Lwesya, Francis; Mbukwa, Justine

Article

A retrospective evaluation of the intellectual structure of private agricultural and food standards research in global trade

International Trade, Politics and Development (ITPD)

Provided in Cooperation with:
Department of International Commerce, Finance, and Investment, Kyung Hee University

Suggested Citation: Lwesya, Francis; Mbukwa, Justine (2023) : A retrospective evaluation of the intellectual structure of private agricultural and food standards research in global trade, International Trade, Politics and Development (ITPD), ISSN 2632-122X, Emerald, Leeds, Vol. 7, Iss. 2, pp. 92-114,
https://doi.org/10.1108/ITPD-11-2022-0023

Received 5 November 2022
Revised 15 January 2023
Accepted 16 January 2023

A retrospective evaluation of the intellectual structure of private agricultural and food standards research in global trade

Francis Lwesya
Department of Business Administration and Management, The University of Dodoma, Dodoma, Tanzania, and
Justine Mbukwa
Department of Mathematics and Statistics Studies (MSS), Mzumbe University, Morogoro, Tanzania

Abstract

Purpose – The aim of this article was to present a retrospective assessment of the intellectual structure of private agricultural and food standards research in global trade. This study was motivated by the increasing role of standards and certifications in governing global agricultural and food trade.

Design/methodology/approach – The current investigation was carried out with bibliometric methods using VOSviewer software. Techniques such as citation, co-citation, keyword co-occurrence, keyword evolution and co-authorship analyses were performed to tackle the research questions. Articles were extracted from Scopus database for the period 1998–2022 (30th August 2022) with selected keywords ("Private food standard*" OR "food standard*" OR "agri-food standard*" AND "agri*" OR "agro*" OR "farm*" OR "food*" AND "international trade" OR "global trade" OR "international business") along certain filters (subject – Economics and Business management: language – English: Document – article and review articles and source – journals).

Findings – The results show that the intellectual structure of private agricultural and food standards research in global trade has evolved around five clusters, namely: (1) the political economy of food standards, (2) food standards and their challenges in global trade, (3) food standards and integration into value chains, (4) food standards and market access and (5) food standards and exports from developing countries. However, the authors found the research gaps in each of the thematic clusters.

Research limitations/implications – The main limitation of this study is that the authors focused their attention on certain aspects of bibliometric review, such as the intellectual structure of the field, the citation analysis and the collaboration network. Future research could attempt to explore new field development through bibliographic coupling and deepening of conceptual structure using content analysis by incorporating the research methods used in the respective studies.

Practical implications – The emerging research areas in private agricultural and food standards in global trade are related to topics on food quality, sustainable development, genetically modified organisms, World Trade Organization, tariff structure, trade agreements, food industry and European Union. However, there is less research and little collaboration between Africa and developed countries. For example, Africa's total publications were (15), while the US had (46), China (15), Belgium (23), Germany (27), Italy (32) and the UK (24).

Originality/value – There are limited studies that have conducted a retrospective evaluation of the intellectual structure of private agricultural and food standards research in the global trade using bibliometric analysis. The present investigation is novel in identifying the thematic research clusters, emerging issues and

International Trade, Politics and Development
Vol. 7 No. 2, 2023
pp. 92-114
Emerald Publishing Limited
e-ISSN: 2632-122X
p-ISSN: 2586-3932
DOI 10.1108/ITPD-11-2022-0023

future research directions. This is more important to developing countries as their agricultural produce face challenges to access markets of the developed world.

Keywords Bibliometric analysis, Global trade, Intellectual structure of the field, Private agricultural and food standards

Paper type General review

1. Introduction

Over the last three decades there have been changes in the management of food systems. The focus has shifted to food quality and safety attributes and decent labor conditions. Environmental sustainability issues have also become important in the management of food systems as global challenges such as global warming result in yield variability and other wide-ranging impacts, including the impact on strategic water sources such as the Brahmaputra river in India and the Mekong river in the Indochina region. The environmental dimension of sustainable development emphasizes the management of organizational processes and practices in a way that minimizes the environmental impacts of human activities (Neven, 2014). The agri-business industry must therefore be aware that it is not striving for economic gain at the expense of neglecting society and the environment. Modern consumers are not only interested in tangible product attributes such as size, taste, content and price, but also in intangible ones such as food safety, environment, human and animal welfare throughout the chain (Akkerman *et al.*, 2010; Trienekens *et al.*, 2012; Badar, 2014). As a result, the salient features of the modern agricultural sector are more in the direction of agricultural commercialization, technological advances, emergence of modern food value chains, the supermarket revolution and the introduction of new food regulatory systems and standards are now used to regulate agricultural and food supply chains (Henson *et al.*, 2006; Yakovleva, 2007; Chen and Stamoulis, 2008; Badar, 2014). As food value chains extend to more than one country, as a result of liberalization policies and the growth of international trade, private standards have become part of the governance of these global food value chains (Henson and Humphrey, 2009). While public standards are generally important in providing the overall structure of standards, private standards fill in the gaps in quality and characteristics aspects in public regulations. According to Masood (2014) "public standards only outline the elementary parameters of food safety system while private standards cover all necessary details not only about the end product, but also about the entire operationalization processes both vertically and horizontally". Similarly, private standards provide scope for product differentiation and harmonization that cannot be achieved with public standards.

Four categories of standards have been identified in the literature, including public mandatory, public voluntary, private mandatory and private voluntary (Henson and Humphrey, 2009). Private standards developed by coalitions of different private sector actors are called private voluntary standards. Sometimes private standards are adopted by public regulators and vested with legal authority, in such cases compliance is mandatory and these private standards are then statutory private standards. Due to the large proportion of users, standards can be legally binding or necessary in practice. Alternatively, standards may be voluntary in the sense that potential users can choose whether or not to comply with them. However, Henson and Northen (1998) noted that modern food systems are governed by a variety of private food standards that work in tandem with regulatory systems, while not legally binding in the regulatory sense, may be de facto mandatory for suppliers. The existence of private agricultural and food standards in global trade can have several implications for the growth and development of international trade. These include increasing export competitiveness by reducing information asymmetry between exporters and importers on quality, and technology-related issues that result in trade-enabling effects

(Graffham *et al.*, 2009; Masood and Brümmer, 2014). On the other hand, there are also indications of trade-reducing effects of nontariff barriers in developing countries due to noncompliance with standards (Augier *et al.*, 2005; Ferrantino, 2006; WTO and OECD, 2013). In addition, standards have also been linked to the exclusion of small-holder farmers in modern food systems and supply chains due to new financial requirements associated with quality standards and certifications in accessing global markets (Sausman, 2016). This can undermine efforts and strategies aimed at commercializing the agricultural sector and connecting farmers to high-value markets, which is increasingly recognized as an effective approach to promoting rural development and poverty reduction in developing countries.

Private food standards cover a wide range of areas, including people's welfare, labor conditions, environmental protection, food safety and sustainability issues. Private standards such as the GlobalGAP standard and Fairtrade and UTZ are gaining prominence in developing countries. This is partly related to the increasing need for global retail chains to control the entire production process and supply chain in the context of the current competitive global agri-food markets (Clarke, 2010; Fiankor *et al.*, 2017). In the last three decades, publications on private agricultural and food standards in developing countries have increased. However, there is a limited understanding of the intellectual structure of the existing studies in a consolidated manner, their evolution and likely future research direction using bibliometric analysis. The specific objectives of this study are:

(1) To understand publication trends (articles per year) of private agricultural and food standards in global trade.

(2) To identify the most influential publications, authors, and institutions in private agricultural and food standards research in global trade.

(3) To understand the intellectual structure of the field of private agricultural and food standards in global trade.

(4) What current research themes or topics in private agricultural and food standards in global trade.

2. Methodology

2.1 Bibliometric analysis

We use bibliometric analysis techniques such as citation, co-citation, keyword co-occurrence and co-authorship analysis to explore research questions. (1) Citation analysis is used to identify most influential publication in a research area (Zupic and Cater, 2015; Cisneros *et al.*, 2018). (2) Co-citation analysis shows the relationship among different studies to understand the development of themes in a research area (the frequency with which two papers are cited together by other works (Liu *et al.*, 2015; Donthu *et al.*, 2021). (3) Bibliographic coupling identifies the already developed relationship among a set of documents based on overlapping bibliographic references, it captures more recent contributions (Kumar *et al.*, 2020; Mukherjee *et al.*, 2021). (4) Co-word analysis or keyword co-occurrence is used to understand specific themes in research with focus on the content written by the researchers themselves (Zou *et al.*, 2018). (5) Co-authorship analysis to understand the social interaction between authors in a research area and its impact on the development of the research (Xu *et al.*, 2018). Recently, bibliometric analysis is increasingly used in many fields of study to quantitatively analyze bibliographic data, allowing for transparent, reproducible results and minimizing research bias (Zupic and Cater, 2015; Donthu *et al.*, 2021). In this paper we use visualization software which is VOSviewer. Scopus database was used for the collection of bibliographic data used; this is due to its wider and broader coverage of peer-reviewed journals (Fahimnia *et al.*, 2015). We followed the search criteria and article selection as indicated in Figure 1.

