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EVOLUTION AND TRENDS OF SCIENTIFIC RESEARCH ON SHORT FOOD SUPPLY CHAINS: INTERNATIONAL BIBLIOMETRIC ANALYSIS

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ABSTRACT

Short Food Supply Chains (SFSCs) are forms of agrifood product circulation that have the aim of bringing together producers and consumers, promoting fair trade, and giving access to local foods. The study of SFSCs is a developing area of knowledge. The objective of the research was to perform a bibliometric analysis of the evolution and the current state of international scientific research on SFSCs and to identify trends and opportunities for research, specifically in Latin America. For this purpose, we carried a bibliometric analysis out, through the databases Dimensions and Redalyc, during the period of 2000 to 2021 and processed in the VOSviewer software. Results show a total of 253 documents and it was determined that Europe represents 67% of the research on SFSCs; however, a growing production of studies can be seen in North America and Latin America, primarily in case studies, which represent 25%. The areas of knowledge where there are more studies are the social sciences, administration and economy. The conclusion is that COVID-19, food security and agrifood policies are areas of opportunity for research linked to Short Food Supply Chains in Latin America.

Keywords: alternative food supply chains, bibliometrics, fair trade, local consumption, VOSviewer.

INTRODUCTION

The food system, understood as one that involves the various stages of production, distribution and consumption of foods, has experienced the consequences of the current capitalist economics model. It has turned towards protocols of globalization, of trade liberalization and exchange. Nowadays, it is possible to acquire products from diverse regions of the world with great ease. This situation entails some benefits for consumption, although the search for producing more with lower costs has caused the concentration of lands and markets, as well as the search for a higher yield in less space, fostering the use of agrichemicals without control (Food and Agriculture Organization of the United Nations FAO, 2017).

An important piece of data is that "out of the 6,000 plant species that are grown to get foods, less than 200 contribute substantially to the global food production and only 9 represent 66% of the total agricultural production". This information points to the fact that it has promoted monocrops above diversified production in the same space, risking the permanence of ecosystems, the services they provide to human beings, and the living beings and organisms that inhabit them (Bélanger and Pilling, 2019).

Agriculture plays an important role in ecosystem maintenance; Bhagwat *et al*. (2008) mention that agriculture provides rural livelihoods in agreement with biodiversity conservation, for example through agroforest systems in areas of influence and landscapes dominated by human activity. Likewise, Batáry *et al*. (2015) analyze the role of agro-environmental plans in environmental conservation and management in Europe and reached the conclusion that these protocols can be effective for the conservation of wildlife as long as they are designed carefully and there are the economic, political and social resources to implement them.

However, the globalized agrifood system operates under a rationality of utility maximization, where a small group of transnational businesses dominate the links of the agrifood supply chains (Delgado, 2010). Facing this situation, the small-scale producers are excluded from commercial dynamics because they do not have the information, technology and processes of production and distribution required by supermarkets and food trading companies. In addition, they lack the marketing strategies that large corporations use. However, small-scale production is highly important, because it contributes approximately 70% of the foods consumed globally (ETC Group: Action Group on Erosion, Technology and Concentration, 2009; International Fund for Agricultural Development, 2013; Vía Campesina, 2019).

Internationally, supermarkets control 48% of the final price of food products; intermediaries, whether traders or manufacturers, capture up to 38%; while producers receive only 6.5% of the profits, where women are the ones that are affected most because of the gender discrimination still present at the global level (Oxfam GB, 2018).

The COVID-19 pandemic revealed the fragility of the global food system, given the economic, political, social and environmental inequalities experienced. Regarding the food supply, countries such as Russia, Algeria, Kazakhstan, Serbia, Rumania and Vietnam established limits to exports of foods such as flours, sugar, potatoes, oats, vegetable oils and rice, to ensure their national supply (Laborde, 2020). Besides this, the cross-border restrictions of goods and people have slowed down the distribution of foods at the international level, causing an increase in the levels of loss and waste of foods (Pulighe and Lupia, 2020). On the other hand, social distancing measures had an effect on the closing of places such as restaurants and selling points, a fact that eliminated a key market for food producers and distributors (Food and Agriculture Organization of the United Nations, 2021a). Likewise, at the beginning of the pandemic, panic purchases generated an increase in demand of non-perishable products. However, the international measures and recommendations stressed the importance of acquiring and consuming healthy products such as fresh fruits and vegetables, which evidenced the vulnerability that large cities have to access this type of products (Food and Agriculture Organization of the United Nations, 2021b). In this context, the need to take action in building a more resilient and sustainable global food system has been debated, in which both rural zones and urban zones could obtain a safe access to foods (Comité de Seguridad Alimentaria Mundial, 2021).

In face of this situation, the strategic factors proposed by FAO (2021b) are: diversification in food value chains, improvement in connectivity of food supply chains, and resilience capacities in vulnerable households, through the promotion of diversified sources of income and generation of social protection programs by governments. In addition to this, the importance of promoting environment-friendly food systems is reiterated, which contributes to protecting biodiversity and ecosystems.

Facing this new order, there are initiatives that promote a fairer value chain to satisfy the dietary needs, as well as sustainable production protocols, such as agroecology and organic cultivation and which, at the same time, give access to fresh and healthy products. An example of this are the Short Food Supply Chains (SFSCs), which are defined as a "way of commerce based on the direct sale of fresh or seasonal products, without intermediaries between producers and consumers" (Food and Agriculture Organization of the United Nations, 2016), which implies decreasing the number of actors involved and shortening the distance between them. In this sense, the European Council defines SFSCs as: "channels made up by a few economic agents, committed with cooperation, local economic development and socioeconomic relationships between producers and consumers of a nearby geographic zone"; here it is observed that not just economic elements converge in the exchanges, but rather that there are also elements of cooperation and solidarity (Kneafsey *et al.*, 2013).

For their part, Boucher *et al.* (2018, pp. 75-76) mention that the short food supply chains: Emerge from the demand of products that are local, traditional, artisanal, fresh, from the vicinity, and seasonal, which allow small-scale producers to differentiate their products from the creation of immaterial value, allowing them to gain access to fair prices, given by consumers who will pay a price that is sometimes higher than the conventional price.

Therefore, through Short Food Supply Chains (SFSCs), there is the goal of avoiding intermediation between producer and consumer, and promoting geographic proximity, as well as trust ties, territorial valuation of food heritage, and strengthening of social capital (Riveros and Boucher, 2019).

The SFSCs are generally related with agroecological production protocols, understood as "the type of production which seeks to design and generate a sustainable food system through ecological concepts and principles, considering the interactions between animals, plants and human beings" (Wezel *et al.*, 2009), thus being a factor that is closely linked to biodiversity conservation.

