

Review

Research Trends in Agricultural Marketing Cooperatives: A Bibliometric Review

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Abstract: In the last decade, agricultural cooperatives have become increasingly popular in the food industry. This paper aims to shed light on the extensive literature on agricultural cooperatives. **Design/Methodology/Approach:** In conducting this review, we applied the bibliometric review method. Initially, we retrieved 1249 bibliometric data from the Scopus database, which were reduced to 364 documents after applying the PRISMA guidelines. The data were filtered using the following keywords: “agricultural marketing cooperatives”, “agricultural marketing societies”, “performance”, “value chains”, and “supply chains”. **Findings:** According to our findings, the present research is primarily focused on smallholders, sustainability, and supply chain management topics. We found that current research lacks an understanding of why agricultural cooperatives fail in terms of finances, investments, and implementation of strategies. We conclude that agricultural marketing cooperatives in their current state and legal form might not be flexible enough to compete in markets due to global and sustainability concerns. Finally, we provide a practical roadmap for researchers, investors, policymakers, and non-profits. **Limitations:** The main limitation of our review is that it contains only studies found in Scopus and examines only the English language literature. **Originality/Value:** Bibliometric analyses focused on agriculture cooperatives are scarce, and this paper provides a broader perspective of the existing literature. Moreover, it identifies research gaps and current trends in the field while providing a detailed description of how agricultural cooperative research has evolved over time.



Citation: Qorri, D.; Felföldi, J. Research Trends in Agricultural Marketing Cooperatives: A Bibliometric Review. *Agriculture* **2024**, *14*, 199. <https://doi.org/10.3390/agriculture14020199>

Academic Editors: Juan Sebastián Castillo-Valero and María Carmen García-Cortijo

Received: 14 December 2023

Revised: 15 January 2024

Accepted: 24 January 2024

Published: 26 January 2024



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Keywords: value chains; bibliometric analysis; food industry; agriculture cooperatives; sustainability; trends; thematic map; marketing; bibliometrix

1. Introduction

Agricultural cooperatives have become a focal point for scholars, policymakers, investors, and businesses who are increasingly intrigued by the potential of its organizational structure to effectively tackle emerging uncertainties at regional, national, and global scales. Owing to their similarity to cooperative models passed down over generations, this organizational structure is often preferred over alternative models, such as investor-owned firms (IOFs). In addition, the theoretical foundation of offering shared resources and resilience during an economic crisis [1] makes it appealing as a business model. Such cooperatives aim to enhance the livelihoods of farmers based on sustainable development with long-term benefits for the future generation of farmers [2]. In theory, marketing cooperatives are classified as agricultural cooperatives, and as such, they adhere to a set of foundational cooperative principles. These principles include member ownership, member control, the provision of member benefits, profit-sharing or patronage refunds, the right to participate in decision making through voting, open membership, shared risk in terms of equity loss and profitability, and a fundamental policy of membership of not accepting external investments from the public. These principles are referred to as the Barton and Rochdale principles [3,4] and constitute the core tenets that govern the structure and operations of marketing cooperatives. Consequently, laws, rules, and

regulations ensuring a level playing field for cooperatives and investor-owned firms (IOFs) are essential for a cooperative's success.

In addition to the implementation of cooperative principles in day-to-day operations, several other factors such as good economic governance within a cooperative framework, qualified cooperative leaders, education, merit-based hiring, and promotion are also important factors contributing to the success of a cooperative in agriculture [5]. This is further supported by Bijman (2016) [6] who found that cooperatives in the Netherlands benefit greatly from supportive legislation and that, despite expansion and global engagement, they have been able to maintain robust member control through innovative internal governance practices. The Dutch cooperatives also demonstrate flexibility regarding federative cooperative structures and often make well-considered choices regarding their position in the food supply chain [6]. According to Bijman et al. (2012) [7] in their systematic review, agricultural marketing cooperatives facilitate farmers' sales and marketing endeavors and are generally referred to as type three agricultural cooperatives [7].

This cooperative structure allows for a strategic delegation of processing and marketing responsibilities, enabling farmers to concentrate on on-farm activities. The multifaceted functions of collection, integration of processing activities [8], distribution, and marketing contribute to the efficiency and effectiveness of agricultural product commercialization within these cooperative frameworks [7].

In Table 1, we provide a comprehensive summary of agricultural cooperatives focusing on their role and benefits within food supply chains by following the essential stages explained in detail in the book Food supply chain management and logistics: From Farm to Fork. This summary gives a better understanding of the dynamics of marketing cooperatives' role and their role in food supply chains [9].

Table 1. The five stages of agricultural marketing cooperatives. Source: Authors' work.

Stage	Marketing Cooperative Role	Supply Chain Management Role	Benefits
The production stage	Collector	Coordinator for product development Market information provider and R&D	Effective production of the product for the market
The procurement stage	Warehousing and storage of the products; packaging and labeling, by marinating the quality of the produced products Negotiator and mediator for the quantity of storage	Processing and manufacturing Product grading and standardization	Cost optimization Better-quality-product provider Value-addition product
The stage of logistics and transportation	Coordinator Integrator	Product flow of transportation and distribution, logistics, and process integration	Optimization of time order
The stage of marketing and promotion	Branding Market research Sales	Negotiation and cooperation with retailers are crucial to accessing the markets and securing product flow	Market-oriented Consumer-oriented
The customer stage	Support and customer service and knowledge management	Coordinators, integrators, trainers, developers, and trust builders	Integrating customer experiences can help with the continuous improvement of product flow and product quality

The focus on meeting the demands of consumers and retailers has prompted strategic reorientation and organizational restructuring suggesting a market-oriented strategy. Also, the emergence of novel types of producer-owned firms as seen in north-western Europe adds another dimension to this transformative shift [10]. In addition, the way the cooperative works is changing a lot. And, the trends in the environment and who their competitors are affect how well the cooperative makes decisions [11]. Furthermore, an evaluation of the strengths, weaknesses, and resource availability plays a critical role in optimal decision making from the cooperative. As such, “Structure follows Strategy” presented by Alfred Chandlers (1962) [12] can be applied to cooperatives [7] to facilitate and maximize decision making. Many problems have to be addressed in the effectiveness and potential drawbacks associated with restructuring in different countries. Another thing to look at is how the cooperative invests money. As such, it needs further exploration and financial planning to make cooperatives more resilient. As supported by Hakelius et al. (2013) [13], the newly established beehives operating as cooperatives in Sweden exhibit heavy reliance on outsourcing and startup assistance plans [13]. Furthermore, it is necessary to examine both the positive and negative implications and long-term viability of these newly established producer-owned firms to ensure their success is not merely a short-term response to market demands.

Another strategy worth exploring is the export-oriented type of cooperatives implemented in Spain which provides higher productivity, size, and wage levels as compared to the domestic ones [14]. Meanwhile, it is necessary to take a closer look at the problems faced by small farmers due to changing seasons and market fluctuations, especially in fair-trade situations. According to Bacon et al. (2014) [15], stakeholders pursue production-oriented strategies for food security. Diversification and intensification of farming practices are characteristics of production-oriented strategies aimed at increasing agricultural output. Alternatively, exchange-oriented strategies involve measures such as securing a favorable pricing structure, implementing redistribution mechanisms, and expanding credit availability [15]. By acknowledging this symbiotic relationship between production and exchange-oriented strategies, stakeholders can provide solutions to improve the resilience of agricultural systems and food security.