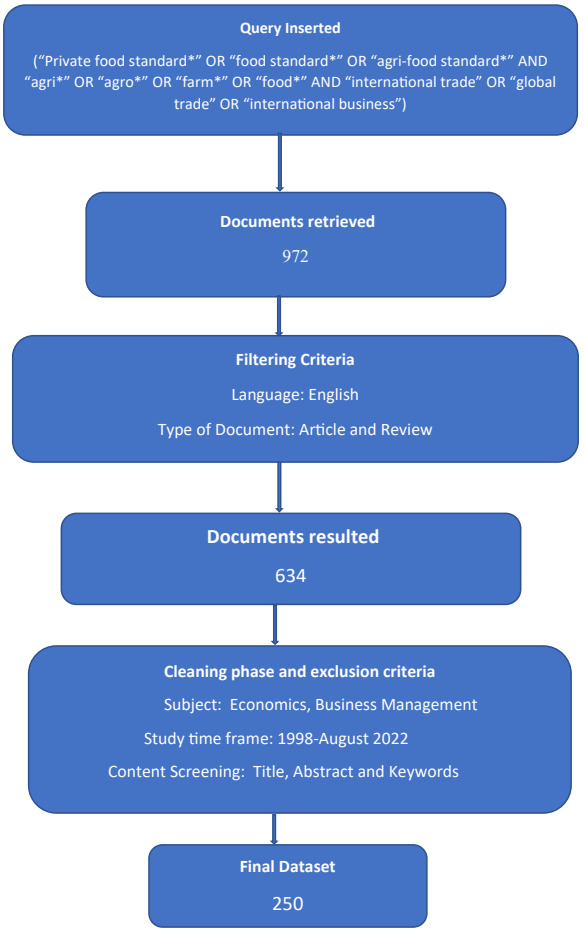

Figure 1.
Search criteria and article selection

3. Results and discussion

3.1 Descriptive bibliometric analysis

Data collection shows that a final sample of 250 articles was written by 563 authors and published in 120 journals. Most authors wrote multi-author documents (520 authors) and only 43 documents were single authors (Table 1). The level of article production in the first year since 1998 was very low. A relatively large number of articles were published in 2015 and subsequent years, and the records of the past three years show increasing research interest in private agricultural and food standards in global trade (Figure 2).

3.2 Publications, authors, and institutions in private agricultural and food standards in global trade research

The most important publications, authors and institutions are listed in Table 2. Based on a set of citations, the most influential researchers in private agricultural and food standards in global trade are Raynolds I., Cai L. and Greis N. with 331, 322 and 322 citations, respectively. Based on a number of publications in the private agricultural and food standards, Swinnen J.,

Table 1.
Main information about data collection

Description	Results
Timespan	1998: August 2022
Sources (Journals)	120
Articles	250
Authors	563
Authors of single-authored documents	43
Authors of multi-authored documents	520
Documents per author	0.444
Authors per document	2.25
Co-authors per documents	2.63
Collaboration index	2.59

Source(s): Scopus database, 1998–30th August 2022

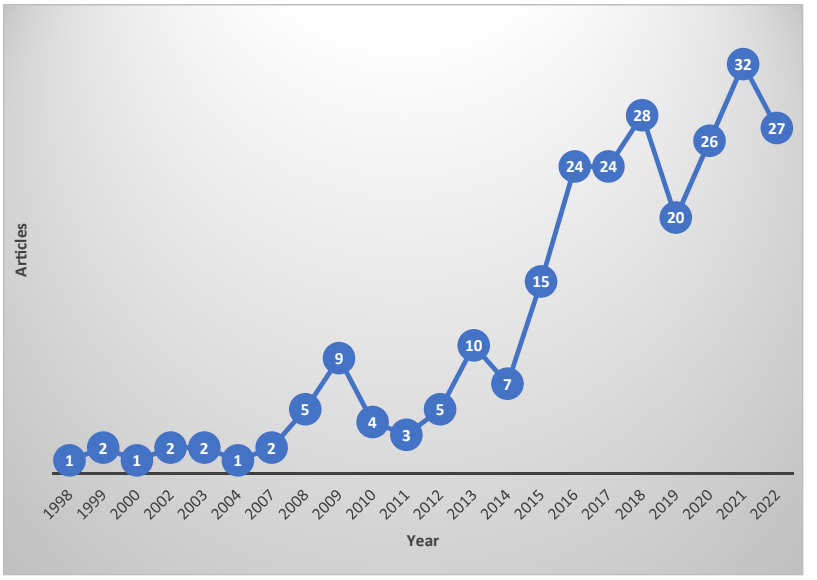

Figure 2.
Number of articles per year (1998 to August 2022)

and Olper A. are the most prolific researchers with eight publications each. In terms of institutions, the most influential institutions are Colorado State University, Cranfield University and Tsinghua University with 331, 322 and 322 citations, respectively. In terms of intellectual contribution, the United States and Italy are the countries with the highest total number of publications and citations, with 46 (1,631) and 32 (639), respectively.

3.3 The most productive journals

The main journals publishing in the food supply chain are listed in Table 3. Based on citations, the most influential journals are World Development, Food Policy and Journal of Operations Management with 913, 567 and 322 citations respectively. The first two journals are rated A and B, respectively by the Australian Business Dean Council 2020 Journal Quality List (ABDC). Most articles are published in leading journals hosted by publishers such as Elsevier, Taylor & Francis, Emerald Insight, Springer Open, etc.

TC	Authors	TP	TC	Organization	TP	TC	Country	TP
331	Raynolds I	1	331	Colorado State University	1	1,631	The United States	46
322	Cai l	1	322	Cranfield University	1	639	Italy	32
322	Greis N	1	322	Tsinghua university	1	616	Belgium	23
322	Marucheck A	1	322	University of North Carolina	1	589	The United Kingdom	24
322	Mena C	1	176	Danish Institute for International studies	1	553	Canada	13
288	Henson S	2	154	Michigan State University	1	474	China	15
189	Ponte S	2	154	University of Guelph	1	463	Germany	27
172	Reardon T	2	154	RIMISP – Latin American Center for Rural Development	1	242	India	12
171	Swinnen J	8	134	The World bank	1	225	Denmark	7
154	Berdegué J	1	131	Georg-August-University of Goettingen	1	223	Netherlands	14
146	Gaim M	2	131	International Food Policy Research Institute (IFPRI)	1	215	Chile	4
138	Olper A	8	114	University of Massachusetts	1	207	Australia	7
134	Jaffee S	1	114	University of Alberta	1	150	Malaysia	19
131	Chiputwa B	1	106	Kuleuven, Geo-Institute	1	129	France	15
131	Spielman D	1	106	Center for Economic Studies KU Leuven	1	80	Kenya	5

Source(s): Scopus database, 1998–August 2022

Table 2.
Top authors, institutions and countries

N0	Source	TC	TP	ABDC	1998–2010	2011–2016	2017–2022
1	World Development	913	14	A	3	5	6
2	Food Policy	567	15	B	3	7	5
3	*Journal of Operations Management*	322	1	N/A		1	
4	*American Journal of Agricultural Economics*	196	5	N/A	1	2	2
5	World Economy	178	8	N/A	1	1	6
6	*Journal of Economic Geography*	173	3	N/A	1	1	1
7	*Journal of Cleaner Production*	170	6	A*		2	4
8	*European Review of Agricultural Economics*	149	8	N/A	1	3	4
9	*British Food Journal*	147	10	B	2	2	6
10	Agricultural Economics (The United Kingdom)	125	7	N/A		3	4
11	*Journal of Agricultural Economics*	116	7	A		1	6
12	Economic Geography	77	1	N/A	1		
13	Annual Review of Resource Economics	74	3	N/A		1	2
14	Review of World Economics	74	2	N/A	1		1
15	International Food and Agribusiness Management Review	72	7	B	2	3	2

Note(s): TC = total citations, TP = total publications, ABDC = Australian Business Dean Council 2020 Journal Quality List, N/A = Not Applicable

Table 3.
Most cited journals in private agricultural and food standards in global trade

3.4 The intellectual structure of the field: co-citation analysis

Co-citation analysis is useful for understanding subdomains, advances and changes in a research discipline. It measures the similarity and analyzes the relationship between different elements (literature, authors, journals, etc.) to understand the intellectual structure of the field

and deduce some characteristics of the relevant field (Song *et al.*, 2022). Based on a co-citation analysis, five clusters were identified based on their research focus. Lead articles in each cluster were selected (Table 4 and Table 5). Similarly, the reference node was chosen and a network diagram (Figure 3) of private agricultural and food standards in global trade literature citations was obtained according to the default values. Each node represents an article and its size is proportional to citation frequency and the co-citation network has identified five main groups.

Cluster 1: The political economy of food standards

Cluster 1 consists of 14 articles which discuss about food safety laws, regulations and standards. The three most articles with the highest total link strength are Xiong and Beghin (2014), Fontagn e *et al.* (2015) and Crivelli and Groeschl (2016) with 41, 35 and 35 total link strength, respectively. Studies in this cluster show that food standards can both promote and hinder agricultural and food trade. Studies in this cluster show that stringent sanitary and phytosanitary (SPS) measures and maximum residue levels (MRLs) requirements not only reduce export supply but also increase import demand and affect market behavior and prices (Drogue and Demaria, 2012; Xiong and Beghin, 2014; Li and Beghin, 2014; Fontagné *et al.*, 2015; Crivelli and Groschl, 2016). The compliance costs associated with these measures put producers from least developed countries at a disadvantage (Disdier *et al.*, 2007; Xiong and Beghin, 2014; Crivelli and Groschl, 2016). In the same way, when Africa and European Union trade relations were assessed on harmonized aflatoxin standard set by the EU on food exports from Africa, the results showed that the implementation of the aflatoxin standard in the EU had a negative impact on African exports of cereals, dried fruits and nuts to Europe (Otsuki *et al.*, 2001). However, SPS measures related to product characteristics enhance consumer confidence by providing safety information on imported products, but also tend to increase trade flows, particularly for those countries that raise concerns with the World Trade Organization (WTO) SPS Committee about a SPS measure that affects other exporters (Crivelli and Groeschl, 2016). The papers in this cluster propose measures for the effective application of food standards, including consideration of the cost component of nontariff measures and their differential impact on small and large businesses, appropriate use of quantitative economic models, regulatory guidance, and careful analysis of the impact of specific standards, before classifying them as protectionist instruments and policy makers are recommended to focus on competitive structures and market mechanisms and not just on assessing the risk when a national food laws, regulations and standard deviates from the international standard (Anders and Caswell, 2009; Marette and Beghin, 2010; Swinnen and Vandemoortele, 2011; Xiong and Beghin, 2014; Fontagné *et al.*, 2015).