Some typologies of short food supply chains mentioned in studies are: direct sales from producer to consumer, local markets, agroecological markets, *tianguis*, fairs, delivery baskets, institutional purchases and consumption cooperatives, gastronomic markets, tourism routes, and territorial markets (Craviotti and Soleno, 2015; Delgadillo, 2019; Food and Agriculture Organization of the United Nations, 2016; Pérez, Seplovich, Gusman, and Vidal, 2018; Romagnoli *et al.*, 2018; Romero-López and Manzo-Ramos, 2017; Saravia-Ramos, 2020).

Therefore, Short Food Supply Chains (SFSCs) are forms of agrifood product circulation, of different typologies, which have the aim of bringing together producers and consumers; in addition, they promote family or small-scale agriculture, which has socioeconomic aspects associated to the territory where it is generated. SFSCs seek to establish relationships with the social actors of the territory and to reduce the intermediary phenomenon. They have an environmental component, since most times the foods that are offered are produced under agroecological techniques and in agreement with the ecosystems present from each region, a fact that also contributes to human health when offering fresh and quality products to consumers.

Therefore, the SFSCs are a concept that has taken on importance during the last twenty years, seeking to solve the problems of the current food system. These have been studied from various approaches and in practical cases that respond to specific territorial situations and which represent a mechanism for the construction of sustainable and resilient food systems. In the case of the global north, countries such as the United Kingdom, Italy, France, Hungry and Canada stand out; in the global south, the most representative countries are Brazil, Mexico, Colombia and Argentina. An important part of the studies are focused on the analysis of case studies, others are focused on defining sustainability variables in the SFSCs, as well as on the impact these have in the transformation of food systems, themes that will be addressed in depth in this study's discussion.

For their part, it should be stressed that the study of SFSCs is and will be a relevant theme for the coming years, taking into account the challenges present to reach a sustainable food system, as well as to fulfill the Sustainable Development Goals (SDGs) for 2030 and the challenges set out by government and non-government organizations, base associations and groups of organized producers.

With this background, the research study has the aim of performing a bibliometric analysis, which provides information about the evolution and the current state of international scientific research on short food supply chains, with the aim of enrichening the theoretical debate of the concept and identifying the research trends and opportunities, specifically in Latin America, given the relevance of the region in agricultural production, which represents approximately 14% of the production at the global level (Gardi *et al*., 2014).

In addition, in the region there are more than 15 million farmers, many of them in conditions of poverty and extreme poverty (Trivelli and Berdegué, 2019). According to Holmes (2021), poverty in Latin America is concentrated primarily in rural zones, where 48.6% of the population is poor and 22.5% extremely poor; therefore, the study of SFSCs represents an important opportunity area, given that they are trade mechanisms that open the market for small-scale producers and contribute to increasing their profits, as well as maintaining agriculture as a livelihood.

METHODOLOGY

The study has a mixed approach; on the one hand, quantitative and qualitative data were collected, analyzed and connected for the bibliometric analysis around the SFSCs.

Likewise, the study has a descriptive reach, given that it is focused on showing with accuracy the current state of international scientific research on SFSCs.

For this purpose, the Dimensions database was consulted, which is a Digital Science database, with free access and which contains over 100 million scientific publications, updated until 2022; this tool was selected since it allows accessing international publications from the main scientific databases without charge, as well as downloading and treating information to carry out bibliometric analysis with software such as Vosviewer, which was also used for this study. The database from the *Red de Revistas Científicas de América Latina y el Caribe, España y Portugal* (Redalyc) was examined, which contains 1,443 online journals, with the aim of having a greater reach of publications in Latin America and the Caribbean.

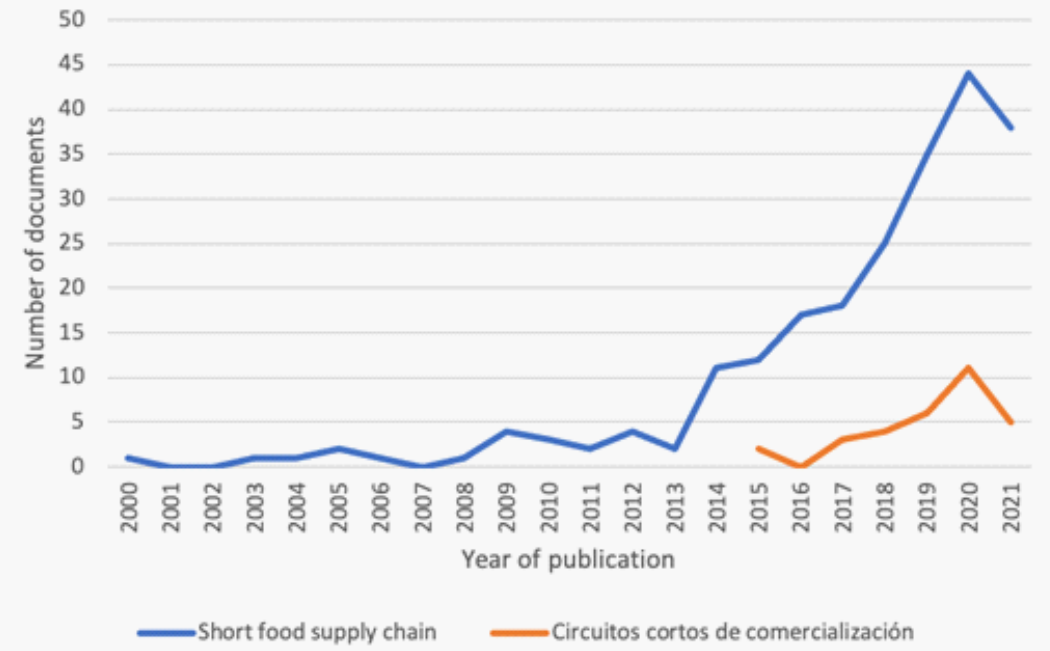
To conduct the search, we used the following terms in English and Spanish: *"Short food supply chains"* and *"Circuitos cortos de comercialización"*. The analysis period was free and it was identified that in the Dimensions database, the year 2000 was the first when there was a record of studies on short food supply chains; however, this does not mean that there are no publications before that year. We recovered 253 documents from the Dimensions and Redalyc databases, of which 221 articles, 25 chapters and 7 reports were identified, and the number and year of articles published in English and Spanish was determined.

Later, the data analysis was carried out in the bibliometric analysis software Vosviewer version 1.6.17, which is based on bibliometrics to identify patterns of co-occurrence of terms, knowledge networks, and links between the components of a network. This allows identifying the most cited documents and countries with the highest productivity, the main areas of knowledge, and the emergent themes. The Excel software was also used to determine comparative graphs of the data gathered.

RESULTS AND DISCUSSION

Production of articles in English and Spanish language

There is a greater production in English, with the term *short food supply chain,* than in Spanish with the term *circuitos cortos de comercialización*, as shown by Figure 1. According to the search performed, we see that there are records of the academic production in English since the year 2000, and studies in Spanish, since 2015. However, it cannot be ruled out that there may be prior publications that are not registered in the databases consulted. The first publications in English address themes related to the role that short food supply chains (SFSCs) play in rural development. In this regard, Marsden *et al.* (2000) mention that they impact positively on adding value to products, although the permanence in time and space of these initiatives is questioned; this will depend on the participation and coordination of the actors involved. Likewise, the authors suggest that the permanence of SFSCs requires uniting four types of evolution to have the potential of affecting rural development, which are: temporal, spatial, of demand, and associative or institutional.