Despite these strategies [15] and the positive influence on its members, cooperatives are complex business structures, and additional studies are needed to understand how they can balance mixed objectives in a changing environment [16]. Further exploration of how cooperatives can effectively synchronize their local and international dimensions to foster a form of globalization is needed [17]. Uncertainties driven by factors such as the COVID-19 pandemic [18,19], conflict implications in global food supply chains [20], and challenges associated with climate change [21–23], combined with the complex nature of cooperatives [16], make it difficult to ensure resilience and flexibility in the long term. A possible solution to all these problems can be network strengthening to enhance the competitiveness of agricultural cooperatives and small-medium enterprises in food supply chains [24]. Addressing the inherent inflexibility of cooperatives can be a vital factor that can significantly impede their capacity to adeptly navigate the uncertainties of the agricultural landscape. This requires an in-depth examination of structural and organizational constraints that govern their flexibility. The implementation of recommended collaborative and innovative strategies within cooperatives is fraught with complexities that stakeholders may encounter. Farmers’ cooperatives can facilitate vertical integration, economies of scale in production and marketing, increased bargaining power in markets, and added value to the products for their members [25]. It is evident that bargaining power and experience levels do not consistently align with expected outcomes, as shown by the experiences of fruit and vegetable trading in Hungary, and cooperatives, despite being a favorite model, are not flexible enough for early business. Producer organizations’ (POs) weak market influence and low annual turnover suggest a preference for short-term resolutions over strategic thinking [26]. Meanwhile, the smart cooperative is presented as a solution to compete in global markets, but its implementation is challenging due to the lack of internet infrastructure in some rural areas [27]. Researchers primarily focus on the development and

implementation of technologies such as precision farming techniques, advanced irrigation systems, and mechanization, but besides providing knowledge and expertise, they also need to address the farmers' attitudes toward the adaptation of these technologies [28].

Moreover, possessing a food safety certification translates into higher quality in agricultural marketing products. Thus, this is efficient in providing quality management at the production level and effective operational management during warehousing, processing, and packaging. As reported by Cai and Su (2016) [29], the quality of products from cooperatives is positively influenced by two factors: (a) a higher count of food safety certification and (b) a strategic focus on collaborations with supermarkets and export enterprises [29]. Researchers, policymakers, and cooperatives need to develop policies and practical approaches that can enhance farmers' engagement in the agricultural value chain and provide access to dynamic markets [25] based on the industry they operate.

In addition, members of cooperatives demonstrate a higher income compared to non-participants [30]; however, the findings of Sebhatu et al. (2020) [31] suggest a negative relationship between financial leverage size, board member number, and pure technical efficiency [31]. This implies that despite the observed positive effects on income, another factor that has often been overlooked is the social dynamics, performance, and membership size [17]. The findings from Gezahegn et al. (2019) [32] suggest that the allocation of advantage among large cooperative members can be a driver in maintaining stability but does not guarantee that members will remain cooperative. The arising conflicts in the larger cooperatives can range from delayed dividend payments and a lack of awareness regarding cooperative laws and regulations to failures in timely credit repayments [32]. Recent studies have shown that larger memberships in cooperatives are associated with increased susceptibility to internal conflicts [31], and members within larger cooperatives become more distrustful [32]. Suggesting that expansions of cooperative organizational structure can be challenging in the long run. Mujawmariya and Speelman (2013) [33] report that factors such as credit, essential consumables, and community relationships cause farmers to become distrustful and choose to sell to traders instead [33]. Another reason for cooperative failings is the conflicts between members and the board of directors, members, and employees across various dimensions [34], suggesting that larger cooperatives are destined to fail if they do not assess these internal governance issues. Scholars are focusing their research on a niche theme such as the efficiency of blockchain technology to address the concerns of agricultural cooperatives related to transparency [35], trust, and traceability in the development of this technology for sustainable and resilient food supply chains [36]. Additionally, blockchain technology is in its early stages, and concerns associated with the types of smart contracts to be selected [37], data privacy, financial constraints, issues related to investments for this type of technology, and regulatory frameworks have to be addressed before implementing and promoting to the agricultural sector in general.

Abebaw and Haile (2013) [38] highlight that the majority of cooperative members are males, and their study suggests that males adapt well to new technologies [38]. These claims seem to be underlooked by scholars in addressing the challenges that females face in joining cooperative memberships, and the educational level of females and/or males in developing countries that can affect the technology adoption in cooperatives and agriculture. Contributing to rural development and implementing policies that can address gender equality and quality of education gaps align with the United Nations Sustainable Development Goals (SDGs) [39].

1.1. Novelty of This Research

The novelty of this research lies in the use of bibliometric analysis to analyze agricultural cooperative research evolution over the past few decades. Firstly, we give a brief descriptive analysis by presenting basic data-related research publications conducted in the field of cooperatives associated with the most influential research work measured by the respective h-index.

Secondly, we provide a broader picture of the research work carried out in the agriculture cooperative field by using thematic evolution and thematic mapping which gives us insights into the evolution of research trends over the years and allows us to suggest paths for future studies. Furthermore, it serves as a map for stakeholders and researchers of the current situation in this evolving area.

Third, we display the dynamics of international partnerships for the research work performed in agricultural cooperatives with an explanatory approach.

1.2. Bibliometric Studies

Bibliometric analyses are scarce in the field of agricultural cooperatives. The latest scholarly work carried out on this type of analysis associated with cooperatives is by authors Luo et al. (2020) [40] with a focus on agricultural cooperatives' challenges in the Western World. They concluded that the challenges connected to agricultural cooperatives include adapting values to attract younger generations, addressing trust issues in diverse member relationships, improving positioning within agricultural value chains, and comparing cooperative models across Western regions for insights into their advantages and disadvantages [40]. Meanwhile, a synthesis of the sustainability performance of agriculture cooperatives in the economic, social, and environmental dimensions was performed by authors Marcis et al. (2019) [41]. Their findings reveal a scarcity of work on sustainability assessment in agriculture cooperatives [41].

2. Materials and Methods

The systematic review was performed using the bibliometric analysis method due to its efficiency in summarizing large amounts of data to present a synthesis of the current state and emerging trends of the research topic. However, this method has its limitations; firstly, it analyzes only the research work indexed by Scopus, and biases can come from the scholarly work [42].

Bibliometric analysis is a crucial tool in analyzing the research work in quantitative and statistical approaches. It is open-source for scientometrics and bibliometrics by providing insights into authors, country collaborations, science mapping, trend topic mapping, etc.

To address research concerns, the bibliometric data were analyzed at two levels. Initially, a performance analysis was carried out to demonstrate the publication trends, followed by a science mapping study to explore the conceptual structure of the research [43].

We followed the PRISMA protocol to find, select, analyze, and summarize studies for this review [44]. RStudio 4.2.2 and the bibliometrix package were used to examine and illustrate the data [45]. The data for this study were obtained from the SCOPUS database [46,47] (last accessed on 29 October 2023). A total of 1249 data points were retrieved for the period from 1963 to 2023. After applying the criteria provided by the PRISMA guidelines (Figure 1), we were left with a total of 364 documents, 350 articles, and 14 conference papers (Table 2).

Table 2. Meta-data general information.