Cluster 2: Food standards and their challenges in global trade

This cluster consists of 13 articles on food standards and their hindrance for global trade. The three most articles with the highest total link strength are Melo *et al.* (2014), Ehrich and Mangelsdorf (2018) and Herzfeld *et al.* (2011) with 60, 45 and 33 total link strength, respectively. Articles in this cluster discuss how regulations and standards are becoming more stringent to address food safety in global trade. The articles indicate that an increase in stringency has negative and significant effects on world trade by having different impacts on global agricultural trade, and the impact will differ depending on which markets and standards become stricter and constitute a barrier to the integration of low-income countries into global agricultural export markets (Herzfeld *et al.*, 2011; Melo *et al.*, 2014; Ehrich and Mangelsdorf, 2018). The implementation of some standards requires the harmonization of standards, taking into account labor standards, the environment and animal welfare, but the difficulty lies in finding the level that balances efficiency gains with meeting the standards'

Cluster	Author	Title	TC	Total link strength
Cluster 1: The political economy of food standards	Xiong and Beghin (2014)	Disentangling demand-enhancing and trade-cost effects of maximum residue regulations	7	41
	Fontagné *et al.* (2015)	Product standards and margins of trade: firm-level evidence	7	35
	Crivelli and Groschl (2016)	The impact of sanitary and phytosanitary measures on market entry and trade flows	7	35
	Swinnen and Vandemoortele (2011)	Trade and the political economy of food standards	10	33
	Marette and Beghin (2010)	Are standards always protectionist?	9	32
	Santeramo and Lamonaca (2018)	The effects of nontariff measures on agri-food trade: a review and meta-analysis of empirical evidence	6	32
	Li and Beghin (2014)	Protectionism indices for nontariff measures: an application to maximum residue levels	8	31
	Disdier *et al.* (2007)	The impact of regulations on agricultural trade: evidence from the SPS and TBT agreements	7	30
	Anders and Caswell (2009)	Standards as barriers versus standards as catalysts: assessing the impact of HACCP implementation on seafood imports	7	26
	Fischer and Serra (2000)	Standards and protection	6	25
	Drogue and Demaria (2012)	Pesticide residues and trade, the apple of discord?	5	24
	Otsuki *et al.* (2001)	Saving two in a billion: quantifying the trade effect of European food safety standards on African exports	5	17
	Swinnen (2017)	Some dynamic aspects of food standards	5	12
Cluster 2: Food standards and their challenges in global trade	Melo *et al.* (2014)	Do sanitary, phytosanitary and quality-related standards affect international trade? Evidence from Chilean fruit exports	11	60
	Ehrich and Mangelsdorf (2018)	The role of private standards for manufactured food exports from developing countries	8	45
	Herzfeld *et al.* (2011)	Cross-national adoption of private food quality standards	6	33
	Henson and Reardon (2005)	Private agri-food standards: implications for food policy and the agri-food system	12	30
	Jaffee and Masakure (2005)	Strategic use of private standards to enhance international competitiveness: vegetable exports from Kenya and elsewhere	8	29
	Fulponi (2006)	Private voluntary standards in the food system: the perspective of major food retailers in OECD countries	9	29
	Jongwanich (2009)	The impact of food safety standards on processed food exports from developing countries	5	22
	Subervie and Vagneron (2013)	A drop of water in the Indian ocean? The impact of GlobalGap certification on lychee farmers in Madagascar	6	21
	Henson and Humphrey (2010)	Understanding the complexities of private standards in global agri-food chains as they impact developing countries	5	15
	Schuster and Maertens (2010)	Do private standards create exclusive supply chains? New evidence from the Peruvian asparagus export sector	6	14
	Escanciano and Santos-Vijande (2014)	Reasons and constraints to implementing an ISO 22,000 food safety management system: evidence from Spain	5	7
	Karipidis *et al.* (2009)	Factors affecting the adoption of quality assurance systems in small food enterprises	5	5

(*continued*)

Table 4. The intellectual structure of the field: Co-citation analysis

Cluster	Author	Title	TC	Total link strength
Cluster 3: Food standards and integration in value chains	Anderson and Van-wincoop (2003)	Gravity with gravitas: a solution to the border puzzle	12	56
	Melitz (2003)	The impact of trade on intra-industry reallocations and aggregate industry productivity	11	43
	Otsuki *et al.* (2001)	Saving two in a billion: quantifying the trade effect of European food safety standards on African exports	7	39
	Helpman *et al.* (2008)	Estimating trade flows: trading partners and trading volumes	6	35
	Blind and Jungmittag (2005)	Trade and the impact of innovations and standards: the case of Germany and the UK	5	28
	Maertens and Swinnen (2009)	Trade, standards and poverty: evidence from Senegal	7	26
	Gereffi *et al.* (2005)	The governance of global value chains	8	13
	Bolwig *et al.* (2009)	The economics of small-holder organic contract farming in tropical Africa	5	8
	Chiputwa *et al.* (2015)	Food standards, certification, and poverty among coffee farmers in Uganda	5	7
	Gereffi (1999)	International trade and industrial upgrading in the apparel commodity chain	5	7
Cluster 4: Food standards and market access	Ferro *et al.* (2015)	The effect of product standards on agricultural exports	17	80
	Xiong and Beghin (2014)	Disentangling demand-enhancing and trade-cost effects of maximum residue regulations	7	41
	Henson and Reardon (2005)	Private agri-food standards: implications for food policy and the agri-food system	12	30
	Fulponi (2006)	Private voluntary standards in the food system: the perspective of major food retailers in OECD countries	9	29
	Swinnen (2016)	Economics and politics of food standards, trade and development	8	29
	Beghin *et al.* (2015)	Nontariff measures and standards in trade and global value chains	5	23
	Olper *et al.* (2014)	Do food standards affect the quality of EU imports?	8	21
	Clougherty and Grajek (2014)	International standards and international trade: empirical evidence from ISO 9,000 diffusion	5	20
	Curzi and Olper (2012)	Export behavior of Italian food firms: does product quality matter?	6	12
	Curzi and Pacca (2015)	Price, quality and trade costs in the food sector	7	12
Cluster 5: Food standards and exports from developing countries	Shepherd and Wilson (2013)	Product standards and developing country agricultural exports: the case of the European union	6	42
	Beghin *et al.* (2015)	Nontariff measures and standards in trade and global value chains	6	41
	Czubala *et al.* (2009)	Help or hindrance? The impact of harmonized standards on African exports	5	39
	Henson and Jaffee (2008)	Understanding developing country strategic responses to the enhancement of food safety standards	7	38
	Li and Beghin (2012)	A meta-analysis of estimates of the impact of technical barriers to trade	5	34
	Mangelsdorf *et al.* (2012)	Food standards and exports: evidence for China	6	33
	Schuster and Maertens (2015)	The impact of private food standards on developing countries' export performance: an analysis of asparagus firms in Peru	5	32
	Vigani *et al.* (2012)	International trade and endogenous standards: the case of GMO regulations	6	20

