluded. Second, 31 articles that did not make any analysis of trust in agrifood supply chains were also excluded. These articles covered several main subjects, such as fraud, food safety, public trust, coercive power, packaging, power within supply chains, food scares, marketing, willingness to pay,

TABLE 2 List of the 11 review articles

Authors	Trust approach
Wang et al. (2021)	Trust between consumers and institutions (government or private)—fraud
Durrant et al. (2021)	Trust among stakeholders—new technologies and traceability
Rahman et al. (2021)	Trust between consumers and institutions (government or private)—New Technologies and Traceability
Wu et al. (2021)	Trust between consumers and institutions (government or private)—new technologies and traceability
Nardi et al. (2020)	Trust between consumers and institutions (government or private)—food safety
Manning (2020)	Assesses trust in a managerial environment—management
Kendall et al. (2019)	Trust between consumers and institutions (government or private) —Fraud
Manning and Monaghan (2019)	Trust between consumers and institutions (government or private)—fraud
Kamrath et al. (2019)	Trust between consumers and institutions (government or private)—new technologies and traceability
Pearson et al. (2019)	Trust between consumers and institutions (government or private)—new technologies and traceability
Lehmann et al. (2012)	Trust between consumers and institutions (government or private)—new technologies and traceability

traceability, animal welfare, and biofuels. Afterward, we analyzed the seven review articles that assessed trust in some way.

Based on the previously obtained conceptual framework, the 50 articles related to consumer trust, referring to cluster 3 of the topics found were identified and removed from the analysis. Thus, 74 articles remained for further analysis, corresponding to clusters 1 and 2 of the previous conceptual structure. The publication of Sanderet al. (2018), which addressed both consumer confidence and trust among stakeholders, was properly examined.

3.8 | Reviews analysis

Of the 11 evaluated review articles, the most of them, nine documents, dealt with the relationships of trust between consumers and institutions, be the governmental or private. From this group, corresponding to cluster 3 found in the factorial analysis of the conceptual structure, three subgroups were also found: the document by Nardi et al. (2020) addressed the relationship between consumers and institutions with a concern related to food safety; the articles by Wang et al. (2021), Kendall et al. (2019), and Manning and Monaghan (2019) focused on food fraud; and Rahman et al. (2021), Wu et al. (2021), Kamrath et al. (2019), Pearson et al. (2019), and Lehmann et al. (2012) have written reviews addressing the influence of new technologies and food traceability on consumer trust.

The work of Durrant et al. (2021) fits into the objective of this research, related to cluster 1 of the conceptual structure. The authors built a review on the role of technology within the stakeholder's information sharing, and deeply they addressed the relationship between Data Trust and Data Sharing.

Manning's (2020) article approached trust from a managerial perspective, corresponding to cluster 2. The author sought some definitions of trust, one of which was as an aspect of integrity, and advocated the use of cultural maturity models and assessment tools to build trust.

Table 2 below shows the list of the 11 review articles found in our search.

3.9 | Articles analysis

To assess the articles, we first sought to classify them according to the type of publication. This process showed us that most of the documents were research papers, 54 publications, followed by case studies, conceptual papers, and short communications, with 11, 6, and 3 publications, respectively. The case studies whether addressing project designs, product designs, or qualitative analysis, the conceptual papers, and short communications presented different issues related to trust, such as trust among stakeholders, governance, sustainability, technology, blockchain, compliance, bargaining power, and food safety, as shown in Table 3.

Of the 54 research papers, 15 took a qualitative approach, 29 addressed quantitative methods, and 10 applied mixed methods, that is, qualitative and quantitative.

Regarding the documents with qualitative methods, in addition to trust among stakeholders approach, some addressed other issues, such as the research by Costa et al. (2019), which addressed aspects of trust management, the work of Malagon-Zaldua et al. (2018), which studied the trust within alternative food networks, the article by Sander et al. (2018), which had a focus on the study of blockchain, and the publication of Pascucci et al. (2015), which addressed governance in supply chains.