Source: prepared by the authors based on results.
Figure 1. Evolution of publications on short food supply chains in English and Spanish.

In the case of the publications in Spanish, case studies are examined, such as the one by Craviotti and Soleno-Wilches (2015) who characterize two case studies of SFSCs in Argentina, identifying that although they are different in their modalities, internal organization and conformation processes, they coincide in promoting productive practices with lower use of chemical inputs, they favor the development of new abilities for producers and the access to higher profits from their products, and in addition, they allow remaining in their places of origin.

Figure 1 shows that during 2020 the publications both in English and in Spanish increased. In that year the studies were focused on the following themes: case studies, SFSC typologies, social and solidary economy, family agriculture, governance, responsible consumption, sustainable food systems, logistics, urban and peri-urban agriculture, life cycle analysis, consumers' perceptions, and COVID-19.

Most cited documents

Concerning the most cited documents (Table 1), the ones found were those by Renting (2003) and Marsden (2000), which were pioneering and approached exploratory aspects about the development of short food supply chains focused on rural development. The next most cited conducted case studies in countries like United Kingdom and Canada (Ilbery and Maye, 2005; Ilbery *et al.*, 2004; Mundler and Laughrea, 2016). Other more

Table 1. Roster of most cited documents with their author, country of origin and number of citations.

No.	Document Title	Author	Country	Number of citations
1	Understanding Alternative Food Networks: Exploring the Role of Short Food Supply Chains in Rural Development	Renting *et al.* (2003)	United Kingdom	895
2	Food Supply Chain Approaches: Exploring their Role in Rural Development	Marsden *et al.* (2000)	United Kingdom	522
3	Alternative (Shorter) Food Supply Chains and Specialist Livestock Products in the Scottish–English Borders	Ilbery y Maye (2005)	United Kingdom	175
4	Agroecological Research: Conforming—or Transforming the Dominant Agro-Food Regime?	Levidow *et al.* (2014)	United Kingdom	117
5	The contributions of short food supply chains to territorial development: A study of three Quebec territories	Mundler y Laughrea (2016)	Canada	79
6	Forecasting food supply chain developments in lagging rural regions: evidence from the UK	Ilbery *et al.* (2004)	United Kingdom	76
7	Is the Short Food Supply Chain an Efficient Solution for Sustainability in Food Market?	Canfora (2016)	Italy	67
8	A Theory of Planned behaviour perspective for investigating the role of trust in consumer purchasing decision related to short food supply chains	Giampietri *et al.* (2018)	Italy	65
9	Will the COVID-19 pandemic make us reconsider the relevance of short food supply chains and local productions?	Cappelli y Cini (2020)	Italy	65
10	Measuring the Economic, Environmental, and Social Sustainability of Short Food Supply Chains	Malak-rawlikowska *et al.* (2019)	Poland	60
11	Circuitos cortos de comercialización agroalimentaria: un acercamiento desde la agricultura familiar diversificada en Argentina	Craviotti y Soleno (2015)	Argentina	58
12	Food First: COVID-19 Outbreak and Cities Lockdown a Booster for a Wider Vision on Urban Agriculture	Pulighe y Lupia (2020)	Italy	51
13	Sustainability and local food procurement: a case study of Finnish public catering	Lehtinen (2012)	Finland	50
14	Critical success factors in Short Food Supply Chains: Case studies with milk and dairy producers from Italy and Brazil	Sellitto *et al.* (2018)	Brazil	48
15	From Short Food Supply Chains to Sustainable Agriculture in Urban Food Systems: Food Democracy as a Vector of Transition	Yuna *et al.* (2016)	France	47

Source: prepared by the authors based on results from Vosviewer.

recent studies are focused on the evaluation of SFSCs as an alternative for sustainability in food markets (Canfora, 2016); their relationship with the three pillars of sustainability (Malak-Rawlikowska *et al.*, 2019); the behavior of consumers in their purchasing decisions (Giampietri *et al.*, 2018); and the most recent ones are related with local consumption and the COVID-19 pandemic (Butu *et al.*, 2020; Cappelli and Cini, 2020).

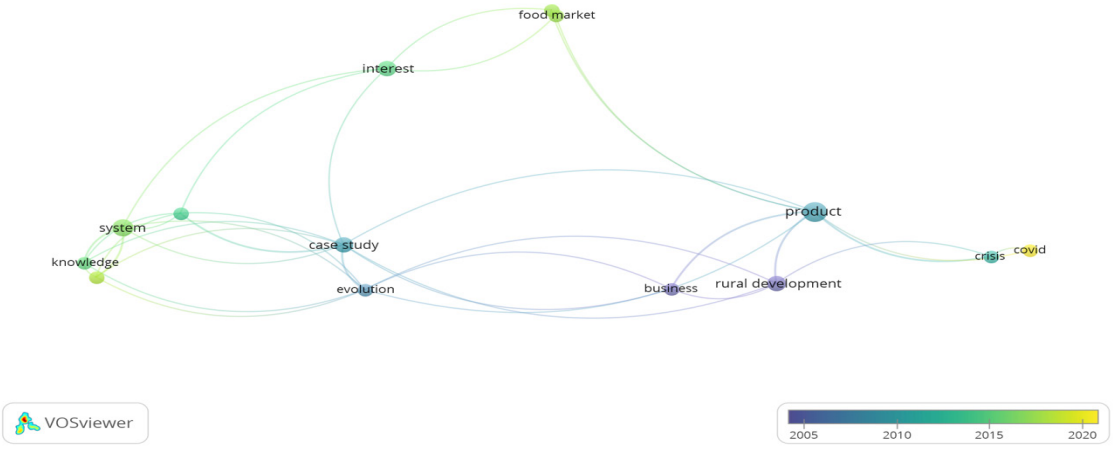
These studies agree on the influence of SFSCs for the development of more sustainable food systems, which generate economic and social services that contribute to improving the quality of life of the population (Food and Agriculture Organization of the United Nations, 2017), in addition to responding to the growing demand of consumers who are interested in obtaining foods from local, artisanal and seasonal production (Reyes-González and Boucher, 2013). It is also important to emphasize that the SFSCs can contribute

to the defense of territories, local products, and traditional agroecological systems, as long as they do not become a new modality of inequality in the differentiated access to food (Torres-Salcido *et al.*, 2020). For this purpose, the authors propose increasing the actions of public administration through public purchases, educational campaigns, and regulations that prevent such inequality in the population.

