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REGET/UFSM
Revista Eletrônica em Gestão, Educação e Tecnologia Ambiental

V. 30 2026

ISSN 2236-1170

OPEN ACCESS

Reget, Santa Maria, e86487, v. 30, 2026 • https://doi.org/10.5902/2236117086487
Submitted: 25/01/2024 • Approved: 09/05/2025 • Published: 11/12/2026

Environmental Management

Advantages and challenges of Short Food Supply Chains (SFSC) for sustainability

Vantagens e desafios das Cadeias Curtas de Abastecimento Alimentar (CCAA) para a sustentabilidade

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ABSTRACT

Consumer habits regarding food purchases have been changing due to the desire for healthy eating and sustainable consumption. Consumers are looking for quality food products of known origin, increasingly resorting to more direct and transparent supply chains. With this, there is a (re)valuation of local agriculture, due to scientific evidence that the Short Food Supply Chains (CCAA) are more sustainable than the long ones. To investigate this question, the objective of this research was to analyze the publications of the last 7 years on topics related to short chains and sustainability to identify if and in what way CCAA contributes to sustainability. Bibliometric research was carried out considering the Scopus and Web of Science databases, using the Bibliometrix@ program for data analysis. The period of analysis was from 2016 to April 2022 to highlight the state of the art of the subject and from 2021 to 2022 for reading articles and discussions on the subject. The CCAA contributes to sustainability by supporting food and economic security, and socio-environmental development, mainly through the reconnection between producer and consumer, preservation of natural resources, and improvement of producer income. In addition, they allow consumers to purchase higher quality, healthier, and seasonal products, promoting the territory where they operate. It is concluded that building direct relationships between farmers and food consumers makes it possible to create different distribution and food production scenarios that lead to greater sustainability.

Keywords: Consumption; Development; Family farming; Networks

RESUMO

Os hábitos de consumo em relação à compra de alimentos vêm mudando devido ao desejo por uma alimentação saudável e consumo sustentável. Os consumidores procuram produtos alimentares de qualidade e de origem conhecida, recorrendo cada vez mais a cadeias de abastecimento mais diretas

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e transparentes. Com isso, há uma (re)valorização da agricultura local, devido às evidências científicas de que as Cadeias Curtas de Suprimento de Alimentos (CCAA) são mais sustentáveis que as longas. Para investigar esta questão, o objetivo desta pesquisa foi analisar as publicações dos últimos 7 anos sobre temas relacionados a cadeias curtas e sustentabilidade para identificar se e de que forma CCAA contribui para a sustentabilidade. Foi realizada pesquisa bibliométrica nas bases de dados Scopus e Web of Science, utilizando-se o programa Bibliometrix@ para análise dos dados. O período de análise foi de 2016 a abril de 2022 para evidenciar o estado da arte do assunto, e de 2021 a 2022 para leitura de artigos e discussões. As CCAAs contribuem para a sustentabilidade ao apoiar a segurança alimentar e econômica e o desenvolvimento socioambiental, por meio da reconexão entre produtor e consumidor, preservação dos recursos naturais e melhoria da renda do produtor. Estas permitem aos consumidores adquirir produtos de maior qualidade, saudáveis e sazonais, promovendo o território onde atuam. Conclui-se que a construção de relações diretas entre agricultores e consumidores de alimentos permite criar diferentes cenários de distribuição e produção de alimentos que levam a uma maior sustentabilidade.

Palavras-chave: Consumo; Desenvolvimento; Agricultura familiar; Redes

1 INTRODUCTION

The process of changing from an industrial economic system to a post-industrial one began to stimulate alternatives to globalized food chains, such as the Short Food Supply Chains (CCAA). The concept of CCAA is related to the concept of servitization Vandermerwe; Rada (1988) and has been addressed in different contexts of sustainability (social, economic, and environmental) Lankauskiene et al. (2022).

From a conceptual point of view, academia and professionals have not adopted a common definition of CCAA. However, the "locality" factor of food is a central feature, but CCAA can also be "spatially extended" Marsden et al. (2000). Therefore, a more comprehensive definition of CCAA is accepted, as networks of connected and interdependent actors that work together and cooperatively to control, manage and improve the flow of products, and services, from production to consumption, aiming at reducing intermediaries and physical distance. between producers and consumers Michel Villarreal et al. (2021).

Concerning sustainability Sachs (2002) sustainable development takes into account the need to improve society's quality of life, considering present and future generations, and the preservation of the environment. Therefore, it is characterized by being solid, economically viable, ecologically correct, socially fair, and culturally accepted Sachs (2002); Feil; Schreiber (2017).

It is argued that the discussion of the sustainability of food systems is especially driven by two aspects, namely: 1) negative externalities caused by the traditional industrial food system Hendrickson and Heffernan (2002); Jaffe and Gertler (2006); 2) change in the demand profile from consumers Bayir et al. (2022).

In this context, CCAA emerged as "places of resistance" to the traditional system and present themselves to consumers as different and better Campbell (2009). Although perceived as driving forces toward a more sustainable food system Beus; Dunlap (1990); Kloppenburg et al. (2000); Constance et al. (2014); Le Velly, (2019); Evola et al. (2022), they remain marginal in importance within more broad agro-food systems Kovács et al. (2022).

Concerning demand, it is important to assess what the demand trend is for food consumers. Bayir et al. (2022) and Carmona; Griffith; Aguirre (2021) highlight that consumer habits regarding food purchases have been changing in recent years, being increasingly oriented towards the desire for healthy food, sustainable consumption, high quality, and known origins. This makes them increasingly appeal to more direct and transparent supply chains such as the CCAA, which respond to consumer demand for greater proximity and quality while providing small producers with opportunities for autonomy and increased income Bayir et al. (2022).