Timespan	2013:2023
Sources (journals)	167
Documents	364
Article	350
Conference paper	14

Based on our criteria, only studies in the English language and published during the period between 2013 and 2023 were kept for further analysis. Following that, we chose only scientific articles and conference proceedings. A total of 5 articles in Chinese and Spanish were excluded, along with 1 book and 12 book chapters. In addition, we also excluded articles that had social aspects with marketing cooperatives and kept only scientific work involving supply chain content. This left us with a total of 365 documents,

350 of which were scientific articles. In addition to the search process details are provided in Appendix A. The Supplementary Information regarding the materials employed is available in the Supplementary Materials.

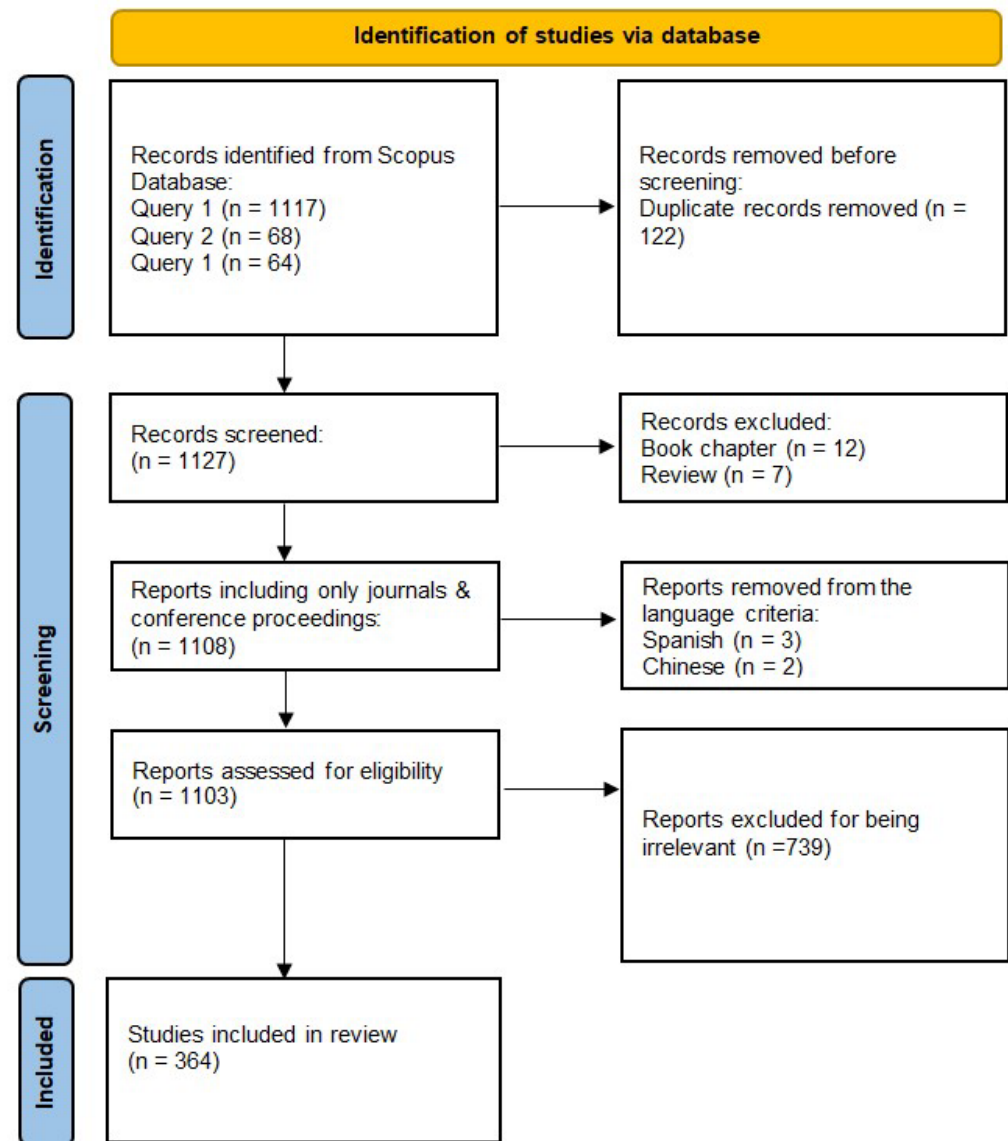


Figure 1. PRISMA Guidelines report. Source: Authors' own work.

3. Results

The findings in this section are organized as follows: performance results, scientific mapping results, and co-citation analysis [47].

3.1. Performance Results

3.1.1. Annual Scientific Production

Based on our annual production analysis, 2022, 2020, and 2018 were the most productive years with 68, 51, and 38 articles, respectively (Figure 2). Despite the fluctuations from the period between 2013 and 2022, an upward trend can be seen in the number of publications. Interestingly, in periods of uncertainty, such as during COVID-19, 2019–2020, the research grew significantly from 31 articles to 51 articles.

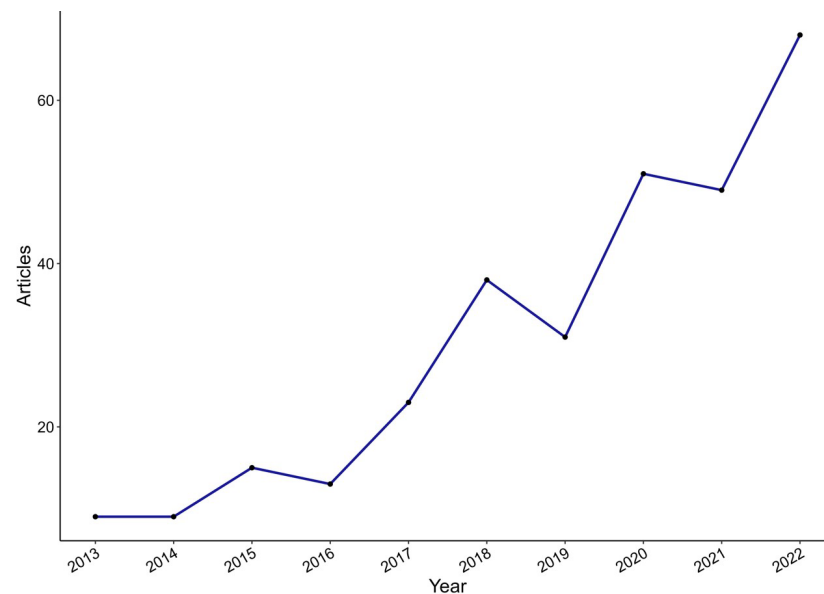


Figure 2. Annual scientific production. The x-axis displays the period analyzed in this study, from 2013 to 2022, whereas the y-axis represents the number of publications published in each year.

3.1.2. Most Relevant Sources

According to the number of published articles on agriculture cooperatives with a focus on marketing, *Sustainability* (Switzerland) published by MDPI (Switzerland) and *Food Policy* and the *Journal of Rural Studies* published by Elsevier are the top three most relevant journals in this field. An overview of other relevant journals identified in our analysis can be found in Table 3.

Table 3. Most relevant sources. This table displays the identified journals in this study, along with the number of publications, Hirsch index, SCImago journal ranking (SJR) and its quartiles, country, and publisher.

