

## UNFOLDING THE SCIENTIFIC UMBRELLA OF FOOD TRADING

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### Abstract

*International agri-food markets are staples of food security that ensure nutrition for countries all around the world through trading. In such a globalized economic climate, international agri-food flows shift in patterns rapidly and are subject to numerous risks and challenges such as climate change issues, food insecurity, supply chain disruptions caused by pandemics and many other challenges. Agriculture and food trading have been under a lot of pressure caused by the COVID-19 pandemic, by the constantly growing pressure for mitigating climate change issues, while still ensuring food security globally. On top of that, there is also the commitment of achieving the Sustainable Development Goals in time, as specified in the 2030 Agenda for Sustainable Development, plus the upcoming commitment in the EU for implementing the Green Deal, with direct impact on agriculture and international agri-food trading activities. In this context, the aim of this research was to explore the scientific interest for the topic of food trading with a focus on the 2019-2021 period and highlight emergent trends through quantitative mapping of the keywords associated to the papers published in this field and indexed in the Web of Science. Results show a scientific interest shift from a research area specific to the economic competitiveness of food trading to an area specific to environmental and global food supply concerns.*

**Keywords:** *food trading; food security; sustainability; bibliometric analysis; VOSviewer.*

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### Introduction

Globalization pushes countries all around the world to compete and harness their potential in various economic sectors. In this context, participating in international trading flows is essential and ensures efficiently fostering competitiveness, not only internationally, but also domestic competitiveness.

International agri-food trading activities are crucial for achieving food security globally and for enabling nations around the world to foster their competitive advantage efficiently based on national resources availability (Forsman, 2000; Constantin et al., 2022), meeting the complex demands of consumers in distant locations (Kummu et al., 2020).

The rapid increase of international food trade volumes has significantly altered the nature of the global agri-food system, especially after the 2000s (FAO, 2018). In the context of a poor resilience to internal structural changes and external challenges (i.e.: the COVID-19 pandemic), disruptions in the global agri-food supply chain are expected, as well as economic shocks (Galanakis et al., 2021; Yu et al., 2021).

To gain a better grasp of the novel scientific research trends in this direction, the objective of this research paper was to explore potential paradigm shifts related to food trading activities

based on a comparison between the scientific papers published in this field and indexed in the Web of Science during 2019–2021 and the scientific papers published on the same topic before 2019—also indexed in the Web of Science.

The contribution and novelty of this paper to the existing literature on the topic food trading activities resides in the fact that this research provides an in-depth quantitative perspective on the changes observed in the scientific literature in the context of the commitment of achieving the SDGs in time, implementing the European Green Deal and ensuring food supply chain resilience during the COVID-19 pandemic.

This conference research paper follows the traditional structure—after the introduction, the first section was dedicated to a brief literature review of the papers approaching the topic of food trading activities, then the second section was dedicated to describing the materials and methods used in carrying out this quantitative research, whereas the third section of the paper was dedicated to discussing the main findings of the research. Finally, the conclusions section was dedicated to explaining the limitations of this research, as well as suggesting future research avenues.

## **1. Literature Review**

By connecting the economic implications of international agri-food product trading activities with the topic of food security, Andrei et al. (2021) recognized the vital role of the global agri-food supply chain in feeding the constantly growing world's population, therefore arguing for the importance of the free market. Since the intensity of agricultural trade continues to amplify (Karakoc & Konar, 2021), even during the COVID-19 pandemic, when behavioral food consumption pattern changes occurred (Constantin, Beia, et al., 2021; Hobbs, 2020; Rodríguez-Pérez et al., 2020), ensuring food security became more challenging than ever (Atalan-Helicke & Abiral, 2021; Deaton & Deaton, 2020; Wegerif, 2020). On top of that, agri-food trading activities and food security are also highly connected to topics specific to sustainable development and climate change (Istudor et al., 2019; Pérez-Escamilla, 2017; Wheeler & von Braun, 2013). Managing the complex facets of agriculture and food security requires innovative solutions (Constantin et al., 2021).