Despite being presented as alternatives and more sustainable, Bayir et al. (2022) point out that CCAA faces a variety of challenges in its creation and operation, resulting in limited sustainability. However, the authors did not explain what these challenges are. Chiffoleau and Dourian (2020) and Kiss et al. (2019) also evaluated the issue of sustainability, considering the impacts of CCAA on the environmental, economic and social dimensions. In both surveys, the authors address that the sustainability of this food supply model is not incontestable and depends on each case analyzed and its territorial context. Also, Evola et al. (2022) state that the positive perception of the sustainability of CCAA is not based on scientific evidence, and Azima; Mundler (2022) recommend that the social, environmental, and economic benefits associated with CCAA, although real, should be interpreted with caution, as they are not supported by large-scale empirical evidence.

Added to this, Elghannam et al. (2020) warn that the sustainability of CCAA lacks scientific considerations and that empirical evidence of their positive impact is limited. Lankauskiene; Vidickiené; Gedminaité-Raudoné (2022) also draw attention to the limitations of studies already carried out on CCAA, as well as the focus of these studies, which is too much on typical aspects of the industrial economic system and neglects other fields of study.

Based on these disputes and gaps in the scientific field and the questions arising from them, the present research was proposed. The objective was to identify how the scientific production that relates to the CCAA about sustainability has evolved, as well as to list the advantages, disadvantages, and challenges. Specifically, we sought to analyze these aspects, with family farming Schneider (2006) as central to the production and supply of food to the CCAA.

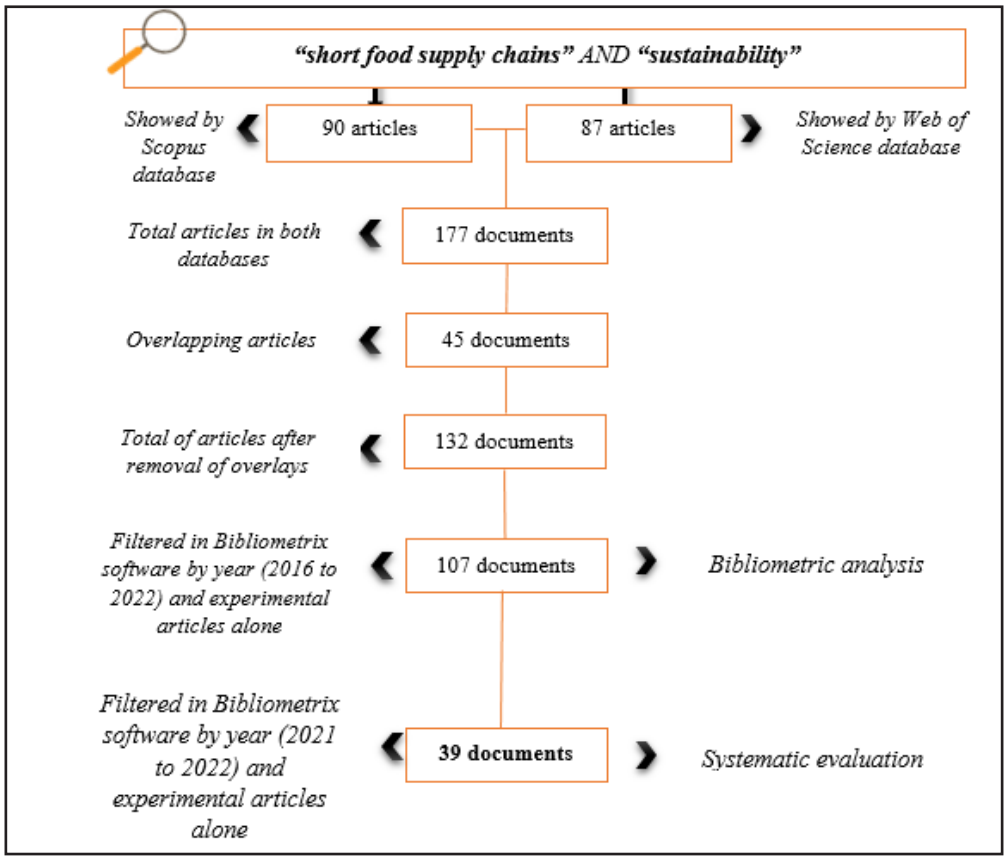
2 MATERIALS AND METHODS

The present research used bibliometric analysis and bibliographical research as a method. This type of research is used to analyze the state of the art of a topic and involves the phases of data collection, data analysis, and data visualization and reports Bawach et al. (2022).

The research data collection involved the selection of scientific articles carried out by searching for specific terms in the Scopus and Web of Science databases. The terms (“short food supply chains” and “sustainability”) were inserted, which were present in the titles, abstracts, and/or keywords of the works, totaling 177 articles.

The results obtained in the preliminary search in the two databases in the period between 2016 and 2022 were explored using the “Bibliometrix” tool (RStudio® software, version 1.4.1106), using only peer-reviewed articles (reviews, conference papers, books, and chapters were excluded from the analysis), totaling 107 articles. The methodology of this work is summarized in Figure 1.