Journals	TP	H-Index	SJR	SJR Quartile	Country	Publisher
<i>Sustainability</i> (Switzerland)	33	136	0.66	Q1	Switzerland	MDPI
<i>Food Policy</i>	15	126	1.9	Q1	United Kingdom	Elsevier
<i>Journal of Rural Studies</i>	15	124	1.32	Q1	United Kingdom	Elsevier
<i>International Food and Agribusiness Management Review</i>	13	42	0.4	Q2	United States	International Food and Agribusiness Management Association
<i>World Development</i>	12	206	2.5	Q1	United Kingdom	Elsevier
<i>Agribusiness</i>	8	49	0.77	Q1	United States	Wiley
<i>International Journal on Food System Dynamics</i>	8	21	0.25	Q3	Germany	CENTMA Research
<i>Journal of Agribusiness in Developing and Emerging Economies</i>	8	19	0.54	Q1	United Kingdom	Emerald
<i>Agricultural and Food Economics</i>	7	26	0.77	Q1	United Kingdom	SpringerOpen
<i>Agricultural Economics</i> (United Kingdom)	7	96	1.38	Q2	United Kingdom	Wiley-Blackwell

3.1.3. Most Cited Sources

The Table 4 lists the most influential sources with corresponding title and DOI, along with the total citations (TCs) and total citations per year (TC/Year).

Table 4. Most cited sources.

Source	Titles	DOI	TCs	TCs/Year
Tallontire A., 2000, Dev Pract [48]	Partnerships in fair trade: reflections from a case study of Café Direct.	10.1080/09614520050010205	282	23.50
Ortmann G.F. & King R.P., 2007, Agrekon [49]	Agricultural cooperatives II: can they facilitate access of small-scale farmers in South Africa to input and product markets?	10.1080/03031853.2007.9523769	256	21.33
Trebbin A., 2014, Food Policy [50]	Linking small farmers to modern retail through producer organizations—Experiences with producer companies in India.	10.1016/j.foodpol.2013.12.007	255	21.25
Cechin A., Bijman J., Pascucci S., Omta O., 2013, Agribusiness [51]	Decomposing the member relationship in agricultural cooperatives: Implications for commitment.	10.1002/agr.21321	192	16.00
Mujawamariya G., D’Haese M., Speelman S., 2013, Food Policy [33]	Exploring double side-selling in cooperatives, case study of four coffee cooperatives in Rwanda.	10.1016/j.foodpol.2012.12.008	182	15.17
Bijman J., Iliopoulos C., 2014, Ann Public Coop Econ [52]	Farmers’ cooperatives in the EU: Policies, strategies, and organization.	10.1111/apce.12048	134	11.17
Liu Y., Ma W., Renwick A., Fu X., 2019, Int Food Agribusiness Management Rev [53]	The role of agricultural cooperatives in serving as a marketing channel: evidence from low-income regions of Sichuan province in China.	10.22434/IFAMR2018.0058	79	6.58
Hovelaque V., Duvaléix-Tréguer S., Cordier J., 2009, Eur J Oper Res [54]	Effects of constrained supply and price contracts on agricultural cooperatives.	10.1016/j.ejor.2008.08.005	75	6.25

3.2. Science Mapping Results

This section uses a word cloud, keyword co-occurrence, theme evolution, trend topics, and factorial analysis to identify the most important topics of inquiry in the discipline [46].

3.2.1. World Cloud

To identify the most popular topics in the collected publications, we created a word cloud based on the keywords used by authors. A list of fifty of the words most frequently used by authors in the collected publications can be seen in Figure 3. To prevent unwanted results and cluttering the word cloud we discarded the country names. Our analysis revealed “smallholders”, “supply chain management”, and “sustainability” as the most frequently used terms. In addition, topics associated with “sustainability” were “sustainability development”, “agriculture protection”, and “climate change”. On the other hand, “supply chain management” showed an association with “commodity market”, “retailing”, “food market”, “agroindustry”, etc. In addition, there is also a connection between “smallholder” research topics related to “certification”, “cooperative land”, etc. The research work carried out in “agriculture” is connected to “agriculture cooperative” and “governance approach”.



Figure 3. Word cloud.

3.2.2. The Keyword Co-Occurrence

To gain a better understanding and to uncover interpretable links, we generated a word network based on the keyword co-occurrence of authors. Keyword co-occurrence analysis (Figure 4) is useful for navigating relevant literature to discover the connections between topics within the field of cooperatives. Researchers can find prominent subjects and their linkages by studying how keywords co-occur in research papers, allowing them to explore related topics more effectively.

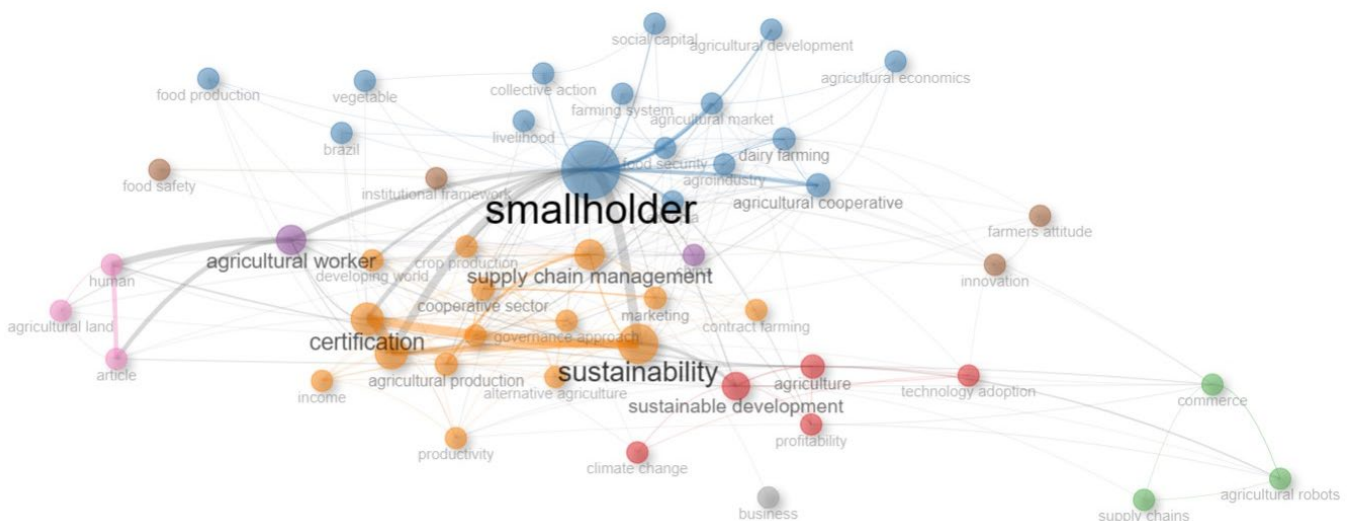


Figure 4. Co-occurrence network. A more extensive thickness suggests that the keywords are closely connected. The node's color signifies the cluster in which the keyword is linked. The keywords and relationships imply that each cluster relates to a study subject. This graphic depicts seven clusters that were created automatically by RStudio 4.2.2 software.

The most prominent cluster is shown in blue, and the main keyword is “smallholder” networking with “agricultural market”, “agroindustry”, “agricultural cooperative”, “farming system”, “food security”, and “livelihood”.

The second cluster in orange is related to “sustainability” and has a strong connection with “smallholder” and, within its cluster, with “certification”. Meanwhile, “supply chain management” is connected to “agricultural production”, “marketing”, “alternative agriculture”, and “sustainability”.