A considerable amount of the papers from the literature on the topic of food trade is specific to studying the competitiveness and comparative advantage of different countries: the case of the Slovak reported to the EU-agri-food trading activities in relation with Russia and Ukraine (Qineti et al., 2009); the case of Hungary in the context of EU accession—the study of Jambor and Hubbard (2013) focused on exploring structural changes and comparative advantages of agri-food products groups, based on international trading activities with such products; the case of Central European and Balkan countries—the study of Bojnec and Fertő (2009) which investigated the advantages and disadvantages of eight Central European and Balkan countries with regard to their international agri-food trading activities and discovered possible food security threats in the period of pre- and post-accession to EU membership. Similarly, Fertő (2008) studied the agri-food trade activity according to the Balassa index procedure and identified patterns of competitiveness in the case of selected group of agri-food products with reference to the Central European countries. Bojnec and Fertő (2019) investigated economic aspects of the EU member states trading activities with agri-food products and identified major competitors internally, but also outside the EU by applying the revealed comparative advantage indices methodology. The main finding of the study was that the United States of America, Argentina, Australia, Canada are the main identified competitors of the EU, especially from the perspective of fruit, vegetables, grain products and dairy products. The revealed comparative advantage is one of the key components of

economic analyses related to assessing the degree of food trade competitiveness of a region, country or continent (Chivu et al., 2021).

There is also a considerable amount of papers dedicated to the topic of food trade in relation with environmental concerns. In the study of Schmitz et al. (2012), the authors highlight that the volume of agricultural trade increases rapidly, which is a reason to be concerned for the associated environmental damage—reason for the authors to propose a method for evaluating both the economic and environmental effects of intensified food trade by using the agricultural production and ecological impact assessment model, resorting to the spatial mapping of land use in relation with greenhouse gas emissions. Pietrzyck et al. (2021) connect multiple concepts: sustainability in the EU, the Common Agricultural Policy, the 2030 Agenda for Sustainable Development and the European Green Deal—with the purpose of explaining how business representatives lack sufficient determination and constraints to act responsibly with regard to agri-food trading activities. Boulanger et al. (2021) argue that although the implementation of the European Green Deal is relying, among other, on promoting fairer trade, the natural capital will continue to be under pressure due to the production distorting effects of the EU's decoupled payment. Consumers' preferences for food is another factor that should be taken into consideration by in order to successfully implement the European Green Deal (Chiripuci et al., 2022).