Figure 1 – Lists of articles used for bibliometric analysis



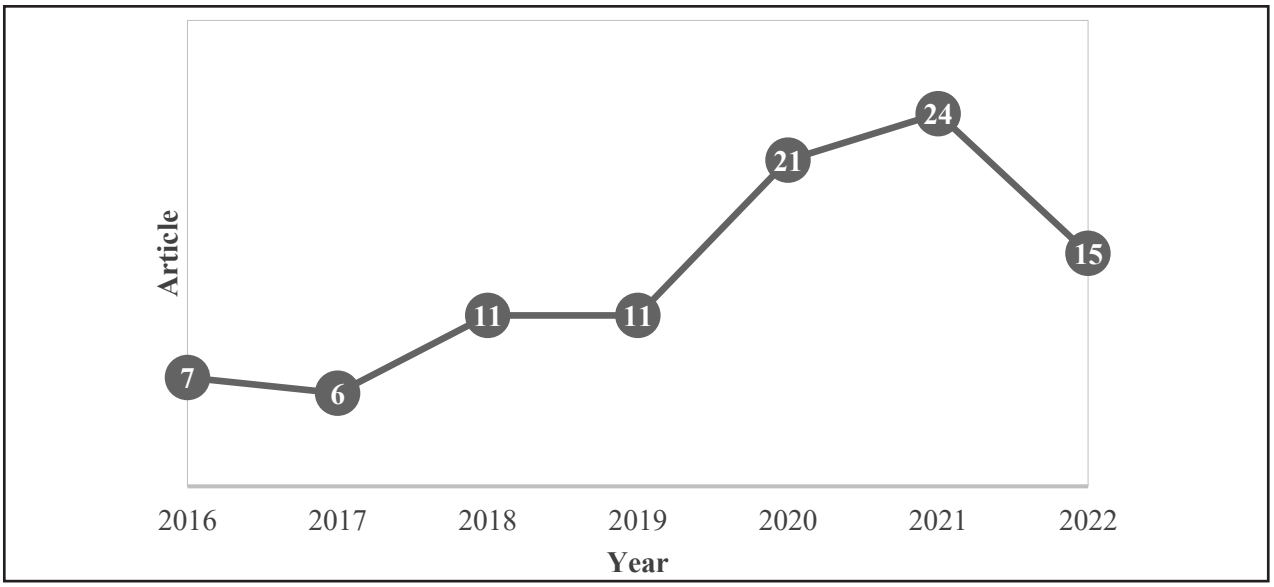
Next, the most current articles were selected, which are from the years 2021 and 2022, for which a systematic content analysis was carried out, seeking elements to respond to the research objectives. In this phase, 39 scientific articles were analyzed through systematic reading, tabulation of information in an Excel@ spreadsheet, categorization, and discussion of information.

3 RESULTS AND DISCUSSION

3.1 Evolution of scientific production on short food supply chains and sustainability

The themes "CCAA" and "sustainability", worked together, and have shown a rise in the academic environment, and according to the bibliometric analysis carried out, it presents an annual growth rate of 27.91%, with the highest production peak in 2021 (Figure 2).

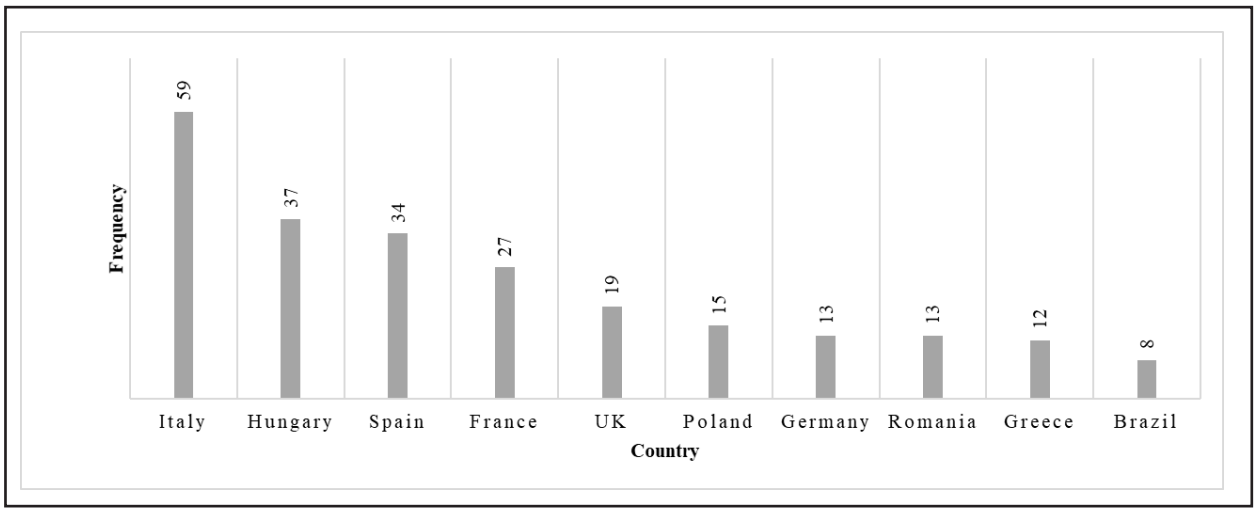
Figure 2 – Annual scientific production on the subject of short chains in food production



Source: Bibliometrix (2022)

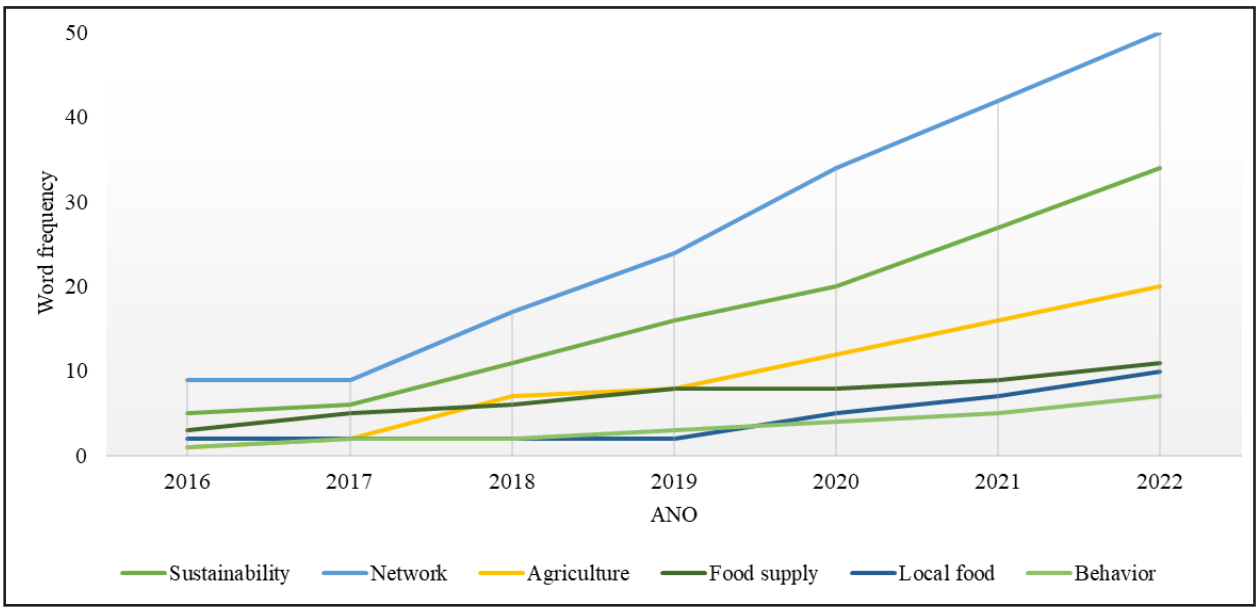
Regarding scientific production by country, Italy stands out as the country that publishes articles on the subject, followed by Hungary, Spain, and France (Figure 3).