Most authors adopted the interview as the main qualitative methodology, with the exception of Romero Granja and Wollni (2019), who used The Trust Game method, and Malagon-Zaldua et al. (2018), who used the methods of Input–output analysis and Rapid Market Assessment—RMA. In addition to the interviews, some authors used complementary methods, such as Camanzi et al. (2019), Musa et al. (2018), and Pascucci et al. (2015), who also used the Expert Panel, Focus Group, and Survey in their research, respectively. The list of articles with a qualitative approach and the methodologies used are in Table 4.

Publications that used quantitative methods also addressed issues other than trust between stakeholders, but related to the theme. The works of Kataike et al. (2019), Souza Filho and Miranda (2019),

TABLE 3 List of the case studies, conceptual papers, and short communications

Authors	Type	Approach
Weber and Wiek (2021)	Case study (project design)	Governance/sustainability
Schrobback and Rolfe (2021)	Case study (qualitative analysis)	Trust among stakeholders
Orjuela et al. (2021)	Case study (product design)	Technology/blockchain
Qian et al. (2020)	Case study (product design)	Technology/blockchain
Probst (2020)	Conceptual paper	Technology/trust among stakeholders
Longo et al. (2019)	Case study (product design)	Technology/blockchain
Lin (2019)	Conceptual paper	Technology/blockchain
Sorrentino et al. (2018)	Conceptual paper	Governance/bargaining power
Dwyer et al. (2018)	Short comunication	Governance
Maréchal et al. (2018)	Short comunication	Governance
Fleury et al. (2016)	Case study (qualitative analysis)	Trust among stakeholders
Modekurti (2016)	Case study (product design)	Technology
Thorsøe (2015)	Case study (qualitative analysis)	Trust among stakeholders
Carrer et al. (2014)	Case study (qualitative analysis)	Governance
Steen and Maijers (2014)	Short communication	Trust among stakeholders
Weseen et al. (2014)	Case study	Governance
Hirschauer et al. (2012)	Conceptual paper	Compliance
Ng and Salin (2012)	Conceptual paper	Trust among stakeholders/food safety
Busch (2011)	Conceptual paper	Governance
Abate-Kassa and Peterson (2011)	Case study (qualitative analysis)	Trust among stakeholders

TABLE 4 List of the qualitative research articles

Authors	Methodology	Authors	Methodology
Deka et al. (2020)	Interviews	Musa et al. (2018)	Focus group, interviews
Huang (2020)	Interviews	Malagon-Zaldua et al. (2018)	Input–output analysis, RMA
Love et al. (2020)	Interviews	Sander et al. (2018)	Interviews
Nakandala et al. (2020)	Interviews	Knoll et al. (2017)	Interviews
Camanzi et al. (2019)	Expert panel, inteviews	Aggarwal and Srivastava (2016)	Interviews
Costa et al. (2019)	Interviews	Pascucci et al. (2015)	Interviews, survey
Romero Granja and Wollni (2019)	The trust game	Beckeman et al. (2013)	Interviews
Liu (2019)	Interviews		

Amentae et al. (2018), and Wilson et al. (2015) studied governance, the work of Wongprawmas et al. (2015) addressed the credibility, and the research of Heyder et al. (2012) also studied aspects of traceability.

The quantitative methods were diverse, the most used being the Structural Equation Model—SEM, Exploratory Factor Analysis—EFA, Keiser-Meyer-Okin—KMO, Cronbach's α, Descriptive Statistics, and Logit Model. The list of documents with a quantitative approach and the methodology used is shown in Table 5.

Regarding the researches with mixed methodology, the work of Pignatti et al. (2012), O'Donovan et al. (2012), and Zhang and Hu (2011) also studied supply chain governance. The most used qualitative methods were interviews and Focus Group, and the quantitative was descriptive statistics. The list of publications that addressed both qualitative and quantitative methods are shown in Table 6.