Table 4. **Source(s):** Scopus database, 1998–August 2022

Cluster	Current research	Future research suggestions
Cluster 1: The political economy of food standards	Explain how food standards can both promote and hinder agricultural and food global trade (Drogue and Demaria, 2012; Xiong and Beghin, 2014; Li and Beghin, 2014; Fontagné *et al.*, 2015; Crivelli and Groeschl, 2016; Disdier *et al.*, 2007; Otsuki *et al.*, 2001; Anders and Caswell, 2009; Marette and Beghin, 2010; Swinnen and Vandemoortele, 2011; Fontagné *et al.*, 2015)	In depth studies are recommended on the benefits and costs of maximum residue levels (MRLs) and evaluate the MRLs that are socially optimal for the global market and their welfare implications Recommended cross-country analysis of the status of standard harmonization and mutual recognition of standards between developed and developing countries Recommended to analyze the impact of reinforced food safety measures on trade for effective food safety systems
Cluster 2: Food standards and their challenges in global trade	Discusses the impact of stringent food standards and regulation in global trade (Herzfeld *et al.*, 2011; Melo *et al.*, 2014; Ehrich and Mangelsdorf, 2018; Fulponi, 2006; Subervie and Vagneron, 2013; Schuster and Maertens, 2010; Jongwanich, 2009)	Much of the research is done at the country level, it is recommended that more food processing companies be studied in low-income countries It is recommended to comprehensively analyze the impact of food standards from multiple perspectives, e.g. macro level, rural development, quality of local institutions, trade policy and sustainability issues
Cluster 3: Food standards and integration in value chains	Elaborates the association between food standards and integration into value chains (Otsuki *et al.*, 2001; Melitz, 200; Blind and Jungmittag, 2005; Maertens and Swinnen, 2009; Bolwig *et al.*, 2009; Chiputwa *et al.*, 2015)	It is recommended to explore, compare, and contrast the effectiveness of different models of global value chain integration such as UTZ and organic certification, GlobalGAP, contract farming, etc
Cluster 4: Food standards and market access	Discusses how food standards hinder market access (Curzi and Olper, 2012; Xiong and Beghin, 2014; Ferro *et al.*, 2015; Beghin *et al.*, 2015; Olper *et al.*, 2014; Fulponi, 2006; Swinnen, 2016)	Conduct a comparative analysis of the companies that can meet standards, that divert trade to other destinations and that cannot meet standards for effective policy advice Analyze the differences in GMO regulations between developed and developing countries in agriculture and related industries Examine the characteristics of NTM regimes, their protectionist potential and the interface between public and private standards Investigate whether there are differences in the quality and price of food exports between developed and developing countries
Cluster 5: Food standards and exports from developing countries	Elaborates the challenges facing producers from developing countries in accessing foreign markets in terms of standards (Shepherd and Wilson, 2013; Henson and Jaffee, 2008; Czubala *et al.*, 2009; Mangelsdorf *et al.*, 2012; Li and Beghin, 2012; Schuster and Maertens, 2015; Beghin *et al.*, 2015)	It is recommended to examine the cross-sectoral variation in standard setting behavior Explore how private standards and food standards in general affect the export opportunities of low and middle-income countries It is recommended to examine how standards are used by farmers in developing countries to structurally organize and increase their exports

Table 5.
Research gap and future research direction based on co-citation analysis

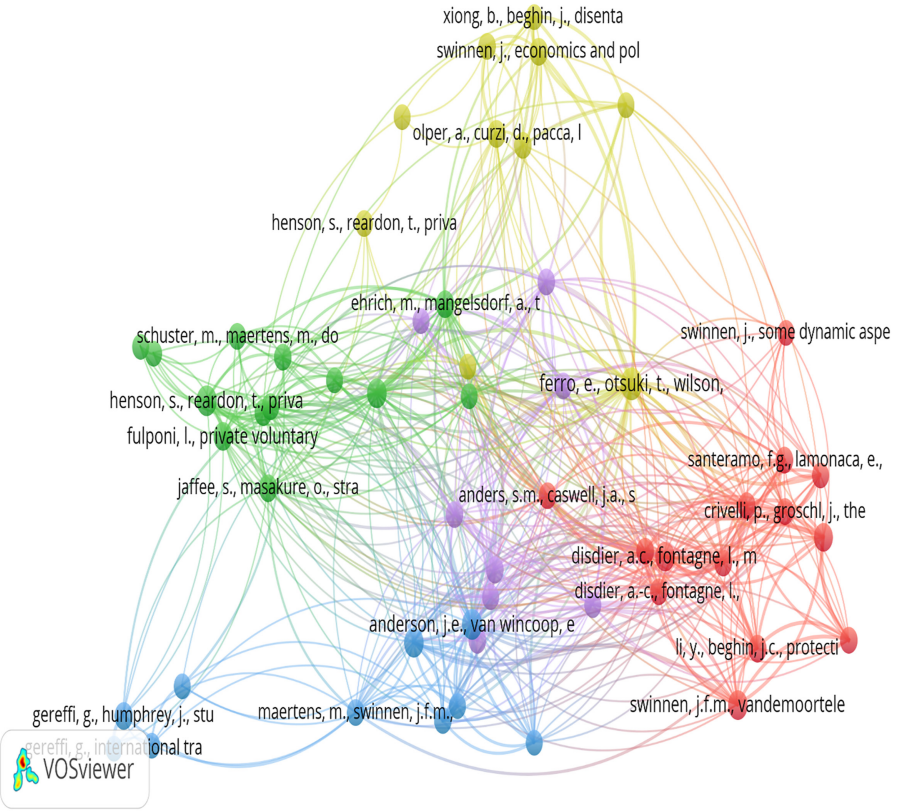

Figure 3.
Co-citation network

goals or objectives (Fulponi, 2006). However, the diversity of private standards with regard to their institutional design, which develops and applies those standards and reasons are crucial. For example, the private standard such as GlobalGAP also have generated positive impacts on both the quantities sold and the prices of certified producers and led to vertical integration, albeit the benefits are not evenly distributed (Subervie and Vagneron, 2013; Schuster and Maertens, 2010). Multilateral efforts to mobilize financial and technical assistance to address limitations in developing countries in meeting the required food safety standards imposed by developed countries are proposed (Jongwanich, 2009).

Cluster 3: Food standards and integration in value chains

This cluster consists of 10 articles on food standards and integration in value chains. The three most articles with the highest total link strength are Anderson and Wincoop (2003), Melitz (2003) and Otsuki *et al.* (2001) with 56, 43 and 39 total link strength, respectively. Studies in this cluster discuss about the impact of food standards on regional trade and integration in value chains. Otsuki *et al.* (2001) found that the implementation of the aflatoxin standard in the EU had a negative impact on African exports of cereals, dried fruits and nuts to Europe. Melitz (2003) and Blind and Jungmittag (2005) show that the existence of export market entry costs affected the distribution of trade impacts across different types of firms. In the UK, however, standards were not only seen as a strategic advantage, but also increased

exports and reduced imports, while Germany no significant impact was found. Similarly, Maertens and Swinnen (2009) studied the vegetable export chain in Senegal and found that despite increased standards requirements among smallholder contract farmers, exports increased sharply and made an important contribution to rural income and poverty reduction. Bolwig *et al.* (2009) examines the income effects of certified organic contract farming for smallholder farmers and the adoption of organic farming practices in a tropical African context. Their analysis found that there are positive income effects from both participation and, to a more modest extent, application of organic farming techniques, which in turn contributes to farmers' value chain integration. Similarly, Chiputwa *et al.* (2015) found that Fairtrade, UTZ and organic standards and certification systems helped to integrate farmers in the value chain and had a positive impact on the livelihoods of coffee farmers in Uganda.

Cluster 4: Food standards and market access

This cluster consists of 10 articles on food standards and market access. The three most articles with the highest total link strength are Xiong and Beghin (2014) and Henson and Reardon (2005) with 80, 41 and 30 total link strength, respectively. Studies in this cluster discuss on how food standards hinder market access. In this cluster the main theme is that product standards negatively affect, on average, exporters' decisions to sell to a particular destination market, and exporters from low-income countries are those who are particularly restrained to export to destinations where standards are more restrictive than in their local markets (Curzi and Olper, 2012; Xiong and Beghin, 2014; Ferro *et al.*, 2015; Beghin *et al.*, 2015). On the other hand, private standards have become an increasingly important factor in accessing domestic and international markets and a source of competitiveness, particularly in the case of vulnerable groups such as smallholder producers and processors of agricultural food (Olper *et al.*, 2014). If you do not meet the standard, you may be locked out of the markets in the short term and eventually pushed out of the sector which in turn leads to a development of physical and human capital to increase technical skills leading to future market access and income (Fulponi, 2006; Swinnen, 2016).

Cluster 5: Food standards and exports from developing countries

This cluster consists of 8 articles on food standards and exports from developing countries. The three most articles with the highest total link strength are Shepherd and Wilson (2013), Beghin *et al.* (2015) and Czubala *et al.* (2009) with 42, 41 and 39 total link strength, respectively. Studies by this cluster discuss the challenges facing producers from developing countries in accessing foreign markets, emphasizing that the impact of standards, and in particular their character as barriers or catalysts, are highly sector-specific and depend on the degree of international harmonization and the per capita income level of the exporter (Shepherd and Wilson, 2013). The papers in this cluster show that internationally harmonized EU standards tend to have weak or even slightly positive trade effects, while nonharmonized standards unique to the EU tend to be trade-restrictive and therefore measures to promote African exports need to be supported by reducing the costs associated with product standards, as well as their harmonization (Henson and Jaffee, 2008; Czubala *et al.*, 2009; Mangelsdorf *et al.*, 2012; Shepherd and Wilson, 2013). In terms of magnitude of impact, agriculture and the food industry tend to be more hampered by these barriers than other sectors (Li and Beghin, 2012). Therefore, the adaptation of products and production methods to foreign standards in many developing countries is a topic of discussion, and has serious technical and financial requirements for compliance, to signal customers that products meet certain quality standards (Mangelsdorf *et al.*, 2012). However, recent studies in this cluster seem to suggest that there is mixed evidence on the effect of private standard on export performance of

developing countries. For example, Schuster and Maertens (2015) found no evidence that certification to private standards in general and to specific individual private standards has an impact on firms' export performance; instead firm characteristics were important for export performance. Similarly, Beghin *et al.* (2015) reported mixed evidence regarding standards as a catalyst or barrier to trade development, drawing attention to the complexity of these impacts and their specificity to industries and countries. The papers in this cluster suggest that harmonization of standards between countries and technical assistance could have a positive trade effect for products from developing countries in global markets.