Figure 2 shows the evolution of the most mentioned terms in the most cited articles. Since the year 2005, business and rural development were the most mentioned terms, and these studies were focused on the study of the business models, primarily of farms and ventures in Europe, as well as their strategies for logistics distribution directed at short supply chains; this was also related to the contribution that these business models had regarding rural development (Ilbery and Maye, 2005; Marsden *et al.*, 2000; Renting *et al.*, 2003).

By 2010, the most mentioned terms were evolution, case study, and crisis. This last concept is related to the food crisis that took place in 2008, derived from factors such as the price increase of basic foods because of the rise in prices of petroleum, transport and the demand of foods per capita; other preponderant factors were the hyper-inflation and the financial instability that was happening in the United States (Steinberg, 2009); therefore, some case studies identified the SFSCs as alternative means for the exchange of local foods and the creation of job opportunities in economies affected by the crisis, as well as implementing agroecology as a transforming factor of the dominant food system (Falguieres *et al.*, 2015; Levidow *et al.*, 2014).

Since 2015 and onwards, the terms with highest representation were focused on the knowledge exchange between the actors involved, where it was discussed that the transference of knowledge should be based on feedback and co-creation between producers and scientists, and some studies also identified that the conditions through which SFSCs operate can change the practices and the knowledge of the actors involved, in addition



Source: Vosviewer results.
Figure 2. Time line of co-occurrence of terms in the most cited documents in the publications.

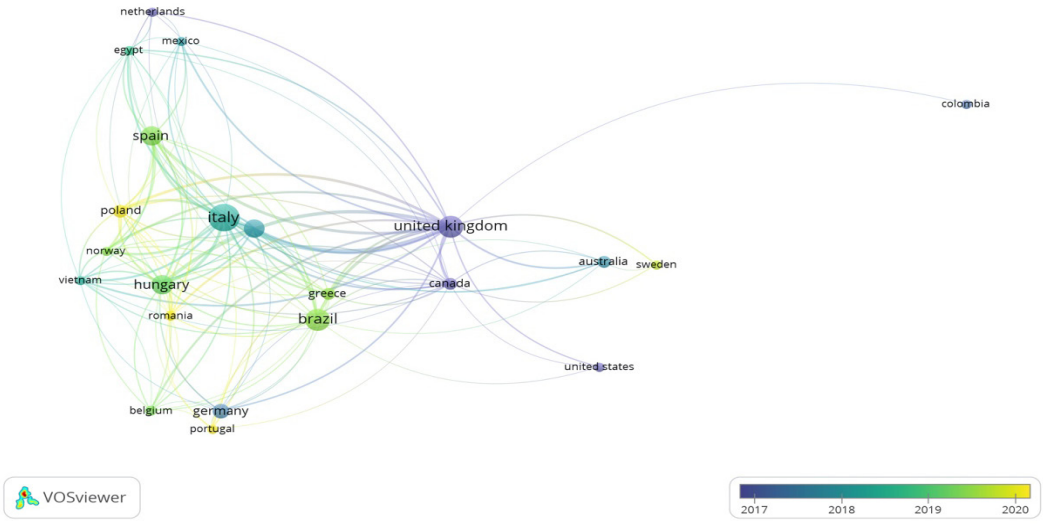
to decreasing the asymmetrical information that can be exchanged between them (Contò *et al.*, 2017; Levidow *et al.*, 2014; Yuna *et al.*, 2016). The term of system is linked to the construction of alternative food systems or markets through short food supply chains that contribute products of high quality and traceability (Sellitto *et al.*, 2018). Finally, COVID was one of the most mentioned terms in 2020, given the relevance of the pandemic, and studies were conducted focused on the importance of the supply from local production, the trading strategies used by producers who offered their products in local markets, the impact of the pandemic in the behavior of consumption, as well as the impact and food security (Butu *et al.*, 2020; Cappelli and Cini, 2020; Nchanji and Lutomia, 2021).

Most cited countries

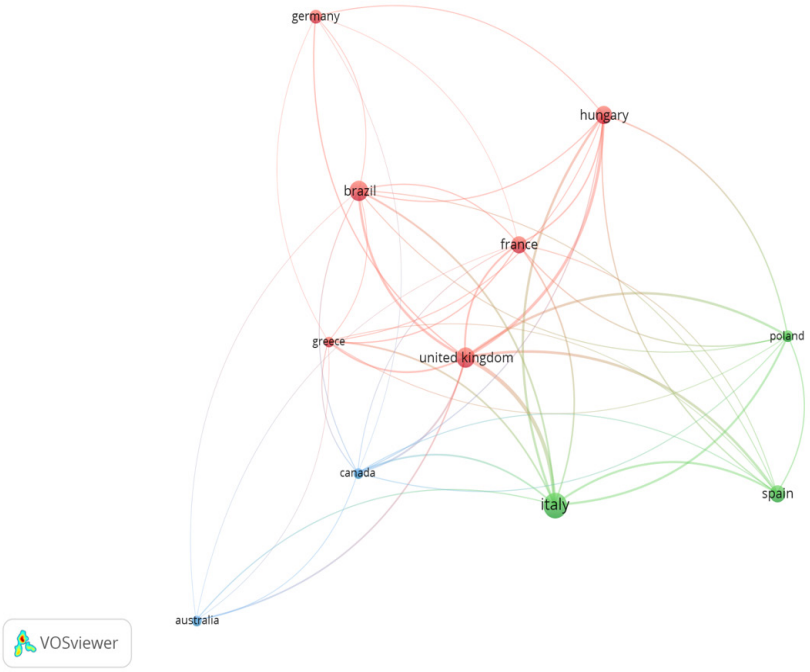
Regarding the countries with most cited publications, Figure 3 shows that the United Kingdom (1833)[3], Italy (513), France (141), Hungary (125), and Canada (122) are the ones that stand out. Most of the countries belong to the European continent, so it can be inferred that it is where there is a greater number of scientific studies cited about the theme. However, countries from North America also stand out, such as Canada (122) and the United States with lower citation (3). With Latin America, the most cited countries are Brazil (17), Colombia (3) and Mexico (3).

Most productive countries

The countries that have the highest productivity of scientific articles are Italy (28)[4], Brazil (17), United Kingdom (17), Hungary (14), Spain (13), France (12), Germany (8), Poland (6), Canada (5) and Greece (5), as shown in Figure 4. Of the scientific production about



Source: Vosviewer results.
Figure 3. Countries with most cited publications about short food supply chains.



Source: Vosviewer results.
Figure 4. Countries with highest productivity of scientific articles about short food supply chains.

SFSCs, 67% was concentrated in countries of the European continent, until 2021. In turn, the countries of North America and Latin America represent approximately 25% of the current scientific production. Other countries that also do, to a lesser extent, are Australia, Vietnam, Egypt, Kenya, China, India, Japan and Nepal.