4 | DISCUSSION

The approach to trust in agrifood supply chains is growing, but it has been shown to be dispersed, considering the productivity and longevity of publications. Despite the main referenced authors, the production of Manning L. stood out due to the two recent review articles, the two articles published in 2021 and the high fractional counting index (4.42), which indicates a high intellectual contribution.

TABLE 5 List of the quantitative research articles

Authors	Methodology	Authors	Methodology
Karim et al. (2021)	SEM	Charatsari et al. (2018)	Hierarquical regression
Amoako et al. (2021)	SEM	Sun et al. (2018)	SEM, EFA, CFA, Cronbach's α
Sun et al. (2021)	SEM	Van der Merwe et al. (2017)	SEM
Mehmeti et al. (2021)	CFA, SEM	Susanty et al. (2017)	SEM
Solazzo et al. (2020)	Logit model	Odongo et al. (2016)	SEM
Kiriveldeniya and Rosairo (2018)	Farmer loyalty index	Truong and Ariyawardana (2015)	EFA, KMO, Bartlett test
Nguyen et al. (2020)	KMO, Cronbach's α, EFA	Wilson et al. (2015)	Multiple regression model, Cronbach's α
Lees et al. (2020)	SEM	Wongprawmas et al. (2015)	Descriptive statistics, independent-sample *t*-test, Mann–Whitney *U*-test
Martins et al. (2019)	Cronbach's α, SEM	Akhtar and Khan (2015)	EFA, SEM
Udoye et al. (2019)	Descriptive statistics	Cechin et al. (2013)	Descriptive statistics, PCA, Cronbach's α, Ordinary least squares regression test
Musabelliu et al. (2019)	Logit model, EFA, KMO	Jie et al. (2013)	Cronbach's α, EFA, multiple regression
Kataike et al. (2019)	SEM	Sauer et al. (2012)	Bootstrapped mixed-effects linear regression model
Dlamini-Mazibuko et al. (2019)	KMO, Cronbach's α, VIF, MANOVA	Heyder et al. (2012)	SEM
Souza Filho and Miranda (2019)	Negative binomial model	Lu et al. (2012)	Logit model
Amentae et al. (2018)	SEM, Cronbach's α		

TABLE 6 List of the qualitative and quantitative research articles

Authors	Methodology	Authors	Methodology
Hoogstra-Klein and Meijboom (2021)	Interviews, descriptive statistics	Pignatti et al. (2012)	Interviews, descriptive statistics
Joffre et al. (2020)	Focus group, hierarquical regression	Boniface (2012)	Interviews, CFA, Cronbach's α, KMO, PCA, cluster analysis
Shanoyan et al. (2019)	Interviews, descriptive statistics	Bezuidenhout et al. (2012)	Interviews, supply chain collaboration index, descriptive statistics
Dunning (2016)	Interviews, descriptive statistics	O'Donovan et al. (2012)	Focus group, descriptive statistics
Mutonyi et al. (2016)	Interviews, SEM	Zhang and Hu (2011)	Focus group, EFA, Cronbach's α

Regarding the countries of authors, although the United Kingdom and Italy have the highest numbers of Multiple Country Publications—MCP (eight and seven), the MCP ratios are not the highest (0.258 and 0.226). This can happen due to the high number of publications in general (31 each) and it can be a natural fact because of that. It can be observed that this does not occur with Australia, for example, which has 19 Single Country Publications and only one MCP, with a MCP ratio of only 0.05, which implies that it is a more isolated country in this field of study. On the other hand, Belgium proves to be quite integrated because, despite not having as many total publications (seven), it has the highest MCP ratio of 0.714 and has a greater propensity for international research cooperation.

The analysis of the conceptual structure using Keywords Plus is supported by the work of Zhang et al. (2016), where the authors concluded that Keywords Plus is as effective as Author Keywords in terms of bibliometric analysis investigating the knowledge structure of scientific fields and revealed similar research trends. In this research, the Keywords Plus were fewer (919) than Author's Keywords (1018) and this allowed us to concentrate more on the topics of interest in the reference's sample. In addition, it is a less discretionary selection and the representation in the map of the keywords clusters was more coherent using the Keywords Plus than that representation provided by Author's Keywords.