3.5 Collaboration networks in private agricultural and food standards in global trade

In terms of co-authorship and collaboration between authors and countries, the analysis shows that Olper A., Curzi D. and Brümmer B. are the most influential authors in terms of overall link strength. Figures 3 and 4 show the nodes representing author names and countries (the larger the size of the circle with different color, the higher the number of publications, and the closer the countries on the map, the stronger the relationship between them). The links represent the co-authorship relationships between different authors, and the node sizes representing the publication counts of each author. Olper A. is the most influential author with 138 citations. The data and network structure in Table 6 and Figure 4 show that the cooperative ties between developed economies and African countries are low. The cooperation network between the developing countries is also small. However, the analysis suggests that the collaborative network among developing countries is increasing. In terms of the country co-author network (Figure 5), Italy, Belgium, USA, China and Germany are influential centers for research in private agricultural and food standards in global trade.

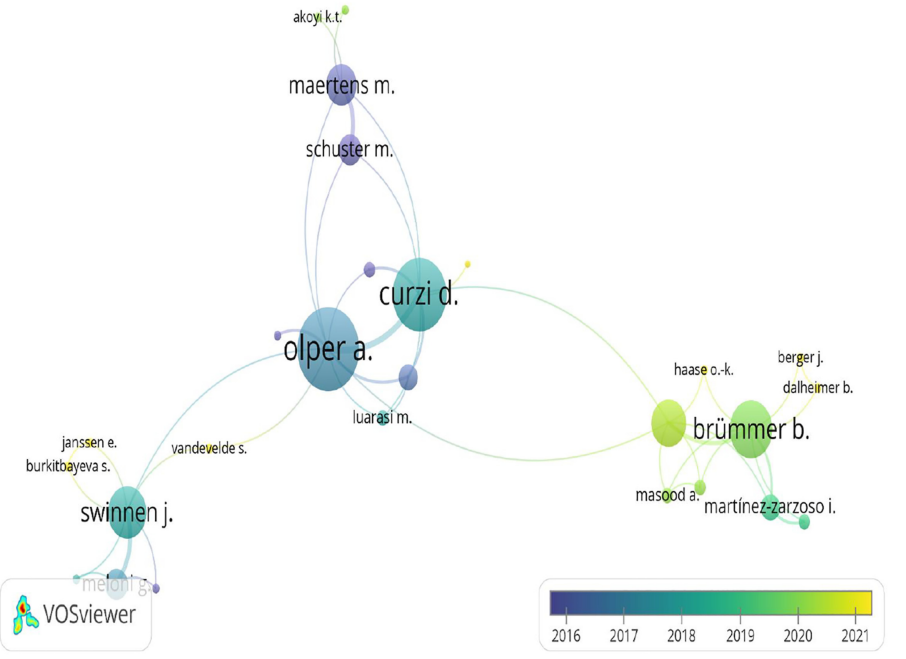

Figure 4.
The author co-authorship network. The whole network consists of 27 nodes, 5 clusters and 46 links. The total link strength value is 64

Collaboration network		TP	Author	TP	Citation	Total link strength
Italy	Belgium	7	Olper A	8	138	16
USA	Canada	5	Curzi D	7	101	14
USA	Belgium	4	Brümmer B	5	29	9
USA	China	4	Fiankor D	4	25	9
Germany	Spain	3	Maertens M	5	111	8
China	Australia	2	Crescimanno M	2	79	8
China	India	2	Galati A	2	79	8
Germany	Brazil	2	Giacomarra M	2	79	8
Germany	Kenya	2	Tinervia S	2	79	8
Germany	The Netherlands	2	Imami D	2	15	8
Hungary	Poland	2	Reardon T	2	172	7
Hungary	Slovenia	2	Swinnen J	8	171	7
Italy	China	2	Santeramo F	5	124	7
Italy	Germany	2	Schuster M	4	105	6
Malaysia	Indonesia	2	Zailani S	2	41	6
United Kingdom	France	2	Theuvsen l	3	18	6
USA	India	2	Elgueta S	1	9	6
USA	Korea	2	Hernandez J	1	9	6
USA	The Netherlands	2	Hunter l	1	9	6
USA	Switzerland	2	Liu S	1	9	6
USA	The United Kingdom	2	Lu H	1	9	6
Albania	Denmark	1	Mangla S	1	9	6
Albania	Serbia	1	Zhao G	1	9	6
Austria	Albania	1	Meloni G	4	71	5
Austria	Denmark	1	Ayuya O	1	51	5
Austria	Serbia	1	Bauer S	1	51	5
Belgium	Albania	1	Bett H	1	51	5
Belgium	Burundi	1	Gido E	1	51	5
Belgium	Ethiopia	1	Kahi A	1	51	5
Belgium	Spain	1	Lagat J	1	51	5
Brazil	Denmark	1	Raimondi V	2	39	5

Source(s): Scopus database, 1998–August 2022

Table 6.
Top collaborating countries and authors

The cooperation relationship between Italy and Belgium is the most common with seven cooperations. USA and Canada follow with five cooperations. In addition, Table 6 shows that the USA, Germany, Belgium and Austria have extensive cooperative relationships with other countries in the world.

The journal co-citation map provides an overview of the structure of the scientific world by generating clusters of related journals that can be linked to scientific fields, and clusters that are close to each other in the map indicate closely related fields (Eck and Waltman, 2010). Figure 6 shows the journal co-citation network. There are four clusters of journals. Cluster 1 consists of journals from the fields of economics, agricultural economics, and political economy. This cluster includes journals such as the *America Journal of Agricultural Economics*, the *Journal of International Economics*, and the *World Economy*. Cluster 2 consists of journals in the fields of management, food systems and marketing. Some of the journals in this cluster are *British Food Journal, Food Control* and *Journal of Islamic Marketing*. Cluster 3 has journals that focus on policy, economic geography and world trade, and some journals in this cluster include *Journal of Business Ethics, World Development* and *Development Policy Review*. Cluster 4 journals focus on agribusiness, food policy and sustainability issues and some of the journals in Cluster 4 include *Food Policy, Econometrica* and *Clean Production Journal*.

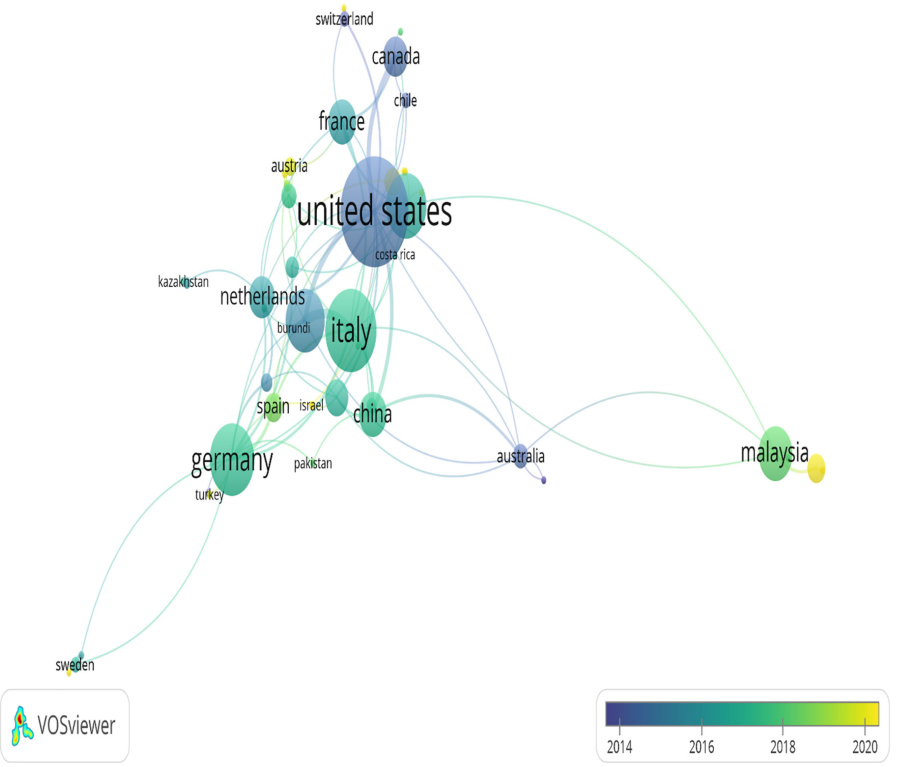

Figure 5.
The author co-authorship network. The whole network consists of 48 nodes, 12 clusters and 99 links. The total link strength value is 138

3.6 Keyword co-occurrence and evolution trend analysis

Keywords help provide important information about the content of the article, and when two or more keywords appear simultaneously in the same work, it is called keyword co-occurrence. A keyword co-occurrence analysis can identify research hotspots and monitor the transfer of research frontiers in a specific field (Su and Lee, 2010; Chen *et al.*, 2014). We therefore used the co-occurrence feature in VOSviewer to identify the most frequent keywords and shown their evolution in Table 7. Table 7 and Figure 7 show that export is the most frequently used keyword, followed closely by standards, international trade, food safety, certification European union, import, developing world, food market, agricultural trade and food industry. The observations clearly show that the main theme of the study revolves around exploring the role of standards and certifications in agricultural and food exports from developing countries to the markets of developed world such as the European Union, Western countries and Asia. The results show that standards and certification requirements can be a barrier or catalyst for exports from developing countries (Shepherd and Wilson, 2013; Mangelsdorf *et al.*, 2012; Shepherd and Wilson, 2013). Many developing countries, especially the least developed countries face difficulties in accessing developed countries markets due to high compliance costs related to food safety requirements, including certification demands and technical requirements. This means that technical support from institutions such as the WTO and some flexibility in WTO rules on sanitary and phytosanitary measures and harmonization of standards between countries and technical