Areas of knowledge

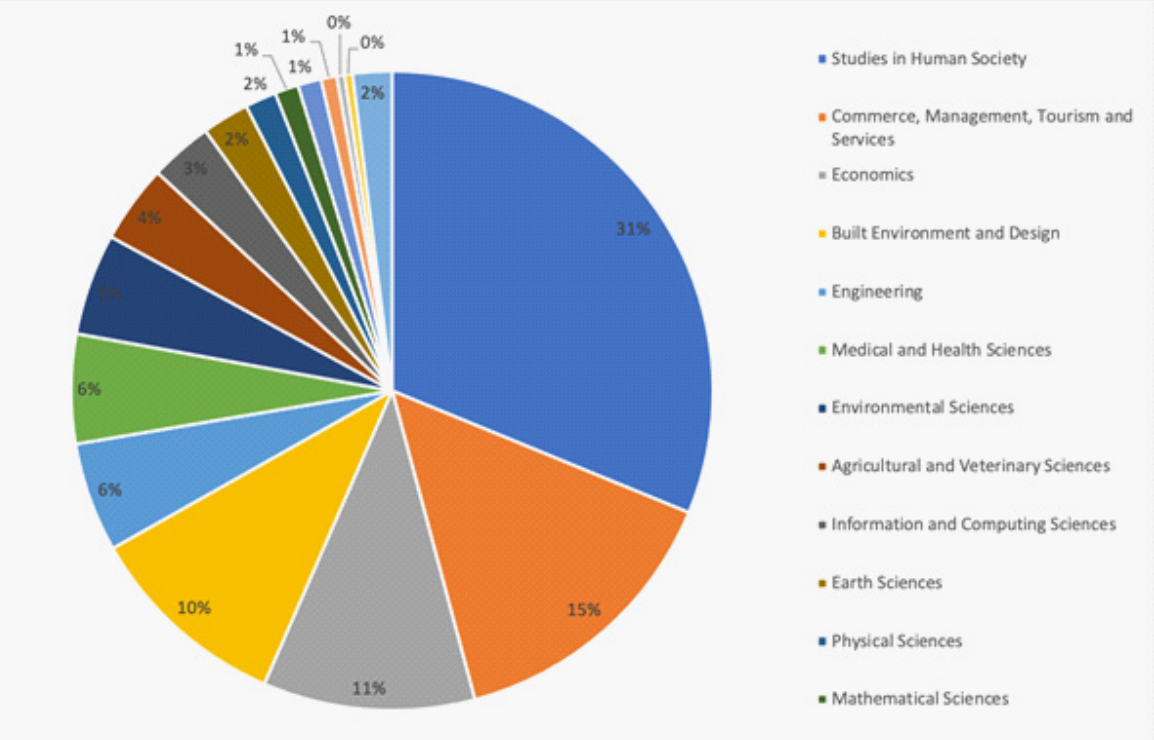
The areas of knowledge that stand out are social studies, which include sociology, anthropology, human geography, politics, and administration, as well as social work. The following studies bear these areas: those related to the impact of COVID-19 on production and on the purchasing behaviors of consumers, as well as on the strategies of producers to place their products (Benedek *et al.*, 2021; Butu *et al.*, 2020; Nchanji and Lutomia, 2021); social innovation and sustainability in the short food supply chains (Corvo *et al.*, 2021); the development of new economic and social models around SFSCs (Chiffoleau *et al.*, 2019; De Souza *et al.*, 2021); public policies directed at rural development, urban agriculture and the promotion of SFSCs (Atkociunienè *et al.*, 2015; Floriš and Schwarcz, 2018; Pettenati, 2019; Walthall, 2016).

The second area of knowledge that stands out is commerce, administration, tourism and services. It is closely linked to social studies, but with an expression directed at economic-

entrepreneurial aspects, given that the they address concepts such as fair trade, disloyal commercial practices in supply chains, sustainability of value chains, role of women in management of farms and SFSCs (Zirham and Palomba, 2016), as well as the role of stakeholders or actors interested in the SFSCs (Wubben *et al.*, 2013). Other areas where there is scientific production are economy, design and creation of surroundings, engineering, medical and health sciences, as well as environmental sciences (Figure 5). Among the themes that have been dealt with in the areas of knowledge mentioned before, there is health related to the SFSCs (De Bresser, 2021), analysis of the life cycle of the product (Loiseau *et al.*, 2020; Majewski *et al.*, 2020), technologies applied in the various activities of the SFSCs (Elghannam *et al.*, 2019; Raffo *et al.*, 2018; Romero-López and Manzo-Ramos, 2017), and logistics (Janjevic *et al.*, 2018). These are areas of opportunity for research, since they have been scarcely explored.

Text mining: co-occurrence of words in the title and the abstract of publications

For text mining, an analysis of the most relevant terms was carried out, which were extracted from the title and the abstract. According to the analysis, there were 6,368 terms, of which it was determined that their co-occurrence should be at least 10 times;

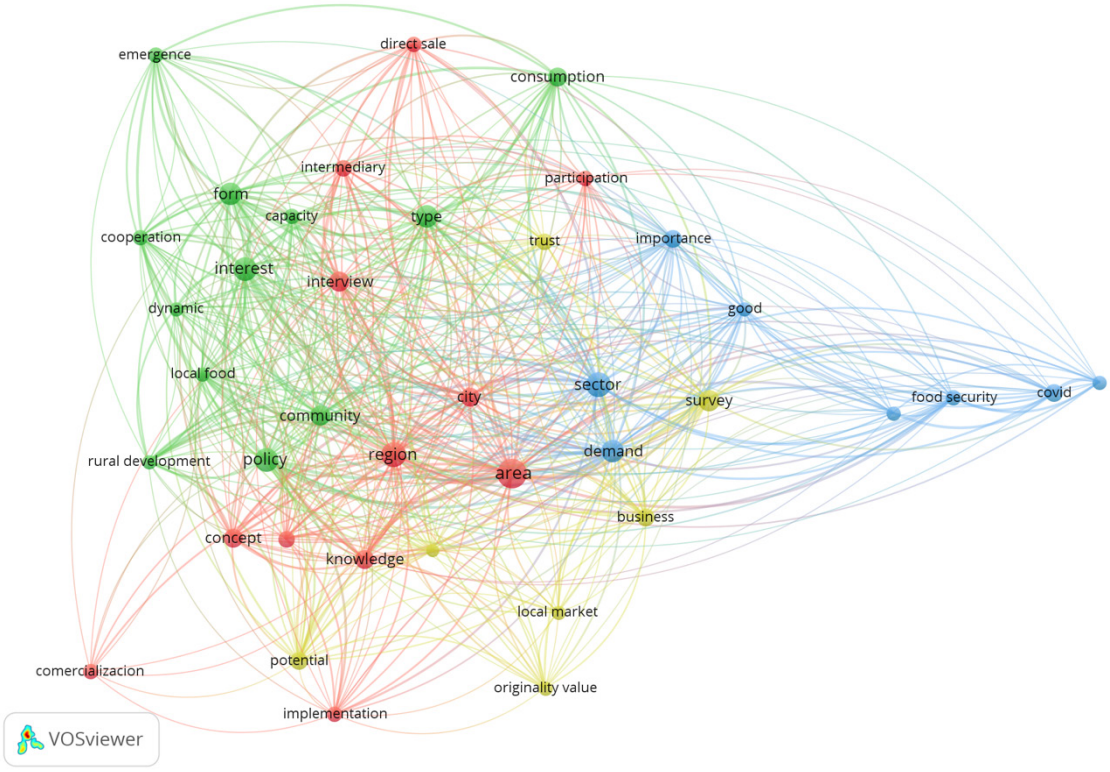


Source: prepared by the authors based on results.
Figure 5. Areas of knowledge around the short food supply chains.

from these, the software resulted in 98, of which the 60% most relevant were 39 terms that are shown in Figure 6.