Figure 3 – Countries that publish the most studies regarding CCAA and sustainability in the food supply



Source: Bibliometrix (2022)

Figure 4 – Dynamics of the most cited words in studies referring to short chains in



Fonte: Bibliometrix (2022)

3.2 Contribution of CCAA to sustainability

From the systematic review carried out in 39 articles, a systematization was carried out, and the CCAA factors that proved to be most relevant for the promotion of sustainability were detailed in five topics, namely: Advantages in socioeconomic aspects; Advantages for the environment and biodiversity; Advantages for consumers; Advantages for family farmers/producers; Advantages in relations between producers and consumers. After presenting the advantages, the challenges verified in the selected database were presented: Disadvantages or challenges in broader socio-economic, institutional and organizational aspects.

3.2.1 Advantages in socioeconomic aspects

According to the research, CCAA contributes to greater food safety and food traceability Brumã et al. (2021). These merge a variety of producers, diverse in size and economic performance, product type, and category Havadi-Nagi (2022). In this perspective, they are fundamental to preserve food diversity and the cultural and social aspects that are behind the production and transformation of food and raw materials, that is, to preserve cultural heritage Brumã et al. (2021).

A second evidenced aspect is that CCAA, compared to traditional food systems based on long chains, allows fairer prices for both consumers and producers, which are not disproportionate to the real value of food Evola et al. (2022). Added to this are social benefits such as job stability, as producers achieve price stability for their products Bui et al. (2021); Evola et al. (2022), benefiting youth participation Evola et al. (2022).

The database also pointed out the potential of CCAA as the promoter of the development of family farming and rural areas in developing countries, allowing the redistribution of value among all actors, directly and indirectly, involved Evola et al. (2022); Bui et al. (2021). In this way, the CCAA format strategies started with the economic sustainability of the localities Escobar-López et al. (2021). This is also evidenced in the potential of CCAA to reduce gender inequalities Bui et al. (2021); Martens (2022) since a higher percentage of women's involvement Bui et al. (2021) and occurred for specific benefits for women agricultural women, especially empowerment and improvements in net income Martens (2022).

Social benefits are linked to the possibility of enhancing the farmer-consumer relationship and a culture of sustainability Evola et al. (2022). This is strengthened by encouraging the creation of collectives of producers and cooperation Raimbert and Raton (2021). On the other hand, the possibility of creating cooperatives brings people closer to communities and ethnic minorities, creating opportunities for farmers to collaborate Bui et al. (2021); being a gateway to obtaining support from local authorities or organizations Bui et al. (2021), institutional support and entrepreneurship Zoll et al. (2021), as well as to establish relationships of trust based on direct contact between market members and family participation Escobar-Lopez et al. (2021).

Still from a social point of view, farmers involved in CCAA build positive connections with other stakeholders in local food, such as local consumers and other agents Martens (2022). With this, they collaborate to create trust and social capital Martens (2022). Direct change in society can also be generated by promoting coalitions between different actors, in which different actors work together and act as catalysts for regime change and innovations by conventional actors Hyland et al. (2022). Furthermore, based on

cooperation Brumã et al. (2021), they can serve as 'norm entrepreneurs' transforming norms and social practices Hyland et al. (2022).

In addition to CCAA contributing to social innovation Corvo et al. (2021), these forms of food supply manage to pass on a social message to all agents involved, especially to the consumer who considers it important to purchase from producers in social vulnerability Torok et al. (2022). Added to this, it contributes to the development of more sustainable eating behaviors De Bernardi et al. (2021), reinforced by the ethical consumption awareness of each customer De Bernardi et al. (2021). Therefore, CCAA generates behavioral changes toward sustainability Brumã et al. (2021).

Another positive result of the CCAA is based on the local performance of the actors and the positive consequences of these interactions. The CCAA mainly uses local human and material resources, which is an essential characteristic of local economic development, based on the concept of endogenous development and the locality's internal resources Floris et al. (2022). Therefore, it boosts work and the local economy, supports local actors, and helps lead them to an environment of mental and socially sustainable agriculture Kovács et al. (2022); Brumã et al. (2021). Local products are also associated with emotional factors such as nostalgia for shopping, fun, and memories of old times Kovács et al. (2022)

Finally, it is highlighted that CCAA allows market strategies to be developed quickly Aubert; Enjolras (2021), which improves disaster response, resilience, and contingency planning agendas, especially for vulnerable populations Reis et al. (2022). Well-managed local production can mitigate seasonal food shortages, especially after catastrophic droughts or typhoons, but it can also provide local communities and neighborhoods with periodic and stable supplies of fresh produce regularly Huang; Chang (2021). This occurs, according to Michel-Villarreal et al. (2021), why short chains include five essential resilience resources: flexibility, redundancy, collaboration, visibility, and agility Michel-VillerealI et al. (2021). The summary of the advantages in terms of socioeconomic aspects is presented in Table 1.