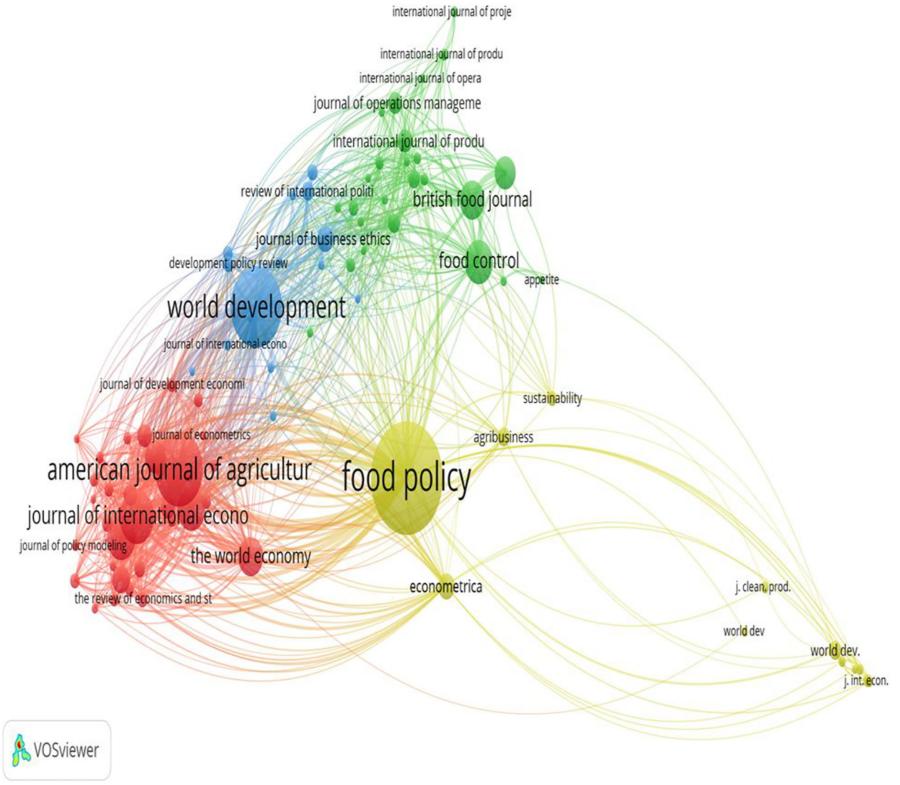

Figure 6.
Journals co-citation networks

assistance could have a positive effect on trade in products from developing countries in global markets.

For keyword development, recent terms include food quality, WTO, tariff structure, trade agreements, sustainable development, genetically modified organisms (GMOs), food industry and European Union (Table 6). Some of these words were also identified in the co-occurrence network of keywords used by authors (Figure 3). Food quality is one of the hottest topics in food supply chain research driven by urbanization, globalization and changes in food consumption patterns globally (Lwesya and Achanta, 2022). Similarly, private standards like the SPS measures agreement and the technical barriers to trade (TBT) agreement are set by the WTO, which means agri-food exporting countries are required to comply with these agreements to demonstrate they have met required quality levels as prescribed by hazard analysis and critical control points (HACCP), maximum residue limits (MRL) and the International Standard Organization (ISO) to access markets such as the European Union. On the other hand, sustainable development is increasingly recognized as crucial for agri-food trade and therefore needs to be integrated into the agri-food sector to achieve sustainable economic, environmental and social benefits for economic growth, poverty reduction and food security (Geibler *et al.*, 2010; Wognum *et al.*, 2011; Soussana, 2014). Furthermore, discussions about GMO food crops are increasing in the literature worldwide, particularly due to their role in increasing agricultural productivity in some countries, but are also associated with the risk of losing market access in some sensitive importing countries.

Keyword	1998–2010	2011–2016	2017–2022	Total
Export	2	8	15	25
Standard	3	11	9	23
International trade	6	6	10	22
Food safety	4	8	7	19
Certification	1	7	9	17
European union		4	12	16
Import	1	5	10	16
Developing world	4	4	6	14
Food market	1	6	7	14
Agricultural trade	1	3	9	13
Food industry	2	2	8	12
Tariff structure		1	10	11
World trade organization	3	1	6	10
Trade flow		2	7	9
Europe		1	7	8
Food supply		4	3	7
Political economy	1	4	2	7
Trade agreement	1	2	4	7
Africa	1	3	2	6
China	2	1	3	6
Empirical analysis		1	5	6
Food quality		2	4	6
Globalization	1	5		6
Sustainable development	1	1	4	6
Food policy	1	3	1	5
Food production	1	3	1	5
Genetically modified organism		2	3	5
Horticulture	1	3	1	5
Supply chain management		2	3	5
Trade policy		2	3	5

Source(s): Scopus database, 1998–August 2022

Table 7. Temporal evolution of keywords between 1998 and 2022 (Number of occurrences >4)

3.7 Conclusions, future research direction and limitations

In this study, the authors examined the intellectual structure of the field of private agricultural and food standards in global trade in the Scopus database from 1998 to August 2022, using VOSviewer software. The aim was to understand the development of the field, the most influential publications, authors and institutions and the current research themes or topics in private agricultural and food standards in global trade. The findings show that:

(1) The top leading authors, countries, and institutions in private agricultural and food standards in global trade research are Raynolds I., Cai l. and Greis N. The main contributing institutions Colorado State University, Cranfield University, and Tsinghua University. The largest contributors are the United States, and Italy.

(2) In terms of co-authorship and collaboration between authors and countries, the analysis shows that Olper A., Curzi D., and Brümmer B. are the most influential authors. Italy, Belgium, USA, China, and Germany are influential centers for research in the private agricultural and food standards in global trade. The cooperation relationship between Italy and Belgium is the most common with seven cooperations. USA and Canada follow with five cooperations. In addition, Table 6 shows that the USA, Germany, Belgium and Austria have extensive cooperative relationships with

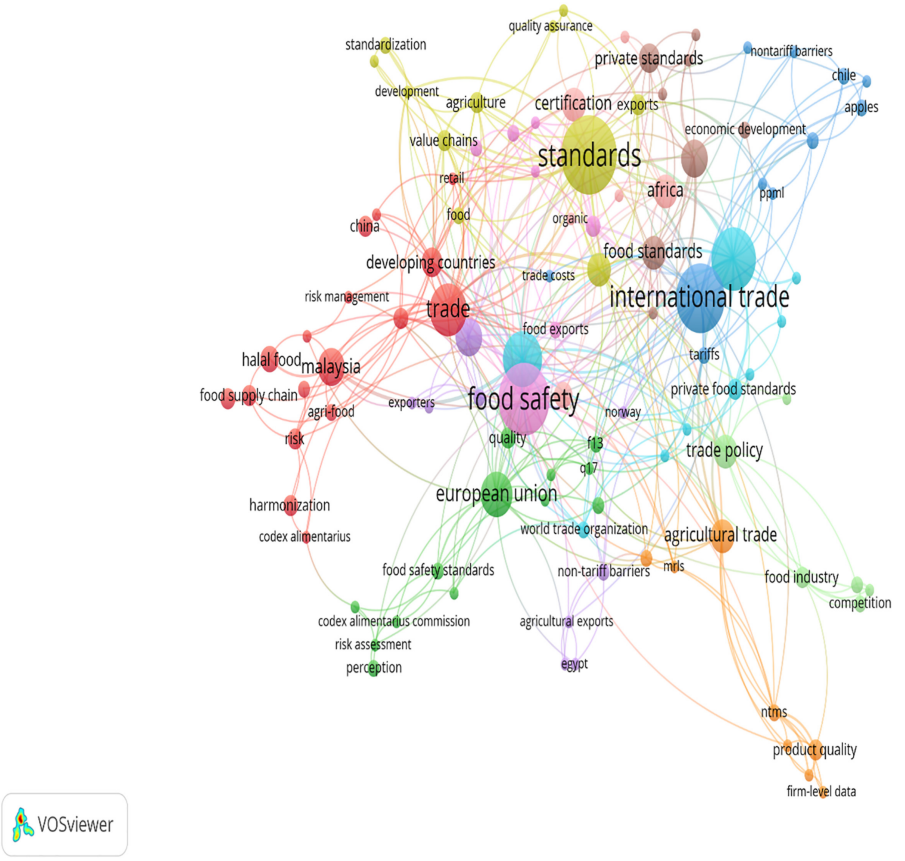

Figure 7.
Co-occurrence network of keywords (1998–2022)

other countries in the world. However, among the cooperating developing countries, there is little cooperative relationship between developed economies and African countries.

(3) The most cited journals were *World Development* (913), *Food Policy* (567) and *Journal of Operations Management* (322).

(4) The intellectual structure of the field of private agricultural and food standards in global trade has evolved around five thematic clusters which are: (1) The political economy of food standards, (2) food standards and their challenges in global trade, (3) food standards and integration in value chains, (4) food standards and market access and (5) food standards and exports from developing countries

(5) The keywords development (evolution) was identified using the co-occurrence analysis. The most recent keywords that are attracting scholarly attention include food quality, World Trade Organization (WTO), tariff structure, trade agreements, sustainable development, GMOs, food industry and European Union in private agricultural and food standards in global trade research.