In this sense, the terms with highest occurrence are those that are shown with larger size, which are: region, demand, community and policies. These words confirm the interest in studying SFSCs from regional perspectives, focused on specific areas that involve the participation of different actors, and therefore, the promotion of territorial-local goods and products takes on importance (Riveros and Boucher, 2019). On the other hand, tools that are used repeatedly in the study of SFSCs are identified, such as interviews, surveys and questionnaires.

Another relevant aspect is the one related to public policies, from which the role played by the State or government sector has been identified, to serve as intermediary and promoter in the development of SFSCs inside the territories (Floriš and Schwarcz, 2018). Presently, there are instruments such as the Milan Pact on Urban Food Policies, created in 2015, which serves as a framework for monitoring the actions and positive or negative impacts generated by food policies, as well as projects and investments applied in the cities. This has the public target of municipal governments and professionals who work in projects related to food in urban areas (Food and Agriculture Organization of the United Nations, 2015).



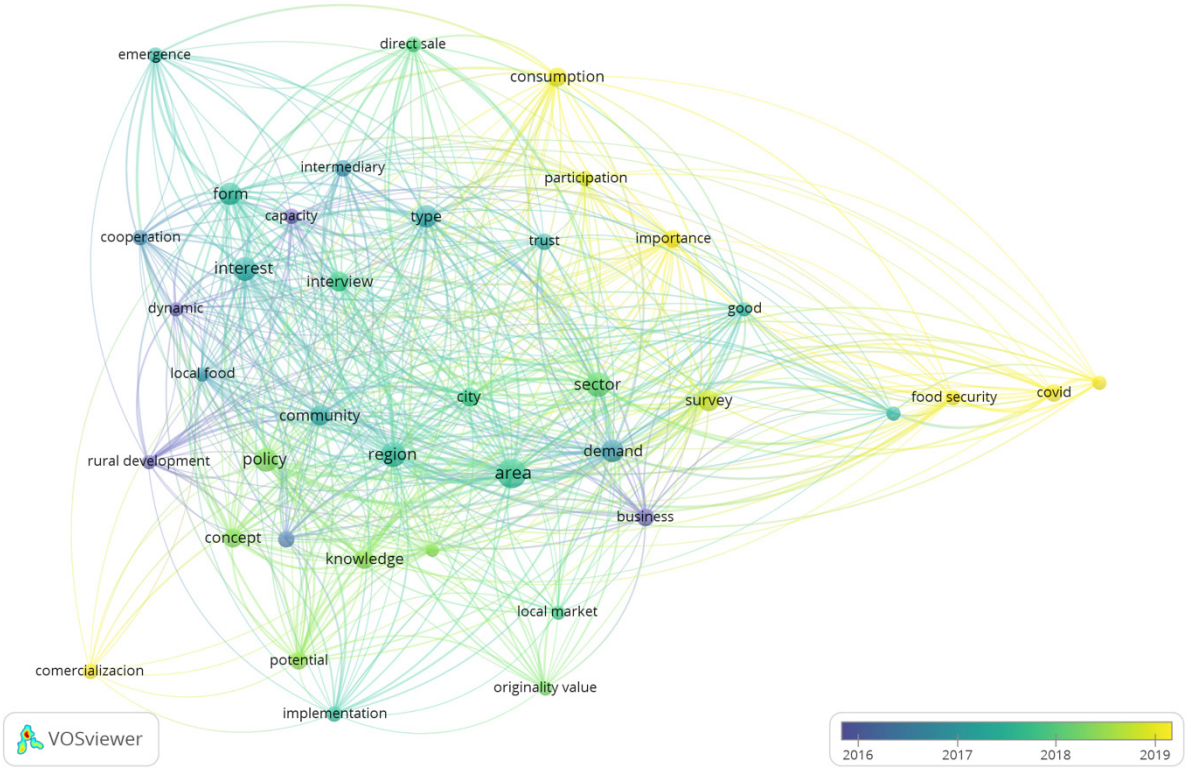
Source: Vosviewer results.

Figure 6. Co-occurrence of words in the title and the abstract of publications on short food supply chains.

In this regard, López *et al.* (2018) mention that in the cities the focus has been placed on the development of key policies for urban sustainability that consider the countryside-city relationship, the strengthening of the social fabric, community health, governance, network work, job creation, and the fight against climate change. Therefore, the food public policies focused on the territories are an interesting research field to take into account for future studies.

Trending themes

Concerning the trending terms, Figure 7 shows the temporary nature of the terms, which are related to the year of publication of the articles. Those with purple and dark blue color are the oldest ones, which range from the year 2016 to 2017, and then those that are found in blue and green appeared from 2017 to 2018, and those that are in green and yellow are the most recent, from 2018 to 2019. Thus, it can be seen that rural development, business, dynamics and capacity are the oldest terms: then, aspects such as territorial approach, public policies, cooperation, local markets, trust and demand for local foods were involved. For their part, the most current themes are focused on participation, consumption, food security, trade and COVID-19.



Source: Vosviewer results.
Figure 7. Co-occurrence and temporary nature of words in publications about short food supply chains.

It should be mentioned that although "rural development" is a term that appears since several years ago, it is still valid within the studies. For example, Kiss *et al.* (2020) identified that even when the contribution of SFSCs to rural development cannot be accurately confirmed, the consumers' interest for local, organic products does stand out, as well as in giving importance to traditional products and obtaining information directly from the producer, which will bring with it a greater demand of such products, a fact that represents an opportunity for small-scale producers. On the other hand, a greater interest was seen from residents of rural areas than those from those in urban areas, which shows a need to promote local consumption in the cities, which represent a greater focus of demand since if consumers consider that local products have quality and are unique, their willingness to pay for them increases.