Considering the thematic evolution of the topics of this study, except for the last year, trust has not been shown to be much studied, despite being a central and transversal theme. In the period from 2016 to 2020, the topics of "Supply Chain Management" and "Traceability" appear as motor themes and these subjects, as well as their relationship with

trust, can be considered trends in this field of study. Some authors suggest new research on the subject, such as Roy et al. (2017), Dania et al. (2018), and Newell et al. (2019).

With regard to publications in 2021, the density of studies on the topic "Trust" has increased significantly; that is, 43 papers were published, an increase of 18.64% compared to the previous year. However, only seven works that dealt with the relationship of trust among stakeholders could be used for the present analysis. This was because 12 papers were discarded due to not have any type of analysis on trust, and another 18 were not analyzed because they dealt with trust between sellers and consumers, which was not the focus of this research. Thus, despite bibliometric data showing a significant growth in publication in 2021, only a small percentage (16.28%) could be used.

In general, many articles related to consumer trust were found, even when a search focused on the relationship of trust within supply chains was conducted. This fact agrees, in a way, with the work of Lees et al. (2020), which stated that despite the considerable research on buyer–seller relationships in the marketing and management literature, only a small proportion of it has focused on procurement relationships between producers and buyers in food supply chains.

Only 11 review articles were available, which we consider a low number. Of these, five reviews were about new technologies and traceability involving trust between sellers and consumers, and three were about product fraud, which demonstrates that these two topics were important in the bibliometric part of this work. Nevertheless, two works were related to the field of trust among stakeholders and valid for this research. The work of Durrant et al. (2021) presented a very interesting approach to Data Trust and Data Sharing, and Manning (2020) assessed trust in a managerial environment.

Recent publications, in the form of Case studies, conceptual papers, and qualitative researches, dealt with the relationship of trust within blockchain. This was the case with the works of Orjuela et al. (2021), Qian et al. (2020), Longo et al. (2019), Lin (2019), and Sander et al. (2018). In this sense, the use of blockchain may be influencing the relationships of trust between actors in supply chains and the use and research of this technology is a trend in the present field of study.

Several studies also focused on the study of governance, since there is a close relationship between trust studies and the governance of structures. This fact agrees with the statement by Ebers and Oerlemans (2016), who claimed that trust can be an independent variable that mediates the organizational building process, affecting the features of governance structures. Moreover, Ghosh and Fedorowicz (2008) observed that trust, as a governance mechanism, plays a crucial role in sharing information among business partners.

5 | CONCLUSION

The use of bibliometric analysis using the R software proved to be efficient for carrying out this work, especially in the search for the main documents and authors, for the identification of specific clusters, and for the mapping of themes and definition of the conceptual structure of the search, allowing to know the trends of the researches carried out.

Although the term "Supply Chain" was placed in the search, a large number of researches were related to trust between sellers and consumers. This demonstrates a solid scientific concern with this specific area, mainly linked to marketing and consumer information. In this regard, research in the area of management and sustainability of agrifood supply chains is smaller and can be increased, as trust remains a central theme. Furthermore, the fact that literature reviews on trust among stakeholders in agrifood supply chains were not found corroborates this consideration.

Several works were found regarding the use of technology to trust, both among stakeholders and between sellers and consumers. These types of technologies, especially those related to blockchain and traceability, are emerging and constitute current trends in the present field of research.

The publications found were carried out through different approaches. Most works took a quantitative approach. The main qualitative methodology was interviews and, in the case of works with a mixed approach, that qualitative method was combined in many cases with descriptive statistics. The data collected on quantitative researches show that the Structured Equation Model (SEM) has been the main method used and should be considered in future researches within this field of study.

The present meta-analysis can be of great use to researchers and practitioners who wish to study or deepen the knowledge of trust among the stakeholders in agrifood supply chains, since we found no specific reviews on this subject.

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CONFLICT OF INTEREST

The authors confirm that they have no conflict of interest to declare for this publication.

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