3.7.1 Limitations of the study and future research directions. The main limitation of this study is that the authors focused their attention on certain aspects of bibliometric review, such as the intellectual structure of the field, the citation analysis and the collaboration network. Future research could attempt to explore new field development through bibliographic coupling and deepening of conceptual structure exploration through content analysis incorporating the research methods used in the respective studies. In addition, future research could examine how standards are used by farmers in developing countries to structurally organize and increase their exports and compare the effectiveness of different models of global value chain integration such as UTZ and organic certification, GlobalGAP and contract farming, as well as cross-industry differences in the standard setting behavior of agricultural and food products. Given the need for more studies in private agricultural and food standards in global trade from developing countries, particularly Africa, more research should be devoted to African countries as this research shows that there are few studies and most of them single-country studies. For example, the number of publications for Africa were Ghana (1), Kenya (5), South Africa (1), Tanzania (1), Rwanda (1), Egypt (2), Ethiopia (2), Burundi (1). On the other hand, USA (46), China (15), Belgium (23), Germany (27), Italy (32) and the United Kingdom (24).

References

Akkerman, R., Farahani, P. and Grunow, M. (2010), "Quality, safety and sustainability in food distribution: a review of quantitative operations management approaches and challenges", *OR Spectrum*, Vol. 32 No. 4, pp. 863-904.

Anders, S.M. and Caswell, J.A. (2009), "Standards as barriers versus standards as catalysts: assessing the impact of HACCP implementation on U.S. seafood imports", *American Journal of Agricultural Economics*, Vol. 91 No. 2, pp. 310-321.

Anderson, J.E. and Wincoop, E. (2003), "Gravity with gravitas: a solution to the border puzzle", *American Economic Review*, Vol. 93 No. 1, pp. 170-192.

Augier, P., Gasiorek, M. and Tong, C. (2005), "The impact of rules of origin on trade flows", *Economic Policy*, Vol. 20, pp. 567-624, doi: 10.1111/j.1468-0327.2005.00146.x.

Badar, H. (2014), "Value chain performance improvement for sustainable mango industry development in Pakistan", Unpublished Doctor of Philosophy, The University of Queensland, School of Agriculture and Food Sciences.

Beghin, J., Maertens, M. and Swinnen, J. (2015), "Nontariff measures and standards in trade and global value chains", *Annual Review of Resource Economics*, Vol. 7 No. 1, pp. 425-450.

Blind, K. and Jungmittag, A. (2005), "Trade and the impact of innovations and standards: the case of Germany and the UK", *Applied Economics*, Vol. 37 No. 12, pp. 1385-1398, doi: 10.1080/13504850500143294.

Bolwig, S., Gibbon, P. and Jones, S. (2009), "The economics of smallholder organic contract farming in tropical Africa", *World Development*, Vol. 37 No. 6, pp. 1094-1104.

Chen, K. and Stamoulis, K. (2008), "The changing nature and structure of agri-food systems in developing countries: beyond the farm gate", in McCullough, E.B., Pingali, P.L. and Stamoulis, K.G. (Eds), *The Tranformation of Agri-Food System: Globalisation, Supply Chains and Smallholder Farmers*, The Food and Agriculture Organisation of the United Nations (FAO) and Earthscan, London, pp. 143-157.

Chen, C., Dubin, R. and Kim, M.C. (2014), "Emerging trends and new developments in regenerative medicine: a scientometric update (2000-2014)", *Expert Opinion on Biological Therapy*, Vol. 14, pp. 1295-1317.

Chiputwa, B., Spielman, D. and Qaim, M. (2015), "Food standards, certification, and poverty among coffee farmers in Uganda", *World Development*, Vol. 66, pp. 400-412.

Cisneros, L., Ibanescu, M., Keen, C., Lobato-Calleros, O. and Niebla-Zatarain, J. (2018), "Bibliometric study of family business succession between 1939 and 2017: mapping and analyzing authors' networks", *Scientometrics*, Vol. 117 No. 2, pp. 919-951.

Clarke, R. (2010), "Private food safety standards: their role in food safety regulation and their impact", *Paper Prepared for Presentation and Discussion at the 33rd Session of the Codex Alimentarius Commission, Food and Agriculture Organization Of The United Nations*.

Clougherty, J. and Grajek, M. (2014), "International standards and international trade: empirical evidence from ISO 9000 diffusion", *International Journal of Industrial Organization*, Vol. 36, pp. 70-82.

Crivelli, P. and Groeschl, J. (2016), "The impact of sanitary and phytosanitary measures on market entry and trade flows", *The World Economy*, Vol. 39 No. 3, pp. 444-473.

Curzi, D. and Olper, A. (2012), "Export Behavior of Italian food firms: does product quality matter?", *Food Policy*, Vol. 37 No. 5, pp. 493-503.

Curzi, D. and Pacca, L. (2015), "Price, quality and trade costs in the food sector", *Food Policy*, Vol. 55, pp. 147-158.

Czubala, W., Shepherd, B. and Wilson, J. (2009), "Help or hindrance? The impact of harmonised standards on African exports", *Journal of African Economies*, Vol. 18 No. 5, pp. 711-744, doi: 10.1093/jae/ejp003.

Disdier, A., Fontagne, L. and Mimouni, M. (2007), "The impact of regulations on agricultural trade: evidence from SPS and TBT agreements", *American Journal of Agricultural Economics*, Vol. 90 No. 2, CEPII Research Center, Working Papers. doi: 10.2139/ssrn.1194969.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N. and Lim, W.M. (2021), "How to conduct a bibliometric analysis: an overview and guidelines", *Journal of Business Research*, Vol. 133 September, pp. 285-329, doi: 10.1016/j.jbusres.2021.04.070.

Drogué, S. and DeMaria, F. (2012), "Pesticide residues and trade, the apple of discord?", *Food Policy*, Vol. 37 No. 6, pp. 641-649.

Eck, V.N. and Waltman, L. (2010), "Software survey. VOSviewer, a computer program for bibliometric mapping", *Scientometrics*, Vol. 84, pp. 523-538.

Ehrich, M. and Mangelsdorf, A. (2018), "The role of private standards for manufactured food exports from developing countries", *World Development*, Vol. 101, pp. 16-27.

Escanciano, C. and Santos-Vijande, M. (2014), "Reasons and constraints to implementing an ISO 22000 food safety management system: evidence from Spain", *Food Control*, Vol. 40, pp. 50-57.

Fahimnia, B., Sarkis, J. and Davarzani, H. (2015), "Green supply chain management: a review and bibliometric analysis", *International Journal of Production Economics*, Vol. 162, pp. 101-114.

Ferrantino, M. (2006), *Quantifying the Trade and Economic Effects of Non-tariff Measures, OECD Trade Policy Papers 28*, OECD Publishing.

Ferro, E., Otsuki, T. and Wilson, J. (2015), "The effect of product standards on agricultural exports", *Food Policy*, Vol. 50, pp. 68-79.

Fiankor, D.D.D., Flachsbarth, I., Masood, A. and Brümmer, B. (2017), Does GlobalGAP certification promote agrifood exports?, *European Review of Agricultural Economics*, Vol. 47 No. 1. pp. 247-272.

Fischer, R. and Serra, P. (2000), "Standards and protection", *Journal of International Economics*, Vol. 52 No. 2, pp. 377-400.

Fontagné, L., Orefice, G., Piermartini, R. and Rocha, N. (2015), "Product standards and margins of trade: firm-level evidence", *Journal of International Economics*, Vol. 97 No. 1, doi: 10.1016/j.jinteco.2015.04.008.

Fulponi, L. (2006), "Private voluntary standards in the food system: the perspective of major food retailers in OECD countries", *Food Policy*, Vol. 31, pp. 1-13.

Geibler, J., Kristof, K. and Bienge, K. (2010), "Sustainability assessment of entire forest value chains: integrating stakeholder perspectives and indicators in decision support tools", *Ecological Modelling*, Vol. 221, pp. 2206-2214.

Gereffi, G. (1999), "International trade and industrial upgrading in the apparel commodity chain", *Journal of International Economics*, Vol. 48 No. 1, pp. 37-70.

Gereffi, G., Humphrey, J. and Sturgeon, T. (2005), "The governance of global value chains", *Review of International Political Economy*, Vol. 12 No. 1, pp. 78-104, doi: 10.1080/09692290500049805.

Graffham, A., Karehu, E. and Macgregor, J. (2009), "Impact of GLOBAL GAP on small scale vegetable growers in Kenya", Standard Bearers: Horticultural Exports and Private Standards in Africa, pp. 53-56 in: A Borrot de Battisti, J. MacGregor and A. Graffham (eds), standard bearers: Horticultural exports and private standards in Africa. London. United Kingdom. International Institute for Environment and Development.

Helpman, E., Melitz, M. and Rubinstein, Y. (2008), "Estimating trade flows: trading partners and trading volumes", *The Quarterly Journal of Economics*, Vol. 123 No. 2, pp. 441-487, doi: 10.1162/qjec.2008.123.2.441.

Henson, S. and Humphrey, J. (2009), *The Impact of Private Food Safety Standards on the Food Chain and on Public Standard-Setting Process*, Codex Alimentarius Commission, FAO headquarters, Rome, Session 32nd session.

Henson, S. and Humphrey, J. (2010), "Understanding the complexities of private standards in global agri-food chains as they impact developing countries", *The Journal of Development Studies*, Vol. 46 No. 9, pp. 1628-1646, doi: 10.1080/00220381003706494.

Henson, S. and Jaffee, S. (2008), "Understanding developing country strategic responses to the enhancement of food safety standards", *The World Economy*, Vol. 31 No. 4, pp. 548-568.