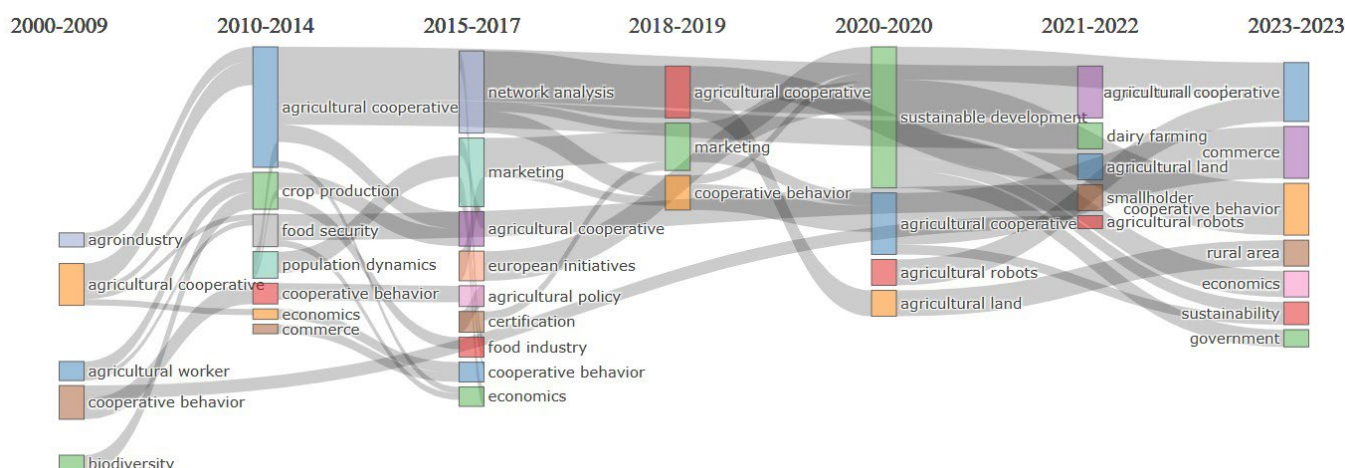


Figure 6. Thematic evolution. The Sankey diagram displays the development and links of academic themes in literature throughout seven time periods using authors' keywords.

From 2000 to 2009, researchers concentrated on topics such as “agroindustry”, “agricultural cooperative”, “agricultural worker”, “cooperative behavior”, and “biodiversity”. In the subsequent period of 2010–2014, the focus shifted toward “agricultural cooperative”, “crop production”, “food security”, “population dynamics”, “cooperative behavior”, “economics”, and “commerce”. From 2015 to 2017, researchers' interests encompassed “network analysis”, “marketing”, “agriculture cooperative”, “European initiatives”, “agricultural policy”, “certification”, “food industry”, “cooperative behavior”, and “economics”. Themes like “agriculture cooperative”, “marketing”, and “cooperative behavior” persisted during 2018–2019. The years 2020 and onward saw exploration into “sustainability”, “agricultural robots”, and “agricultural land” in 2020, while in 2021–2022, attention turned to “agriculture cooperatives”, “dairy farming”, and “agriculture land”. In 2023, the research efforts are directed toward “agriculture cooperatives”, “commerce”, “cooperative behavior”, “rural area”, “economics”, “sustainability”, and “government”.

3.2.4. Thematic Map

The map of themes (Figure 7) is split into four quadrants by values of centrality and density based on publication number, popularity, important citations, and the strengths of the interaction with other subjects. The density of connections within a cluster represented by a subject is estimated. The label given to the cluster by the Biblioshiny program indicates the majority of commonly used terms. The cluster magnitude reflects the number of occurrences of the terms in the cluster, and the cluster location is set based on the centrality and density of the cluster.

We notice that the majority of the clusters are centered in the motor themes, which exhibit high centrality and density. Motor themes Cluster 1 “Value chain, certification, governance”, Cluster 2 “sustainability, developing countries, technology adaptation”, and Cluster 3 “agricultural cooperatives, agribusiness, impact evaluation” are well-researched themes and with high importance for our topic.

Furthermore, basic themes with high centralization and low density are significant and have not yet been defined for the research subject. Part of these themes are Cluster 1 “cooperatives, trust, blockchain”, Cluster 2 “supply chain, fairtrade, social capital”, and Cluster 3 “smallholder farmers, propensity score matching, rural development”.

Additionally, niche themes categorized by high density and lower centralization are thoroughly developed but linked with little field relevance. Cluster 1 “information asymmetry, market information, willingness to pay”, Cluster 2 “agricultural product supply chain, evolutionary game”, and Cluster 3 “agricultural production, horticulture” are part of the niche themes.

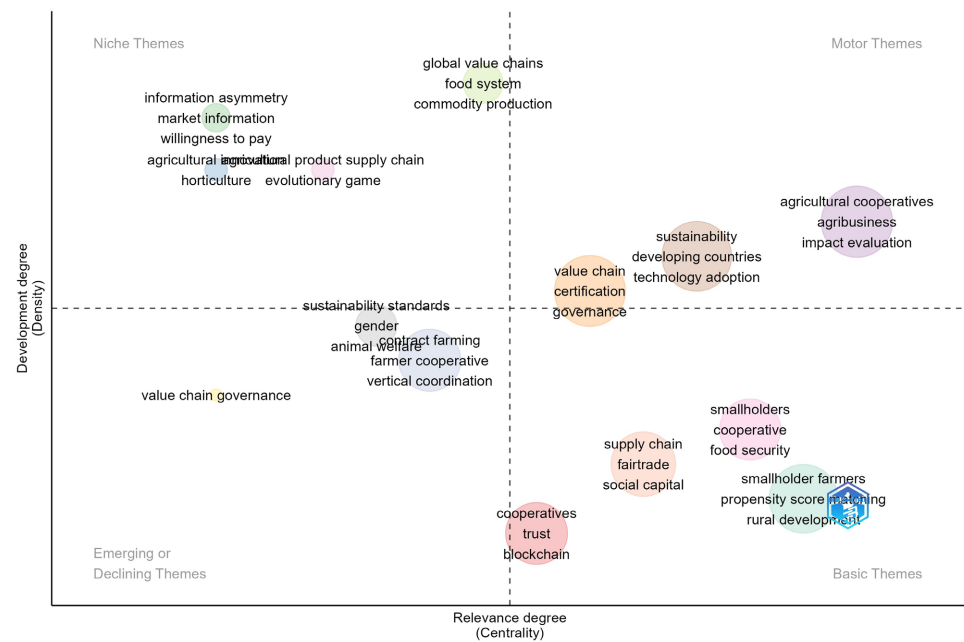


Figure 7. Thematic map for Period 1, 2013:2023.

The emerging/declining themes are Cluster 1 “value chain governance”, Cluster 2 “sustainability standards, gender, animal welfare”, and Cluster 3 “contract farming, farmer cooperative, vertical coordination”.