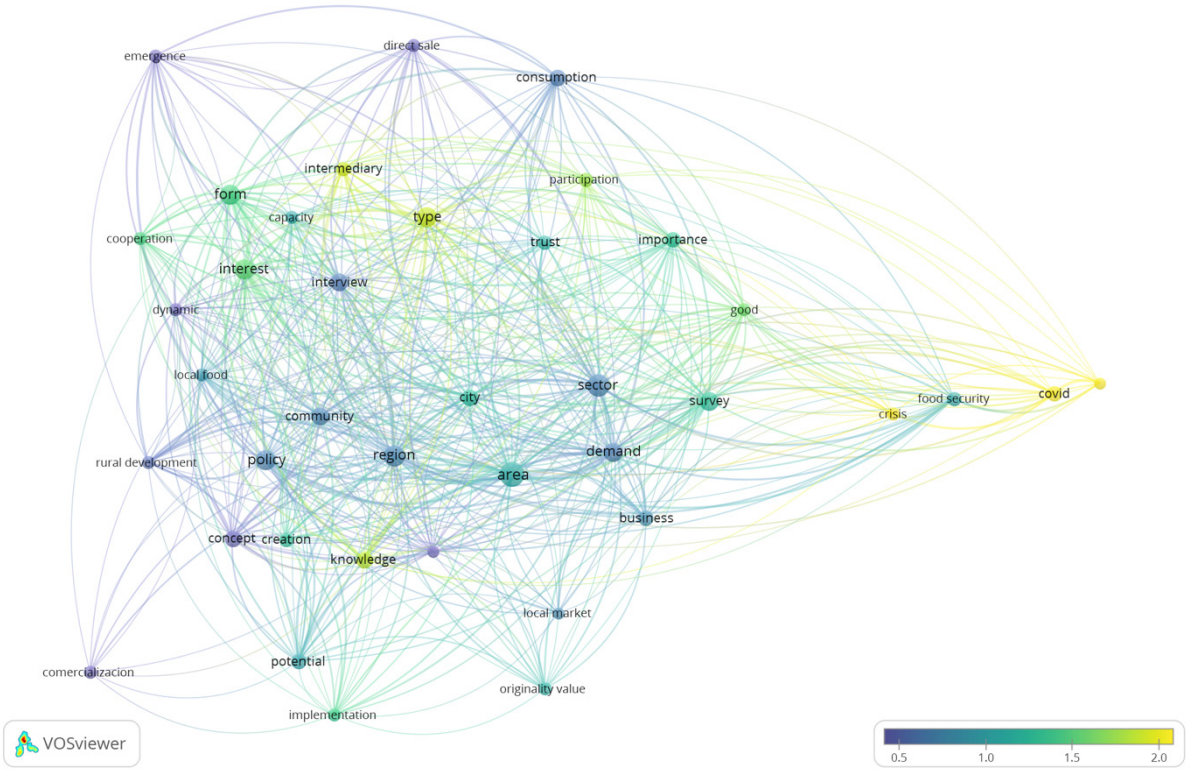
For their part, Clark *et al.* (2021) describe added-value agriculture as a mechanism for rural development that creates new markets and strategic links with processors, distributors and retailers. The authors propose three key characteristics for added-value agriculture: consumers pay a fair price for the products; the profits along the supply chain are ruled by principles and values shared between those involved, thus being an equitable distribution; and all the actors in the supply chain are committed with the community. Therefore, participation, consumption, commitment are recurrent terms in the impact's analysis of SFSCs to achieve rural development.

Regarding food security, it has taken on greater relevance as a result of environmental problems such as climate change and also because of the COVID-19 pandemic, which is why it is a term that has been recently discussed in studies (MacMahon *et al.*, 2015; Nchanji and Lutomia, 2021).

Besides, Figure 8 shows the terms that appear most in the most cited studies, so they are the most outstanding themes internationally at present; the most recent and most cited are COVID-19, food security, crisis and pandemic. Therefore, they are confirmed as opportunity themes for future research.

It is important to broaden the discussion regarding the theme of COVID-19 since it is a fact that the pandemic reflected the vulnerability of supply chains at the international level, and the need to diversify and strengthen local value chains, increase their connectivity and the capacities of resilience of vulnerable households (Food and Agriculture Organization of the United Nations, 2021b). Thus, the pertinence of SFSCs emerges in the discussion as an alternative for local production and consumption, independence from large transnational chains, and alternative monetary income for producers, in the presence of the economic crisis caused by the pandemic (Cappelli and Cini, 2020). Regarding this, the studies about this theme have been conducted since 2020.

In countries of the global North, such as Italy, United Kingdom and Canada, there is discussion of reconsidering the SFSCs as an alternative in face of the COVID-19 crisis and of generating a balance between industrial production and SFSCs, to ensure food access when events such as the pandemic take place. Case studies in Eastern Europe, such as Hungary and Romania, analyzed the changes in purchasing habits of consumers of



Source: prepared by the authors based on Vosviewer results.
Figure 8. Co-occurrence of words in the most cited publications about short food supply chains.

fresh vegetables and dairy, where the results show an increase in the purchase of products through SFSCs during the pandemic; however, the increase was not linear and decreased as soon as the health measures were more flexible. In fact, an opportunity area in research on SFSCs would be to identify how the SFSCs acted after the pandemic; other important themes that were identified to be developed are innovation in the distribution and the use of technological tools in these trade programs (Benedek *et al.*, 2021; Brumă *et al.*, 2021; Butu *et al.*, 2020).

Studies from the global South such as Sub-Saharan Africa reveal that COVID-19 affected bean production, because of the low access to seeds and agricultural inputs, resulting in the temporary scarcity of foods; for this purpose, the authors suggest governments invest in supply systems of inputs and SFSCs, supported by the use of technology (Nchanji and Lutomia, 2021). In Latin America, the study by Gutiérrez *et al.* (2021) stands out, where emerging strategies from farmers were identified; it was found that producers used information technologies such as WhatsApp and Facebook to trade their products, and in addition they innovated in the transformation of fresh products into ready-made foods. One weakness recognized was communication and connectivity, since most of the producers live in zones far from urban centers. In this sense, the authors

mention that the institutional-governmental role consists in ensuring rural, peri-urban and urban connectivity, with the goal of products reaching their destination, in addition to establishing links with producers to face the pandemic and the post-pandemic.

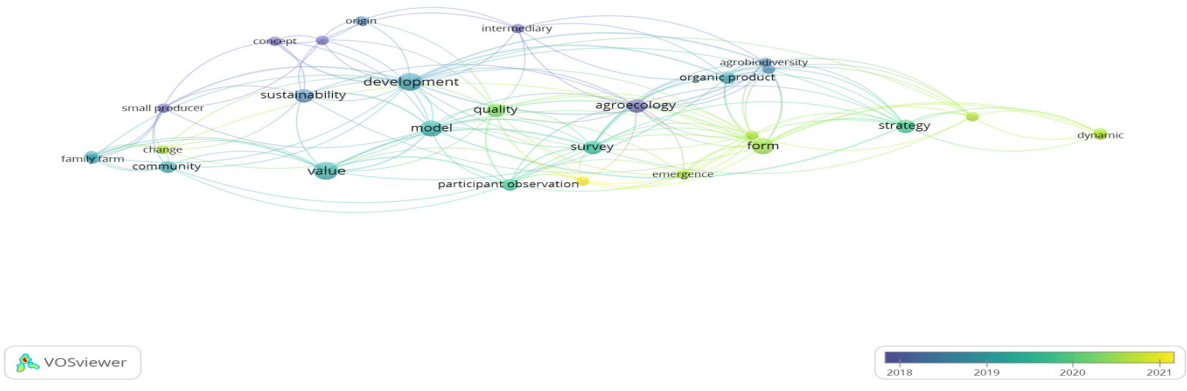
Thus, once again, the need to move towards models of production and consumption that facilitate the exchange of foods in short distances is emphasized, a fact that would decrease the dependency on long international food supply chains in the presence of emergency events such as the COVID-19 pandemic.