Henson, S. and Northen, J. (1998), "Economic determinants of food safety controls in supply of retailer own-branded products in United Kingdom", *Agribusiness*, Vol. 14 No. 2, pp. 113-126.

Henson, S. and Reardon, T. (2005), "Private agri-food standards: implications for food policy and the agri-food system", *Food Policy*, Vol. 30 No. 3, pp. 241-253.

Henson, S., Majowicz, S., Masakure, O., Sockett, P., Jones, A., Hart, R. and Knowles, L. (2006), "Consumer assessment of the safety of restaurants: the role of inspection notices and other information cues", *Journal of Food Safety*, Vol. 26 No. 4, pp. 275-301.

Herzfeld, T., Drescher, L. and Grebitus, C. (2011), "Cross-national adoption of private food quality standards", *Food Policy*, Vol. 36 No. 3, pp. 401-411.

Jaffee, S. and Masakure, O. (2005), "Strategic use of private standards to enhance international competitiveness: vegetable exports from Kenya and elsewhere", *Food Policy*, Vol. 30 No. 3, pp. 316-333.

Jongwanich, J. (2009), "The impact of food safety standards on processed food exports from developing countries", *Food Policy*, Vol. 34 No. 5, pp. 447-457.

Karipidis, P., Athanassiadis, K., Aggelopoulos, S. and Giompliakis, E. (2009), "Factors affecting the adoption of quality assurance systems in small food enterprises", *Food Control*, Vol. 20 No. 2, pp. 93-98.

Kumar, S., Pandey, N. and Haldar, A. (2020), "Twenty years of public management review (PMR): abibliometric overview", *Public Management Review*, Vol. 22 No. 12, pp. 1876-1896, doi: 10.1080/14719037.2020.1721122.

Li, Y. and Beghin, J.C. (2012), "A meta-analysis of estimates of the impact of technical barriers to trade", *Journal of Policy Modelling*, Vol. 34 No. 2, pp. 497-511.

Li, Y. and Beghin, J. (2014), "Protectionism indices for non-tariff measures: an application to maximum residue levels", *Food Policy*, Vol. 45, pp. 57-68.

Liu, Z., Yin, Y., Liu, W. and Dunford, M. (2015), "Visualizing the intellectual structure and evolution of innovation systems research: a bibliometric analysis", *Scientometrics*, Vol. 103 No. 1, pp. 135-158, doi: 10.1007/s11192-014-1517-y.

Lwesya, F. and Achanta, J. (2022), "Mapping research trends on food supply chain: a bibliometric analysis", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. ahead-of-print No. ahead-of-print, doi: 10.1108/JADEE-08-2022-0175.

Maertens, M. and Swinnen, J. (2009), "Trade, standards, and poverty: evidence from Senegal", *World Development*, Vol. 37 No. 1, pp. 161-178.

Mangelsdorf, A., Portugal-Perez, A. and Wilson, J. (2012), "Food standards and exports: evidence from China", *World Trade Review*, Vol. 11, pp. 507-526, doi: 10.1017/S1474745612000195.

Marette, S. and Beghin, J. (2010), "Are standards always protectionist?", *Review of International Economics*, Vol. 18 No. 1, pp. 179-192.

Masood, A. (2014), "GlobalGAP certification and international trade flows", Unpublished PhD Dissertation Thesis Submitted in the Faculty of Agricultural Sciences, Georg-August-University Göttingen, Germany.

Masood, A. and Brümmer, B. (2014), "Impact of GlobalGAP certification on EU banana imports: agravity modeling approach", *GlobalFood Discussion Paper 49*.

Melitz, M.J. (2003), "The impact of trade on intra-industry reallocations and aggregate industry productivity", *Econometrica*, Vol. 71 No. 6, pp. 1695-1725, available at: http://www.jstor.org/stable/1555536

Melo, O., Engler, A., Nahuehual, L., Cofre, G. and Barrena, J. (2014), "Do sanitary, phytosanitary, and quality-related standards affect international trade? Evidence from Chilean fruit exports", *World Development*, Elsevier, Vol. 54 C, pp. 350-359.

Mukherjee, D., Kumar, S., Donthu, N. and Pandey, N. (2021), "Research published in Management International Review from 2006 to 2020: a bibliometric analysis and future directions", *Management International Review*, Vol. 61 No. 5, pp. 599-642, doi: 10.1007/s11575-021-00454-x.

Neven, D. (2014), *Developing Sustainable Food Value Chains: Guiding Principles*, Food and Agriculture Organization, Rome.

Olper, A., Curzi, D. and Pacca, L. (2014), "Do food standards affect the quality of EU imports?", *Economics Letters*, Vol. 122 No. 2, pp. 233-237.

Otsuki, T., Wilson, J. and Sewadeh, M. (2001), "Saving two in a billion: quantifying the trade effect of European food safety standards on african exports", *Food Policy*, Vol. 26, pp. 495-514, doi: 10.1016/S0306-9192(01)00018-5.

Santeramo, F. and Lamonaca, E. (2018), "The effects of non-tariff measures on agri-food trade: areview and meta-analysis of empirical evidence", *Journal of Agricultural Economics*, Vol. 70 No. 3, doi: 10.1111/1477-9552.12316.

Sausman, C. (2016), "Social capital formation in global value chains: evidence from Peru's alternative development program", Doctor of Philosophy (PhD) thesis, University of Kent.

Schuster, M. and Maertens, M. (2010), "Do private standards create exclusive supply chains? New evidence from the Peruvian asparagus export sector", *Food Policy*, Vol. 43, pp. 291-305.

Schuster, M. and Maertens, M. (2015), "The impact of private food standards on developing countries' export performance: an analysis of Asparagus firms in Peru", *World Development*, Vol. 66, pp. 208-221.

Shepherd, B. and Wilson, N.L. (2013), "Product standards and developing country agricultural exports: the case of the European Union", *Food Policy*, Vol. 42, pp. 1-10.

Song, Y., Lei, L., Wu, L. and Chen, S. (2022), "Studying domain structure: a comparative analysis of bibliographic coupling analysis and co-citation analysis considering all authors", *Online Information Review*, Vol. ahead-of-print No. ahead-of-print, doi: 10.1108/OIR-12-2020-0540.

Soussana, J.-F. (2014), "Research priorities for sustainable agri-food systems and life cycle assessment", *Journal of Cleaner Production*, Vol. 73 No. 0, pp. 19-23.

Su, H.N. and Lee, P.C. (2010), "Mapping knowledge structure by keyword co-occurrence: a first look at journal papers in technology foresight", *Entometrics 2010*, Vol. 85, pp. 65-79.

Subervie, J. and Vagneron, I. (2013), "A drop of water in the Indian ocean? The impact of GlobalGap certification on lychee farmers in Madagascar", *World Development*, Vol. 50, pp. 57-73.

Swinnen, J. (2016), "Economics and politics of food standards, trade, and development", *Agricultural Economics*, Vol. 47, pp. 7-19, doi: 10.1111/agec.12316.

Swinnen, J. (2017), "Some dynamic aspects of food standards", *American Journal of Agricultural Economics*, Vol. 99 No. 2, pp. 321-338, doi: 10.1093/ajae/aax022.

Swinnen, J. and Vandemoortele, T. (2011), "Trade and the political economy of food standards", *Journal of Agricultural Economics*, Vol. 62, pp. 259-280, doi: 10.1111/j.1477-9552.2011.00294.x.

Trienekens, J.H., Wognuma, P.M., Beulens, A.J.M. and Vorst, J.G.A.J (2012), "Transparency in complex dynamic food supply chains", *Advanced Engineering Informatics*, Vol. 26 No. 1, pp. 55-65.

Vigani, M., Raimondi, V. and Olper, A. (2012), "International trade and endogenous standards: the case of GMO regulations", *World Trade Review*, Vol. 11 No. 03, doi: 10.1017/S1474745612000262.

Wognum, P.M., Bremmers, H., Trienekens, J.H., van der Vorst, J.G.A.J and Bloemhof, J.M. (2011), "Systems for sustainability and transparency of food supply chains - current status and challenges", *Advanced Engineering Informatics*, Vol. 25 No. 1, pp. 65-76.

WTO and OECD (2013), *Aid for Trade in Agrifood WTO Agrifood_47*, WTO and OECD.

Xiong, B. and Beghin, J. (2014), "Disentangling demand-enhancing and trade-cost effects of maximum residue regulations", *Economic Inquiry*, Vol. 52, pp. 1190-1203.

Xu, X., Chen, X., Jia, F., Brown, S., Gong, Y. and Xu, Y. (2018), "Supply chain finance: a systematic literature review and bibliometric analysis", *International Journal of Production Economics*, Vol. 204, pp. 160-173.

Yakovleva, N. (2007), "Measuring the sustainability of the food supply chain: a case study of the UK", *Journal of Environmental Policy and Planning*, Vol. 09 No. 01, p. 26.

Zou, X., Long, W. and Le, H. (2018), "Visualization and analysis of mapping knowledge domain of road safety studies. Accident Analysis and Prevention", *Accident Analysis and Prevention*, Vol. 118, pp. 131-145, doi: 10.1016/j.aap.2018.06.010.

Zupic, I. and Cater, T. (2015), "Bibliometric method in management and organization", *Organizational Research Methods*, Vol. 18 No. 3, pp. 429-472.

Corresponding author
Francis Lwesya can be contacted at: flwesya@yahoo.com