3.2.5. Trend Topics

Figure 8 displays the trending topics for researchers for the years 1983 until 2023. To give a broader picture of our research trend topics, we included all the years. The following topics of “employment”, “cooperative”, “developing country”, “environmental protection”, and “environmental management” were popular during the years 1983, 1989, 1994, 1999, and 1999, respectively. Meanwhile, the most requested trend topics were “fair trade” and “agricultural market” in 2013, “cooperative sector” in 2014, and “marketing” and “cooperative behavior” in 2016. Furthermore, in 2019, the topics such as “sustainable development”, “sustainability”, and “commerce” emerged as trend topics. Also, during the 2020s, new trend topics, such as “agricultural worker”, “agricultural land”, and “livelihood”, were researched.

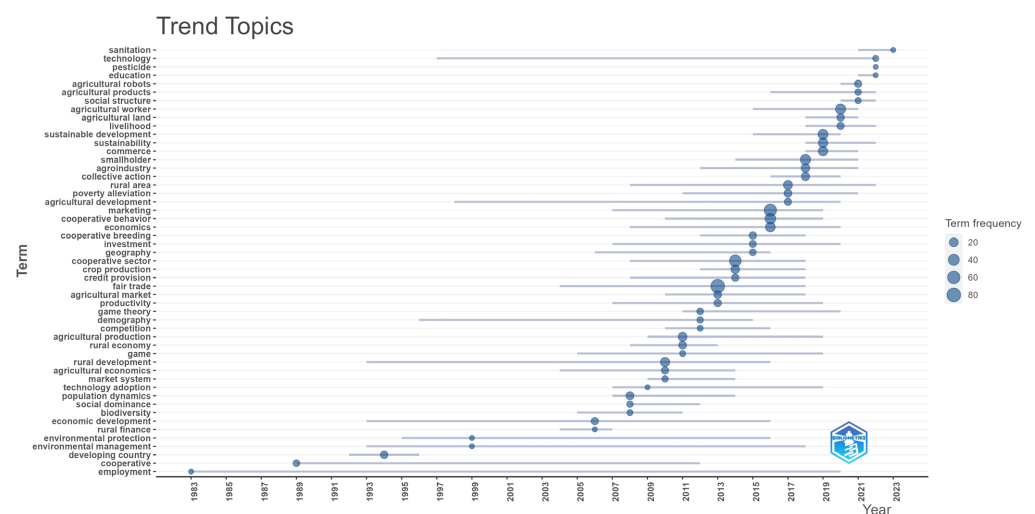


Figure 8. Trend topics over the years 1983:2023.

In recent years, the trend topics have been influenced by events of uncertainty. In 2023, the trending topic was “sanitation”, while for 2022, it was “technology”, “pesticide”, and “education”. In 2020, the trend topics were “agricultural robots” and “agricultural products”.

3.2.6. Factorial Analysis

The conceptual structure map demonstrates the conceptual linkages and relationships among various concepts in the agricultural cooperative literature. It compresses large amounts of data with various variables into a low-dimensional space and provides insights into how concepts are interlinked. The locations of each word are set by the values of Dim 1 and Dim 2, where “Dim” is a diminutive particle, a bibliometric phrase that results in mapping between words with relatively comparable values. Moreover, keywords nearer the center point imply that those themes have been receiving significant attention in recent years. The red zone in Figure 9 indicates that the majority of agricultural cooperative efforts have been centered on food supply chain challenges. The conceptual structure map hints that the present research focuses on “vertical coordination” in “marketing cooperatives”, “food industry”, “innovation”, and “agriculture”.

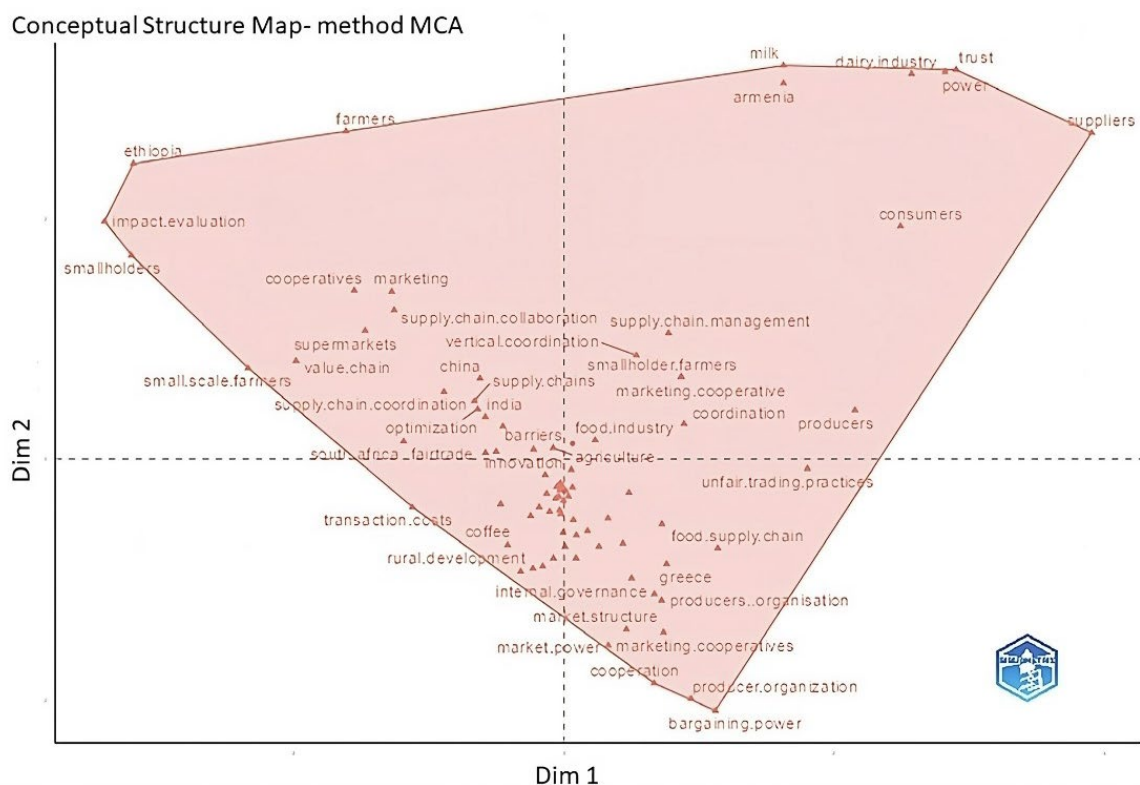


Figure 9. Conceptual structure map (CSM) factorial analysis. The study performed multiple correspondence analysis (MCA) on the keywords of the dataset; it displays the conceptual structure of the terms related to agricultural cooperative papers included in this study.

3.3. Analysis of Country Collaboration

3.3.1. Country Collaboration

Country collaboration analysis (Table 5) is conducted based on the authors’ origin in the collected studies. It displays the documents in two aspects: single-country publications shown in blue color and multiple-country publications visualized in red color. From Figure 9, we can point out that the countries with the largest collaboration are China, the USA, and Italy. China dominates the chart for single- and multiple-country publications. China is followed by the USA, where there are more multiple-country publications than

single-country publications. A similar pattern is observed for Italy, whereas the Netherlands and France show the exact same pattern regarding collaborations.

Table 5. Corresponding authors' countries (Biblioshiny results).

Country	Articles	SCP	MCP
USA	49	29	20
China	42	28	14
The Netherlands	33	17	16
Germany	24	11	13
Ethiopia	17	6	11
India	15	9	6
Belgium	12	9	3
Brazil	11	8	3
Indonesia	11	8	3

SCP: single-country publication; MCP: multiple-country publication.