Short food supply chains in Latin America

Regarding Latin America, word mining was done in articles belonging to the countries identified: Mexico, Argentina, Chile, Brazil, Ecuador, Colombia, and Costa Rica. The number of terms identified was 28, of which the following stand out for their co-occurrence: development, sustainability, agroecology and quality. It is also seen that the technique of participant observation is used recurrently, as shown in Figure 9.

The study cases from Latin America agree with those at their international level, regarding the possibility that SFSCs have to contribute to the efforts related to rural development and sustainability, and some studies analyze the contribution of these circuits to such an achievement (De Souza-Amaral *et al.*, 2020).

Another fundamental point covered in Latin America is the approach towards agroecology; study cases such as the one by Craviotti and Soleno (2015) show that the development of SFSCs promotes practices that minimize the use of agrichemicals, such as agroecological production, while other authors identify that the organization of producers in short food supply chains can contribute to sustaining agroecological principles, in contrast with the conventionalization of organic agriculture (Viegas, Rover, and Medeiros, 2017). The challenges that family farmers on the path to agroecological transition face are also analyzed, which are related to the change in processes, organization, and working conditions to move towards agroecological models (Parodi, 2018).



Source: Vosviewer results.

Figure 9. Co-occurrence and temporary nature of words in the publications of short food supply chains in Latin America.

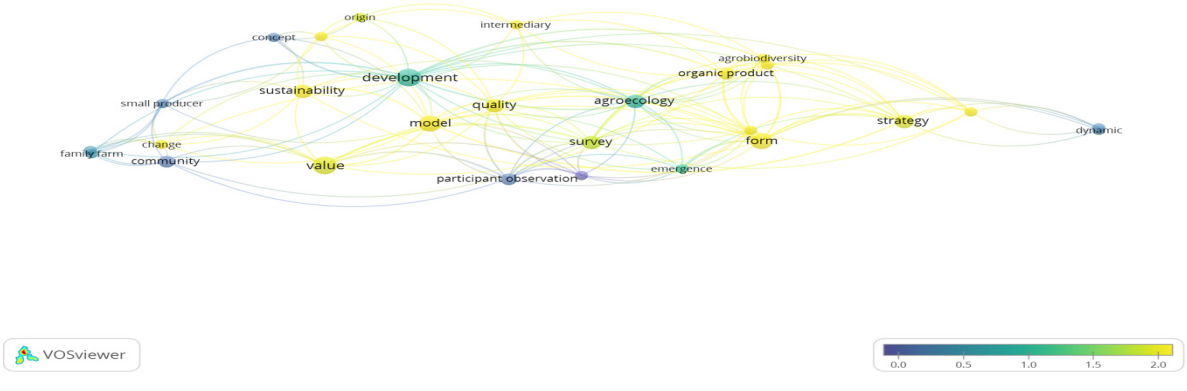
The theme of quality is addressed, and in this sense, alternative mechanisms for quality certification come into play, such as Participative Guarantee Systems (PGS) where both the producers and the consumers are involved. The PGS are based on a series of norms and procedures established by the actors involved, which are ruled by trust, transparency, participation, horizontality, and learning (Boza-Martínez, 2013). We should point out that these systems ease the appropriation of the value of products and the savings in the expenses of higher-cost certifications.

Figure 10 shows that the terms that stand out in the most cited articles agree with those mentioned before: sustainability, value, quality, agrobiodiversity, organic products, models and strategies. Therefore, they are themes with research potential in Latin America. Among the themes where the possibility of studying in more detail is identified, there is an analysis of the factors of decrease or increase in the consumption from SFSCs post-COVID-19.

CONCLUSIONS AND RECOMMENDATIONS

The short food supply chains (SFSCs) are forms of exchange of food products that promote geographic proximity, the decrease of intermediaries, the link between producers and consumers, as well as the territorial valuation of food products. These present various typologies and have characteristics of their own according to their context. The emergence of these plans happens from movements that place the focus of attention on the problems in food systems, which is the reason for the emphasis that has been recently given to their study.

Derived from the bibliometric analysis carried out in this study, it was identified that most of the research about short food supply chains is concentrated in Europe, and the European countries that stand out are the United Kingdom, Italy, Hungary, France and Spain. However, in North America and Latin America, there is also a growing production of studies. In this region, the countries that stand out are Canada, United States, Mexico, Argentina, Chile, Brazil, Ecuador, Colombia and Costa Rica. Other



Source: Vosviewer results.

Figure 10. Co-occurrence of words in the most cited publications on short food supply chains in Latin America.

countries that are part of the production to a lesser extent are Australia, Vietnam, Egypt, Kenya, China, India, Japan and Nepal. A good part of the studies are focused on the case studies of SFSCs, which respond to very specific contextual characteristics, although it is seen that the studies address themes around rural development, sustainability, logistics, agroecological production, local products, businesses, food security, policies, administration, urban and peri-urban agriculture, and COVID-19.

The main fields of knowledge in which studies take place are the social sciences and the economic-administrative sciences, because, the short food supply chains make up one of the last links in the food chains, with trade being the step that precedes the final consumption of the product.

With Latin America, Brazil, Argentina, Chile, Mexico and Colombia are the major countries where studies on SFSCs are carried out. Case studies predominate, primarily in local markets, also called fairs, bio-fairs, *tianguis*, or organic markets. The studies in this region are focused on the contribution of the SFSCs to sustainable development, the strategies of producers in their transition towards agroecology, and how the SFSCs are spaces for transmission of knowledge of such mechanisms of production. The participative certifications of food quality are addressed as an alternative to the hegemonic certifications that small-scale producers cannot gain access to.

Finally, it is seen that the study trends are directed towards governance, the impact in food public policies, the strengthening of education towards responsible consumption, food security, social and technological innovation, the strengthening of countryside-city relationships, as well as mechanisms that allow permanence, continuity and growth of SFSCs in the territories. Especially in Latin America, where the cases of SFSCs are diverse and there is an opportunity area to analyze and to strengthen them, given the needs to contribute to the sustainability of food systems in the region. Therefore, it is recommended that future studies should focus on such themes.

It should be mentioned that the limitations of this study are related to the temporary nature of publications, since new studies are constantly conducted in the area, which is why this analysis covers a specific period in time that was from the year 2000 to the end of 2021.

NOTES

[3]Number of citations per country.

[4]Number of articles per country.

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