Table 1– Contribution of short food supply chains to sustainability in terms of socioeconomic aspects

Advantages	Author
Food safety and food traceability Preserve cultural heritage	Brumã et al. (2021)
Enhance the farmer-consumer relationship and a culture of sustainability Benefit youth participation Allow fairer prices for both consumers and producers	Evola et al. (2022)
Variety of producers, diverse in size and economic performance, product type, and category	Havadi-Nagy (2022)
Job stability	Bui et al. (2021); Evola et al. (2022)
Encouraging the creation of production and cooperation collectives	Raimbert and Raton (2021)
Cooperation and cooperatives bring people closer to communities and ethnic minorities	Bui et al. (2021); Brumã et al. (2021)
Facilitate support from local authorities or organizations	Bui et al. (2021); Zoll et al. (2021)
Transforms social norms and practices by conveying a social message	Hyland et al. (2022); Török et al. (2022)
Trust relationships based on direct contact between market members and family participation Contribute to the economic sustainability of localities	Escobar-López et al. (2021)
Reduction of gender inequalities	Bui et al. (2021); Martens (2022)
Local positive connections between farmers and other local food stakeholders	Martens (2022); Floriš et al. (2022)
Catalysts of regime change and innovations by conventional actors	Hyland et al. (2022)
Generate social innovation	Corvo et al. (2021)
More sustainable eating behaviors	De Bernardi et al. (2021); Brumã et al. (2021)
Boosts local work and economy, leading to a mentally and socially sustainable farming environment	(Kovács et al. (2022); Brumã et al. 2021)
Rapidly Developed Market Strategies	Aubert and Enjolras (2021)
Improved disaster response, resilience, and contingency planning schedules	Reis et al. (2022)
Mitigate seasonal food shortages	Huang and Chang (2021); Michel-Villarreal et al. (2021)

3.2.2 Advantages for the environment and biodiversity

The benefits of CCAA extend to environmental preservation, whether through the reduction of environmental pollution, food waste, or energy consumption Hoang (2021). Furthermore, as it presents a more artisanal and less industrial approach to production Gómez (2021), it generally has more green, healthy and fair productions Hoang (2021). In addition, it contributes to the reduction of transport costs and carbon emissions by reducing energy use during transport Bui et al. (2021); Kovács et al. (2022).

The CCAA, compared to other chains, allows the reduction of the environmental impact of food and establishes new social relationships, sustains the landscapes, biodiversity, and resources of the territories, and is encouraged by the demand for varied sustainable products Evola et al. (2022); Bui et al. (2021); Zoll; Specht; Siebert (2021); Aubert; Enjolras (2021); Brumã et al. (2021). Some actions that contribute to this are greater organic production Brumã et al. (2021); Bayir et al. (2022); a decrease in miles traveled for food Bayir et al. (2022); a reduction in the use of packaging material, generating less waste Kovács et al. (2022). The summary of the advantages in terms of the environment and biodiversity is presented in Table 2.

Table 2 – Contribution of short food supply chains to sustainability in terms of the environment and biodiversity

Advantages	Author
More artisanal and less industrial production, greener, healthier and fairer	Gómez (2021); Hoang (2021)
Reduction of transport costs and carbon emissions	Bui et al. (2021); Kovács et al. (2022)
Reduction of the environmental impact of food, sustaining the landscapes, biodiversity, and resources of territories, environmental preservation, reduction of consumption, food waste, and energy consumption	Hoang (2021); Evola et al. (2022); Bui et al. (2021); Zoll et al. (2021); Aubert and Enjolras (2021); Brumã et al. (2021)
Increased organic production	Brumã et al. (2021); Bayir et al.(2022)
Decreased miles traveled for food	Bayir et al. (2022)
Reduction in the use of packaging material, generating less waste	Kovács et al. (2022)

3.2.3 Advantages for consumers

From the perspective of consumers, CCAA is, to a large extent, driven by awareness of the negative externalities of food systems fed in long chains and consumers who are willing to change their food consumption pattern, connecting directly to farmers, supporting communities local, using healthy and welcoming food the environmental impact Hoang (2021).

In addition to the social relationships established between agents, the rescue of local and traditional production is based on quality construction processes and healthier products Seidler; Andreatta; Fritz Filho (2021). Short marketing channels allow consumers access to fresh products, with higher quality, nutritional value, reliability, safety, domestic flavors, naturalness, healthy, ecologically correct, and with social and cultural characteristics specific to the place Seidler; Andreatta; Fritz Filho (2021); Kallas et al. (2021); Lankauskiene; Vidickienél; Gedminaité-Raudoné (2022); Bayir et al. (2022); Gómez (2021); Kovács et al. (2022).

All these aspects are based especially on increasing consumer satisfaction and confidence in food Bui et al. (2021); greater consumer knowledge and confidence in producers Bayir et al. (2022); and consumer participation in the production process and evaluation of product quality in all stages of the production process Lankauskiene et al. (2022). This is reflected in better product quality, healthy eating, safeguarding the environment, greater transparency and traceability, and improvements in consumer health Brumã et al. (2021); Hoang (2021); Bayir et al., (2022); Evola et al. (2022). All these aspects culminate in more power for customers De Bernadi et al. (2021).

Another benefit is that CCAA is an alternative option for consumers who do not support the conventional system and want information about “where your food comes from” Zoll; Specht; Siebert (2021). It also allows independence from supermarkets, which means that consumers can meet their demand for food through short chains and do not need to depend on conventional points of sale Zoll; Specht; Siebert (2021). The summary of advantages for consumers is presented in Table 3.

Table 3 – Contribution of short food supply chains to consumers

Advantages	Author
Social relationships are established between agents that rescue local and traditional products based on quality construction processes and healthier products	Seidler et al. (2021)
Access to fresh products, with higher quality, nutritional value, reliability, safety, domestic flavors, naturalness, healthy, ecologically correct, and with social and cultural characteristics specific to the place	Seidler et al. (2021); Kallas et al. (2019); Lankauskiene et al. (2022); Bayir et al. (2022); Gómez (2021); Kovács et al. (2022)
Increased consumer satisfaction and confidence in food and producers	Bui et al. (2021); Bayir et al. (2022); Lankauskiene et al. (2022); Brumã et al. (2021); Hoang (2021); Evola et al. (2022)
More power to customers	(De Bernardi et al. 2021)
Information about "where your food comes from" Independence from supermarkets and conventional points of sale	(Zoll 2021)

3.2.4 Advantages for family farmers/producers

The advantages of CCAA for family farmers/producers were cited in seven articles consulted, which show that farmers are benefited by joining the commercialization in short chains. The most emphasized advantage was the improvement in farmers' income. That is, compared to the conventional market, direct sales can lead to better economic results for producers, higher and more stable prices, and greater revenues, generating improvements in the socioeconomic situation and health of their families Floris et al. (2022), Martens (2022); Bayir et al. (2022); Huang; Chang (2021); Hoang (2021); Gómez (2021); Medici; Canavari; Catellini (2021). However, income and profits are higher in family establishments that innovate, with advanced technology, develop niche markets and manage well Bui et al. (2021).