3.3.2. The Social Network of Collaboration Country Level

Figure 10, the social network of collaboration is a form of network that illustrates the links between countries depending on the frequency with which they appear in a certain context. In regards to these numbers, China, the United States, and the Netherlands are the closest collaborators. More specifically, China cooperates closely with the Netherlands and has intensive collaboration with the USA. Additionally, we can see that the USA collaborates closely also with Germany. Finally, countries' collaboration is mostly between well-developed countries.

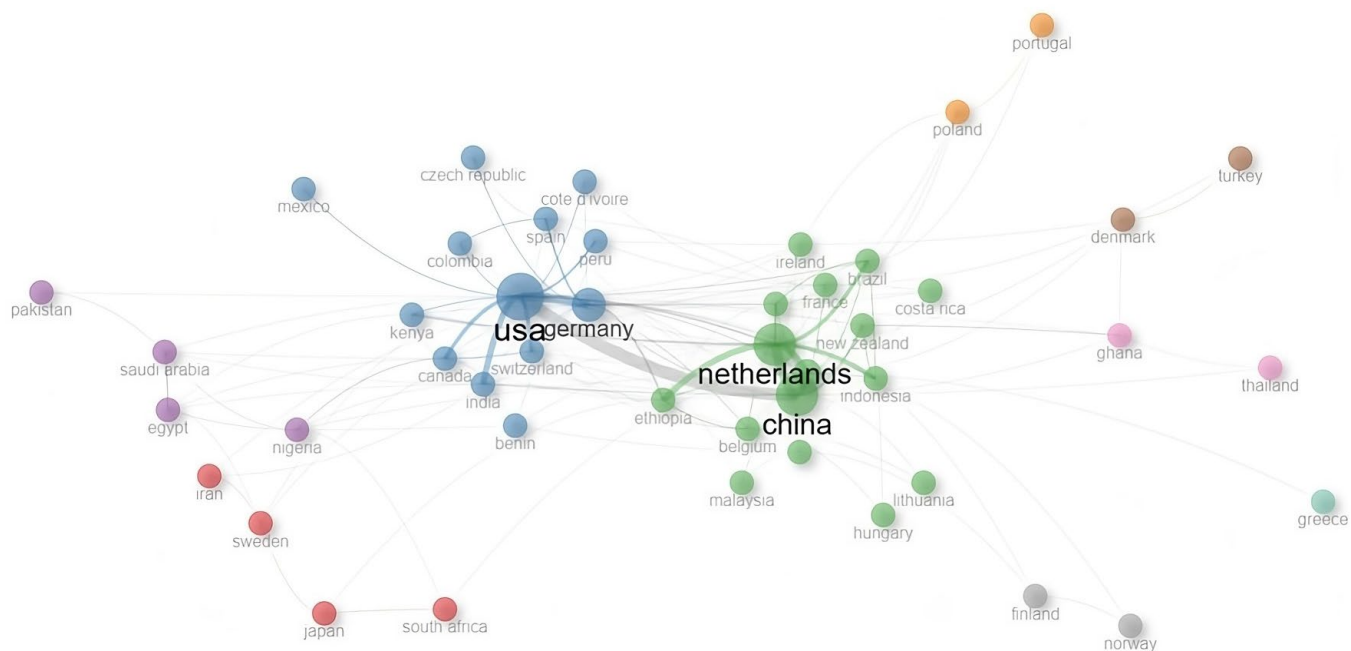


Figure 10. The social network of collaboration at the country level.

4. Discussion

In Table 1, in the introduction section, we summarized the multifunctional nature of agricultural marketing cooperatives by clarifying the agricultural cooperatives' role, the role they have in supply chains, and the benefits of this type of organizational structure, thus providing a future point for both stakeholders and researchers interested in delving into specific contributions of these cooperatives at each stage of the supply chain. A comprehensive analysis of published research in agricultural cooperatives from 2013 to 2023 shows an increasing trend in the research carried out in this field, especially during

the pandemic of COVID-19. Our results show that the most influential sources were *Sustainability* (MDPI), *Food Policy* (ELSEVIER), and *Journal of Rural Studies* (ELSEVIER). Moreover, the majority of the research in the field of agriculture cooperatives was performed by authors from the USA, China, and the Netherlands, which also closely collaborate among them. As indicated by our network analysis, the majority of the collaborations are between the USA and China and between China and the Netherlands (Figure 10). The strong collaboration between the USA and China can be in part due to the fact that China provides a large market for agricultural products, whereas the US has the potential to provide the supply. Moreover, the rapid economic growth of China and the dynamics of the market could be an additional source of motivation for researchers in the US who are keen on exploring the dynamics of food supply chains in China. Meanwhile, the Netherlands is known for its interest in adapting innovative technologies in the agricultural industry, and therefore, its strong collaboration with China is not a surprise [56]. Moreover, the strategic position of the Netherlands in Europe offers them an advantage in sea freight, water logistics, and port facilities as well.

The majority of the research studies in the field are focused on the topics of “small-holder”, “sustainability”, and “supply chain management” (Figures 3–5). As shown in Figures 3–5, agricultural workers appear to be a topic of intensive research in the period from 2000 to 2009. This interest in the topics can be explained by the fact that agriculture is considered low-paying, hard work [57] and capital intensive [58] and therefore less attractive to the new generation. In addition, the topic of agricultural workers was closely associated with “crop-production”, which can be due to the process of agricultural mechanization that is causing considerable job losses [59,60], and it is discussed under automation and robotics in agriculture. Other reasons we argue for the research interest related to agricultural workers are the general knowledge gap in automation, robots, and other technological innovations [61].

Extensive research has been performed for dairy agricultural cooperatives over the years 2021–2022 since they play a crucial part in pooling resources and collaborating in agroindustry activities, such as milk processing and product development. These topics are well researched by scholars and are associated with sustainability, certification, and impact evaluation.

The themes that are declining are related to “value chain governance”, and this can be explained by the shift of the research on the “value chain, certification, and governance” cluster in the motor themes. The emerging theme with high relevance is “contract farming” with a focus on enhancing bargaining power and enabling better negotiations. Moreover, farmers’ cooperatives may engage in vertical coordination [62,63] by establishing connections with downstream actors such as processors and retailers [64]. This vertical integration can be facilitated through contract farming agreements [65]. Other emerging topics are related to sustainability standards, such as gender equality [66] and animal welfare [67]. Niche themes being researched by scholars are global value chains (GVCs) [68] and the influence of food systems in shaping how food is produced, processed, and distributed globally. The production within global value chains is often driven by market demands and trends. This suggests that the market needs responsiveness [69] and fast decision making by producers, processors, and consumers throughout the value chain. It is interesting how cooperatives dominate agriculture when the latest findings suggest that they exhibit lower technical efficiency compared to their capitalist counterparts and face greater challenges in adapting to extreme weather fluctuations [70]. In addition, Table 6 serves as a reference for professionals seeking insights into the current research trends based on Figure 8, opportunities, and challenges derived from the literature.

Table 6. Practical implications. Source: Authors' own work.