## **2. Materials and Methods**

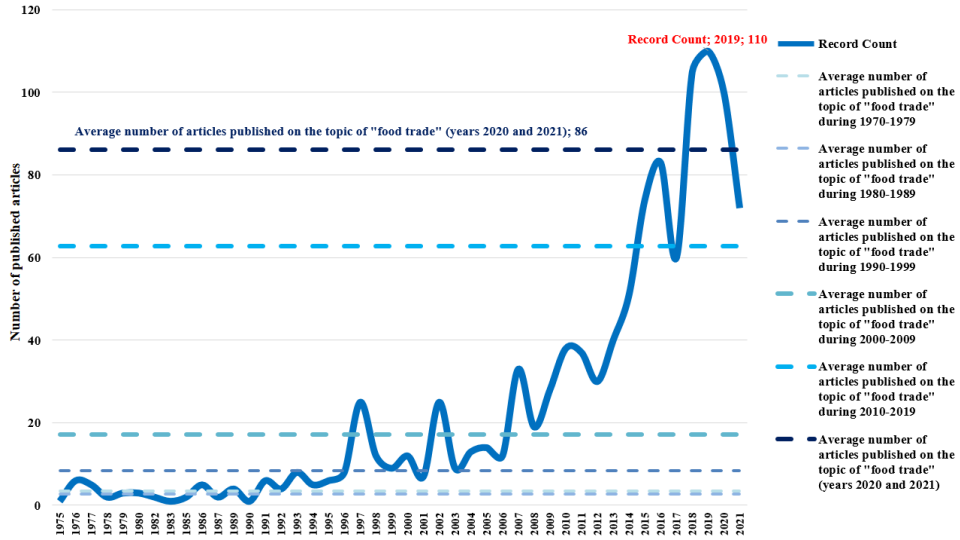
In accordance with the research objective, the research methodology was quantitative. More specifically, the bibliometrics analysis was considered optimal for carrying out the research. As defined by Broadus (1987), bibliometrics represents a science specific to quantitatively measuring the physical units of publications, their performance (e.g.: number of citations), associated keywords and the (in)existence of correlations between those and many other factors. In order to elaborate the comparison between the scientific papers published on the topic of food trade indexed in the Web of Science during 2019-2021 and the scientific papers published on the same topic before 2019 (also indexed in the Web of Science), the mapping of the keywords associated to those papers was computed in VOSviewer 1.16.17 and the results were discussed in section 3. VOSviewer was designed by Ness Jan van Eck and Ludo Waltman, two researchers with prestigious work in the field of bibliometrics. VOSviewer is one of the most frequently used tool in bibliometrics (van Eck & Waltman, 2010), as it provides keyword-based clustering of publications (van Eck & Waltman, 2017).

Data used in this research were extracted from the Web of Science in November 2021, based on the following two queries: (a) *TOPIC: ("food trade") AND YEAR: (1975-2018)*; (b) *TOPIC: ("food trade") AND YEAR: (2019-2021)*. The two different queries were needed in order to unfold the scientific umbrella of food trade per period of analysis: 1975-2018 (the first indexed paper in this field was published in 1975) and 2018-2021. The last period of analysis was selected with the aim of respecting the research objective and enrich the literature with a quantitative analysis of the changes observed in the recent papers elaborated on the topic of food trade in the context of the commitment of achieving the SDGs in time, implementing the European Green Deal and ensuring food supply chain resilience during the COVID-19 pandemic.

Web of Science-extracted metadata were computed in VOSviewer and two maps of the keywords associated to the identified publications on the topic of food trade were generated with the purpose of exploring different research directions, according to the emergence of new global challenges faced by the agri-food system.

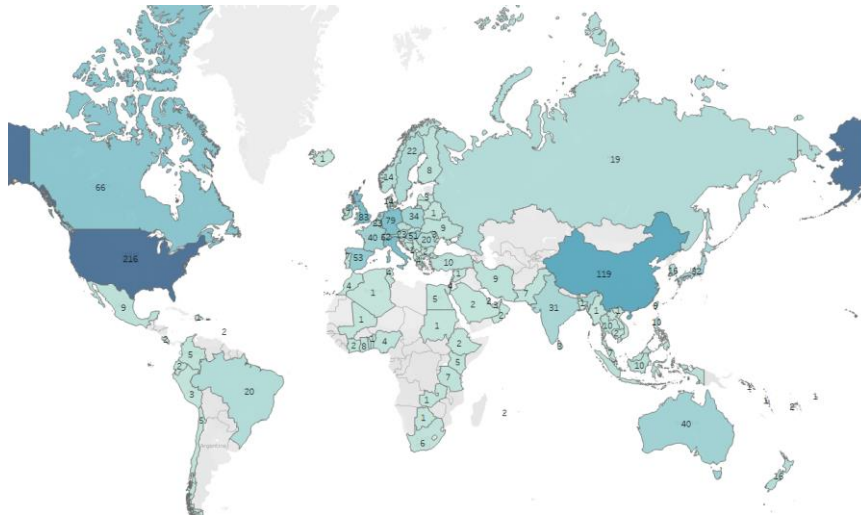
### 3. Results and Discussions

The literature is rich on papers approaching the topic of food trade. In November 2021, 1,092 papers were published with the structure “food trade” existing in the title, abstract or keywords of the papers, all of which are indexed in the Web of Science. Most of them (74.17%) were published before 2019 and the rest (25.83%) was published during 2019-2021. The evolution of these papers per publication year was graphically represented in Figure 1 and the affiliations per country of the authors were represented in Figure 2.