Some of the factors that contribute to higher income for farmers participating in short chains are farmers' ability to produce value-added products Floris et al. (2022); stabilization of sales prices, guaranteed monthly revenues Bui et al. (2021); lower cost of transport and intermediaries Kallas et al. (2021); Bui et al. (2021); Huang; Chang (2021);

Gómez (2021); optimized working time, when sales are organized and concentrated Lankauskiené et al. (2022); diversification of activities in establishments and forms of marketing Medici et al. (2021); Gaviglio et al. (2021); Benedek et al. (2021).

Complementing this, family farmer's/food producers have difficulties accessing conventional markets due to their reduced production volume, low bargaining, and limited relative profit sharing due to the lengthening of the supply chain Evola et al. (2022). Therefore, another advantage concerns the public that CCAA usually involves, mostly producers with limited production capacities, logistics, and access to traditional market channels Torok et al. (2022); Bayir et al. (2022). This form of marketing can be a sustainable option used by producers, especially when they go through crises such as low food prices in the conventional system Zoll et al. (2021).

The selected articles also pointed out that CCAA-participating farmers tend to be more autonomous and have a greater ability to set prices independently Martens (2022); Bayir et al. (2022). Therefore, the CCAA promotes empowerment based on the independence of the farmer, who starts to better manage crucial aspects related to his economic sustainability, such as supplies, marketing, customer relations, and sales price decisions Zoll et al. (2021); Evola et al. (2022). In the same line of reasoning, farmers can counterbalance their dependence on large processors, contributing to their resilience Brumã et al. (2021).

Added to this, starting from existing infrastructure (for example, points of sale) Bayir et al. (2022) can optimize the parallel development of other sectors and the formation of synergies between agricultural practices and different types of multifunctional activities, such as agrotourism, involvement in off-property income activities, environmental projects and projects that are centered on culture and traditional relationships Floris et al. (2022); Bayir et al. (2022); Hoang (2021).

Other advantages were pointed out for farmers, highlighting: the participation of farmers in group dynamics, management, and leadership (MEDICI et al., 2021); the possibility of participating in public catering (for example, school/hospital canteens), that is, institutional food markets Bayir et al. (2022); specialized

productions Medici et al. (2021); a greater sense of pride on the part of farmers for the trader or product directly to the consumer Brumã et al. (2021); allows the farmer to sell his surplus production Polita; Madureira (2021); and maintain social interaction by being close to other people Polita; Madureira (2021).

Thus, research shows that this new demand driven by consumers is stimulating structural changes in small rural organizations that have created new business methods to be more sustainable and innovative Evola et al. (2022). As a result, producers are experiencing greater market opportunities and less exposure to risk Martens (2022), adopting a diversified market strategy, which allows a quick change to more promising channels, is an important element of economic survival in agriculture Benedek et al. (2022). The summary of advantages for family farmers/producers is presented in Table 4.

Table 4 – Contribution of short food supply chains to family farmers/producers

Advantages	**Author**
Better economic results for producers, generating improvements in the socioeconomic situation and health of their families	Brumã et al. (2021)
More rationally used working time, when sales are organized and concentrated	Evola et al. (2022)
Diversification of activities in the properties and the forms of commercialization	Havadi-Nagy (2022)
Access to the non-traditional and more sustainable commercialization channel, and less exposure to risk	Bui et al. (2021); Evola et al. (2022)
Greater autonomy and ability to set prices independently, contributing to their resilience	Raimbert and Raton (2021)
Optimize the parallel development of other sectors and the formation of synergies between agricultural practices and different types of cross-functional activities	Bui et al. (2021); Brumã et al. (2021)
Participation in group dynamics, management, and leadership Specialized productions	Bui et al. (2021); Zoll et al. (2021)
Feeling of pride for marketing the product directly to the consumer	Hyland et al. (2022); Török et al. (2022)
Sell your production surplus Maintain social interaction by being around other people	Escobar-López et al. (2021)
Structural changes to be more sustainable and innovative	Bui et al. (2021); Martens (2022)

3.2.5 Advantages in relations between producers and consumers

From the point of view of relations between consumers and farmers/producers, the CCAA promotes a (re)approach and (re)connection, admitting the management and sharing of knowledge Gómez (2021); Seidler et al. (2021); De Bernardi et al. (2021); Kallas et al. (2021); Martens (2022). Trust also grows, which is one of the main forces of cohesion in the relationship between producers and consumers, due to their greater proximity, direct communication, and personal and ethical relationship Brumã et al. (2021); Kovács et al. (2022); Kallas et al. (2021); Bayir et al. (2022); Jantyik; Balogh; Totok (2021).

This direct contact with farmers and knowledge or direct involvement in the production process has an educational effect on consumers, especially for children, but also for adults Lankauskiené et al. (2022). It turns out that the individuals participating in the CCAA reframe their practices and values around food Zoll et al. (2021), which generates positive social changes in consumers (generally families) and they need to start to organize themselves collaboratively. with others and with producers Lankauskiené et al. (2022); Bayir et al. (2022). The summary of the advantages of relations between producers and consumers is presented in Table 5.

Table 5 – Contribution of advantages relations between producers and consumers

Advantages	Author
(Re)approximation and (re)connection, knowledge management, and sharing	Brumã et al. (2021)
Growing mutual trust	Evola et al. (2022)
Educational effect on consumers, especially for children	Havadi-Nagy (2022)

3.3 Challenges for promoting sustainability via CCAA

The bibliographical analysis allowed the identification of challenges or disadvantages of the CCAA in terms of sustainability, specifically, the sustainability of the short chains themselves. Such challenges and disadvantages were also categorized based on different areas of action and externalities linked to CCAA, which are described below.

3.3.1 Disadvantages or challenges in broader socio-economic, institutional and organizational aspects

Research has shown that, in a broader scenario, the concept of the food supply through short chains is still not widespread and many people are not aware of this alternative Bui et al. (2021). This aspect, added to the existence and preponderance of global and efficient food supply chains with easy-to-reach sales channels, such as supermarkets Bayir et al. (2022), makes its consolidation difficult. The possibilities for commercializing and promoting the CCAA are, therefore, not fully matured and have underutilized growth potential Brumã et al. (2021).

Limitations of cooperation between the actors that are part of the short chains were also highlighted. People's individualism is a challenge to trust and organize collaboratively Lankauskiené et al. (2022), Corvo et al. (2021). The limitations in collaboration are, for example, financial between the CCAA actors Corvo et al. (2021) and managerial negotiations Escobar-López et al. (2021).

The lack of collaboration is still a problem in the governance of the chains themselves at the institutional level. Isolated experiences, like the many reported in this article, recognize that CCAA contributes to sustainability, but lack tools to classify and systematize initiatives, which makes cross-scale cooperation and knowledge sharing between managers of different experiences difficult Martens (2022). This collaboration can also be more complicated depending on the scale of action defined by the territorial actors, the location, and the goodwill adept at the collective, since it can include extensive sectors, and disperse the forces that wish to cooperate Raimbert and Raton (2021).

Other identified challenges relate to actions in the political fields. Marques et al. (2021) warn that the intention of achieving inclusive sustainability requires the integration of environmental and social dimensions into the development plans of the different regions, which is not always observed Marques et al. (2021). Development policies need to support small local producers/processors, which have proved to be central in combating food supply problems caused by the current global health crisis (COVID-19) Brumã et al. (2021).

Added to this is the need to create more organizational and institutional tools that contribute to improving the quality of products and services offered by farmers Lankauskiené et al. (2022) and that break with legal standards and/or requirements excessive Bayir et al. (2022) that make it difficult for small producers to adapt. Finally, it is necessary to strengthen leadership to coordinate short chains Polita; Madureira (2021). The summary of disadvantages or challenges in socioeconomic, institutional, and organizational aspects is presented in Table 6.

Table 6 – Disadvantages or challenges in socioeconomic, institutional, and organizational aspects

Details of disadvantages or challenges	Author
The concept is a little wider, unconsolidated, with underutilized growth potential	Bui et al. (2021); Bayir et al. (2022); Brumã et al. (2021)
Limitations of cooperation between actors, individualism	Lankauskiené et al. (2022), Corvo et al. (2021); Escobar-López et al. (2021); Martens (2022); Raimbert and Raton (2021)
Inadequate public development policies	Marques et al. 2021; Brumã et al. (2021)
Scarce organizational and institutional tools for improving the quality of farmers' products and services	Lankauskiené et al. (2022)
Extensive Legal Requirements	Bayir et al. (2022)

3.3.2 Disadvantages or challenges for consumers

Medici et al. (2021) identified that some CCAAs present a mismatch between what is offered and the gastronomic priorities and demands of consumers; as well as, and consumers fail to become regular buyers, which makes sales symmetry difficult. Another aspect is related to the need for greater and easier regulation to protect local brands and products with certain characteristics and promote consumer recognition and trust Bui et al. (2021). Also contributing negatively in terms of consumption, is consumers' lack of knowledge about CCAA and their predominantly time-oriented buying habits, requiring immediate access to products Bayir et al. (2022).

For consumers who are already active in CCAA, that is, they regularly shop, the limitations identified were: lack of products and difficulties in finding a reliable farmer; especially limited prices and variety González-Azcárate et al. (2021); informal traceability Seidler et al. (2021); Polita; Madureira (2021) and short product storage period Kovács et al. (2022). For potential consumers, the concern is with the food safety of the products Corvo et al. (2021) and higher prices compared to large retailers Evola et al. (2022). The summary of disadvantages or challenges for consumers is presented in Table 7.

Table 7 – Disadvantages or challenges for consumer

Details of disadvantages or challenges	Author
Misfit and sales asymmetry	Medici et al.(2021)
Scarce regulation protects local brands and products	Bui et al. (2021)
Consumers' lack of knowledge about CCAA Time-driven buying habits	Bayir et al. (2022)
Lack of products and difficulties in finding a reliable farmer; limited prices and variety especially	González-Azcárate et al. (2021)
Informal traceability	Seidler et al. (2021); Polita and Madureira, (2021)
Short storage period of products	Kovács et al. (2022)
Concern about the food safety of products	Corvo et al. (2021)
Higher prices compared to major retailers	Evola et al. (2022)

3.3.3 Disadvantages or challenges for farmers/producers

Most of the disadvantages and challenges identified are related to the need to change the business model from selling goods to selling a combination of goods and services, since farmers cannot publicize and serve customers, reaching few consumers Lankauskiené et al. (2022) , Bayir et al. (2022); Corvo et al. (2021); Polita; Madureira (2021); Gómez (2021). Also, given the particularities of individual production, the potential of CCAA is only explored if it manages to reach the market niche with the uniqueness of local suppliers and with a solvent demand Torok et al. (2022).