**Figure 1. The evolution of the number of Web of Science-indexed papers published on the topic of food trade (1975 – 2021)**

*Source: Authors' calculations based on Web of Science dataset*

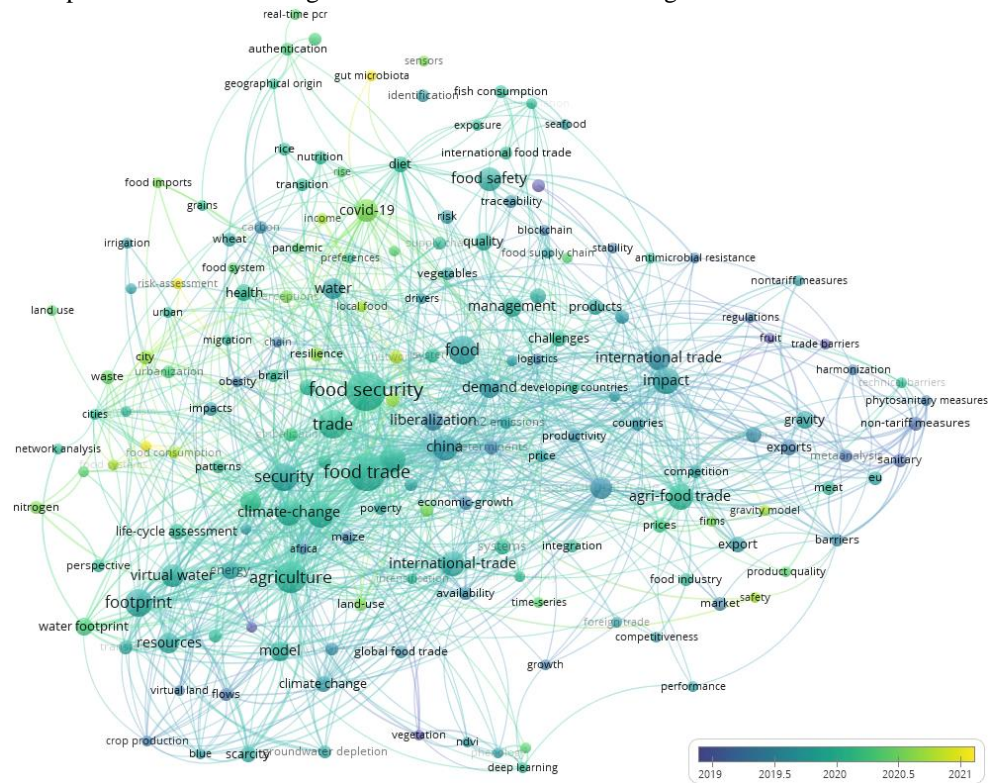


**Figure 2. The number of Web of Science-indexed papers published on the topic of food trade split per country, based on authors' affiliation**





papers published before 2015, which highlights the decline the scientific interest for these keywords and the emergence of ecological concerns in the literature (see keyword “footprint” displayed in yellow, keyword specific to papers published near the year 2018). Lastly, the map of the keywords associated to the Web of Science-identified publications on the topic of food trade during 2019-2021 was elaborated in Figure 4.