A controversial point, as it was also identified as an advantage, concerns income, identified as a challenge by at least six surveys. According to Jantyik et al. (2021); Gaviglio et al. (2021); Medici et al. (2021); Martens (2022) and Hoang (2021) the legal environment, tax regulation, the low production scale, the legal requirements of agro industrialization, in addition to the time spent by farmers in production and marketing do not make the activity profitable and attractive. Added to this, the often stressful, physically demanding and time-consuming nature (production plus marketing) of the direct market lowered job pleasure, having no effect on social satisfaction and resulting in low cost-effectiveness Martens (2022), Benedek et al. (2022). This also occurs, given the characteristics of small producers who usually need to manage several functions, have limited time and human resources, facing difficulties to produce and market at the same time Benedek et al. (2021).

Added to this, other challenges and disadvantages were pointed out, namely: difficulty in constantly renewing and adapting to changing market demands Polita; Madureira (2021); competition from similar products from other suppliers, such as supermarkets Medici et al. (2021); Gómez (2021); lack of financial incentives, especially for small farmers to invest in new production and marketing methods (BUI et al. 2021; Hoang (2021); lack of training (good practices, organic production) and support in business management, such as marketing, brand and product registration, network and sales techniques Bui et al. (2021); Hoang (2021); the supply of products with non-homogeneous shape and quality, although characteristic of this type of production, is a competitive disadvantage Kallas et al. (2021); less variety and quantity of products per production unit Benedek et al. (2022); Bayir et al. (2022); individual and systemic barriers that prevent greater collective action, which may be linked to competition between farmers in short chains Martens (2022); Hoang (2021); inefficient and expensive distribution due to the farmer's difficulty in transporting the products from the production sites to the distribution areas (eg lack of appropriate vehicles) Medici et al. (2021); Bayir et al. (2022).

It also happens that producers sometimes cannot increase their activity through short distribution channels due to their limited access to markets and financial resources, generating incompatibility between demand and supply in the face of growing consumer demand for CCAA products Bayir et al. (2022). Furthermore, the trade-off between increasing the scale and preserving the characteristics of the SFSC Bayir et al. (2022). The summary of disadvantages or challenges for farmers/ producers is presented in Table 8.

Table 8 – Disadvantages or challenges for farmers/producers

Details of disadvantages or challenges	Author
They lack advertising and customer service skills, reaching few consumers	Lankauskienė et al. (2022); Bayir et al. (2022); Corvo et al. (2021); Polita; Madureira (2021); Gómez (2021)
Insufficient income, low cost-effectiveness	(Jantyik et al. 2021; Gaviglio et al. (2021); Medici et. al. (2021); Martens (2022); Hoang (2021); Benedek et al. (2022)
Difficulty in renewal and variation to market oscillation demands	Polita and Madureira (2021)
Competition from similar products from other suppliers	Medici et al. (2021); Gómez, (2021)
Lack of financial incentives Lack of training	Bui et al. (2021); Hoang (2021)
Products with heterogeneous shapes and quality	Kallas et al. (2021)
Less variety and quantity of products per production unit	Benedek et al. (2022); Bayir et al. (2022)
Competition between farmers	(Martens 2022; Hoang 2021)
Inefficient and expensive distribution	Medici et al. (2021); Bayir et al (2022)
Limited access to markets and financial resources A trade-off between scaling up and preserving CCAA features	Bayir et al. (2022)

3.3.4 Disadvantages or challenges in producer-consumer relationships

The essence of the challenges lies in the need to replace the conventional food system, which requires profound changes in consumption patterns Zoll et al. (2021), hampered by the low incentive for local consumption Kallas et al. (2021). Martens (2022) identified the existence of unequal power relations between farmers and consumers, while Escobar-López et al. (2021) highlighted agreement between producers and consumers on the need for products to have a quality mark or certification.

This item ends by highlighting the difficulty of additional growth in farmers' sales given their specialization and lack of organization in deliveries. It is inappropriate for consumers to order dairy products from one farmer, vegetables from another, etc. The shopping experience in supermarkets makes many consumers want to order a complete basket of products Lankauskiené et al. (2022). The summary of disadvantages or challenges in producer-consumer relationships is presented in Table 9.

Table 9 – Disadvantages or challenges in producer-consumer relationships

Details of disadvantages or challenges	Author
Need for profound changes in consumption patterns	Zoll et al. (2021)
The low incentive for local consumption	Kallas et al. (2021)
Unequal power relations between farmers and consumers	Martes (2022)
Lack of brand or product quality certification	Escobar-López et al. (2021)
Disorganization in deliveries in the face of consumers' needs to have all products in the same place	Lankauskiené et al. (2022)

4 FINAL CONSIDERATIONS

The objective of this research was to identify how the scientific production that relates the CCAA with sustainability has evolved, as well as to list challenges and opportunities. The analyzed articles point to advantages, which are sometimes presented superficially, without in-depth discussion, and without measurement. For example, they point to an improvement in income for family farmers who enter short

chains and direct sales, but no research has evaluated these gains quantitatively, measuring them. This aspect is considered a limitation of the results presented.

It is important to highlight that many advantages and challenges depend on the context and location of the study and, therefore, some results of this article seem to contradict each other. For example, while participation in CCAA can generate more income and increase collaboration between farmers in some locations, in other realities individuality predominates and the income earned is not compensatory given the efforts spent.

With this, it is alerted that CCAA is not presented here as a panacea for the evils that prevent achieving sustainability, but that they can be a more sustainable alternative compared to long chains, depending on the agents, locations, and contexts. Another aspect that stands out is that, regarding environmental preservation and biodiversity, no disadvantages or challenges of CCAA were identified. On the other hand, although the CCAA has been especially driven by consumer demand, there are disadvantages or even adaptation needs so that they have a better insertion in the consumer market.

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Conflict of Interest
The authors have stated that there is no conflict of interest.

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Edited by
Cristiano Rodrigo Bohn Rhoden

How to quote this article

Breitenbach, R., Rosseto, M., & Brandão, J. B. (2026). Advantages and challenges of Short Food Supply Chains (SFSC) for sustainability. *Revista Eletrônica em Gestão, Educação e Tecnologia Ambiental.* Santa Maria, 30, e86487 . DOI:10.5902/2236117086487. Available in: https://doi.org/10.5902/2236117086487. Accessed on: XX/XX/XX.