**Figure 4. The evolution of the keyword(s) correlations in the case of the most recent papers (2019 – 2021) indexed in the Web of Science on the topic of food trade**  
*Source: Authors’ computation in VOSviewer based on Web of Science metadata*

There are three clusters in Figure 4 that prove a change in direction with regard to the scientific papers published on the topic of food trade:

(a) Cluster 1 – specific to new technologies in agriculture, their contribution to ensuring food security, as well as their impact on mitigating environmental damage. This cluster consists of the following keyword(s): *blockchain, challenges, CO<sub>2</sub> emissions, food traceability, local food, trade, risk*;

(b) Cluster 2 – specific to the role of the efficient management of the natural capital, as well as to the goal of protecting it, while still ensuring food security globally. This cluster consists of the following keyword(s): *climate change, environmental impacts, sustainability, water footprint, scarcity, global food trade, international trade*;

(c) Cluster 3 – specific to the impact of the COVID-19 pandemic on ensuring food security, economic growth, simultaneously with mitigating climate change. This cluster consists of the following keyword(s): *climate change, COVID-19, economic growth, food security, food imports, international food trade, land use*.

Therefore, it becomes clear that the food supply chains need to be redesigned into a modern resilient system with minimal environmental impact. It is no longer sufficient for it to be economically-efficient. Not only that, but the literature is also converging in the direction of circularity in agriculture (Pătărlăgeanu et al., 2021). In order to observe the differences between the two analyzed periods, Table 1 was constructed with the aim of ranking the number of occurrences of keywords per period of analysis.

**Table 1. Top 15 keywords analysis per period**

Period: 1975 - 2018			Period: 2019 - 2021		
#	Keyword(s)	% of top 15	#	Keyword(s)	% of top 15
1	food trade	11.81%	1	food security	12.46%
2	agriculture	9.59%	2	food trade	11.42%
3	food security	9.59%	3	agriculture	8.30%
4	trade	9.41%	4	trade	6.92%
5	agri-food trade	8.67%	5	food	6.57%
6	food safety	7.20%	6	footprint	6.23%
7	food	6.27%	7	security	6.23%
8	international-trade	6.27%	8	impact	5.88%
9	virtual water	5.72%	9	agri-food trade	5.54%
10	china	4.80%	10	china	5.54%
11	impact	4.61%	11	climate-change	5.54%
12	security	4.43%	12	consumption	5.54%
13	model	4.06%	13	sustainability	5.19%
14	consumption	3.87%	14	international trade	4.50%
15	gravity model	3.69%	15	covid-19	4.15%

*Source: Authors' design based on Web of Science metadata*

The research results derived from the cluster analysis from Figures 3 and 4 are furthermore confirmed by the data from Table 1. “Food security” is now (2019-2021) at the top of the keywords ranking. In relation with food trade, both topics are treated in the recent literature with more attention with respect to environmental impacts. For example, the keywords ranking specific to the 2019-2021 period has new candidates: *footprint* (6.23%), *climate-change* (5.54%), *sustainability* (5.19%). These emerging keywords were not present in the previous ranking (1975-2018)—therefore the scientific interest has been indeed marked by a paradigm shift towards the direction of a more environmentally-friendly agri-food system.

### **Conclusions**

This research presented an assessment of the scientific publications on the topic of food trade. More specifically, this conference paper enriched the literature with an in-depth bibliometric analysis of the changes observed in the research activity in the area of food trade, in the context of the meeting the SDGs from the 2030 Agenda for Sustainable Development in a

timely manner, implementing the European Green Deal and ensuring food supply chain resilience during the COVID-19 pandemic.

The global agri-food system has seen many changes over the last decades due to the rapid increase of international food trade volumes, rapid environmental degradation and even pandemics. The findings from the bibliometric analysis carried out in this paper contributed to understanding that economic competitiveness involves less of a scientific interest than other emerging interests such as environmental impact mitigation in the agri-food system.

The research carried out in this paper has several limitations. The first one is connected to the database of analysis. Since indexing novel work on the topic of food trade in the Web of Science takes time, this research can be further improved by constantly integrating new publications into the bibliometric analysis. Another limitations of this study is that the research was conducted only by considering the Web of Science. Further research avenues might refer to different prestigious scientific databases, such as Scopus.

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