	Opportunities	Challenges
Strategies and Market	<ul style="list-style-type: none"> - Customer-oriented strategy [5]. - Export-oriented strategy [29]. - The symbiotic relationship between producer-oriented and exchange-oriented strategies [15]. 	<ul style="list-style-type: none"> - Consumers' behavior shift. - Uncertainties such as COVID-19 (sanitation problems) [18,19,21–23]. - Lack of flexibility to adapt to the new regulations in uncertainties [16]. - Market structure and barriers.
Technology and Innovation	<ul style="list-style-type: none"> - Cooperative breeding to increase agricultural productivity. - New pesticides, technology. - Incorporating agricultural robots. - Blockchain technology is used for transparency [35], trust, and traceability [36]. 	<ul style="list-style-type: none"> - Education of farmers in the use of pesticides and agricultural robots. - The unpredictable attitude of farmers toward changes and technology adaptation [28]. - Blockchain is in the early stages and does not provide a practical implementation.
Finances	<ul style="list-style-type: none"> - Shared costs and credit prevision contribute to rural finance [3,4]. - Financial support to innovate and adapt. - Financial support for new pesticides and technologies. 	<ul style="list-style-type: none"> - Failures in reinvestments in the long run [39]. - Not addressing fair trade challenges can damage the finances of cooperatives [33]. - The size of the organization remains an issue [32].
Internal Governance	<ul style="list-style-type: none"> - Restructuring of cooperative model to be competitive in value chains [7,10,26]. - Strengthening networking with aim to enhance competitiveness [24]. 	<ul style="list-style-type: none"> - Complex structure model [16]. - Distrust [33]. - Cooperative behavior [34]. - Expansion of cooperatives and the arising conflicts.
Sustainability	<ul style="list-style-type: none"> - Collective action that contributes to rural development [2]. - Sustainable standards [39]. 	<ul style="list-style-type: none"> - Environmental protection. - Biodiversity. - Lack of female participation in cooperatives [38]. - Population dynamics.

5. Conclusions

This study reveals a growing research interest in cooperatives within the agricultural domain, with trends focusing on themes such as “technology”, “sanitation”, and “agricultural robots”. Meanwhile, the emerging areas of interest are “value chain governance”, “sustainability”, and “vertical integration”. We assume that researchers will continue to explore themes related to “technology”, “supply chain management”, and “sustainability” in the future. Moreover, we conclude that despite strategies used by agricultural cooperatives, the cooperative business structure is complex, and it needs further empirical studies. As a solution, we propose network strengthening to enhance the competitiveness of agricultural cooperatives and small-medium enterprises in food supply chains. However, it is worth acknowledging the gap in exploring collaborative and innovative approaches.

The main challenge relies on the paradox between farmers and market dynamics, where farmers want effectiveness and higher profits, but the market wants responsiveness. This contradiction shows that farmers' attitude is not correlated with the preparedness for the market dynamics. Another challenge is that the cooperative model is more popular in the Developed World, even though private liability companies (PLCs) have proven to be efficient in various sectors; their widespread use is notably confined to agriculture. Furthermore, the agriculture cooperative business life cycle is short due to conflicts that can be related to dividend payments, reinvestments, etc. Moreover, the size of the cooperative is an element that can go over the previously mentioned conflicts leading to its failure.

Furthermore, sustainability standards concerning equality, education, and animal welfare make it a necessity for cooperatives to find ways to become flexible and address these issues worldwide.

Future Research Directions

This section provides directions for future research within the domain of agricultural marketing cooperatives, providing an insightful roadmap for scholars to advance knowledge in this dynamic and evolving field and also policymakers, businesses, investors, non-profit organizations, and educational institutions since it provides a wide view of the present situation. Some possible research future questions to be addressed are as follows:

- (a) How does the complexity of agricultural cooperatives impact their ability to achieve mixed objectives in dynamic environments?
- (b) What specific strategies are employed by agricultural cooperatives, and how effective are these strategies in addressing the challenges in their organizational structure?
- (c) How can agricultural cooperatives effectively synchronize their local and international dimensions to navigate challenges in the era of globalization?
- (d) What are the existing gaps in exploring collaborative and innovative approaches within agricultural cooperatives?
- (e) What measures can be taken to address the identified lack of flexibility in agricultural cooperatives, especially for new businesses entering the market?
- (f) How does the investment strategy of the cooperative model impact its financial planning and what further exploration is needed to enhance financial resilience?
- (g) Why does the agricultural sector persist in choosing what seems to be a suboptimal alternative platform for cooperative investment?
- (h) What factors contribute to the consistent failure of these suboptimal platforms for cooperative investment within the agricultural sector?
- (i) What are the primary factors contributing to the high rate of failure among agricultural cooperatives during their initial stages?
- (j) How can agricultural cooperatives address seasonality and market fluctuations to mitigate challenges faced by smallholders within the cooperative model?
- (k) How and at what scale do conflicts within cooperative structures, particularly related to dividend payments and awareness of cooperatives law, escalate with the expansion of the cooperative?
- (l) What role do internal governance issues play in determining the success or failure of larger cooperatives in food supply chains?
- (m) What are the practical ways that innovation, technology adoption, and farmers contribute to mitigating conflicts and enhancing the resilience of cooperatives?
- (n) What challenges and barriers do females face in joining cooperative memberships, and how do these challenges impact the overall sustainability of cooperative initiatives?
- (o) How does the educational level of females and males affect their ability to adapt to technology within cooperative settings?

Limitations: The Biblioshiny program does not support integrating numerous files from several sources; therefore, this bibliometric study is limited only to the Scopus database. However, other databases can give additional findings and uncover new research directions. Also, since the bibliometric analysis method consists of big data, it is not fo-

cused on a specific review but a broader scope, as well as biases that might come from the literature itself.

Supplementary Materials: Supplementary Materials can be accessed and downloaded at the following link: https://docs.google.com/spreadsheets/d/1mrcY2RyovOsn1B9V2au_kyCzxVUEv7YL/edit#gid=391551182. For additional information, please contact dejsi.qorri@econ.unideb.hu.

Author Contributions: Methodology, D.Q.; software, J.F.; validation, D.Q. and J.F.; formal analysis, D.Q.; data curation, D.Q.; writing—original draft preparation, D.Q. and J.F.; writing—review and editing, D.Q. and J.F.; visualization, D.Q.; supervision, J.F.; project administration, J.F. All authors have read and agreed to the published version of the manuscript.

Funding: The APC was funded by the University of Debrecen.

Data Availability Statement: The University of Debrecen provided access to sources used in this study. The data were processed using MS Excel and visualized with Biblioshiny in R Studio. All the data are available within this manuscript.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Academic Literature Research

To determine the relevant academic literature, the literature was obtained using the Scopus database. Table A1 provides the keywords of the searching phase. The findings were improved and filtered for English-language publications published worldwide.

Table A1. Information for the search process.

Information for the Search Process		
Main Query (Q1)		TITLE-ABS-KEY ("agriculture cooperatives" OR "marketing cooperatives" OR "farmer cooperative" OR "agricultural marketing cooperative" OR "agriculture coop" OR "agri-coop" OR "marketing coop" OR "agriculture co-op" OR "cooperative societies")
Other	Q2	(TITLE-ABS-KEY ("agriculture cooperatives" OR "marketing cooperatives" OR "farmer cooperative" OR "agricultural marketing cooperative" OR "agriculture coop" OR "agri-coop" OR "marketing coop" OR "agriculture co-op" OR "cooperative societies") AND ALL ("cost") AND ALL ("performance") AND ALL ("activities"))
	Q3	(TITLE-ABS-KEY ("agriculture cooperatives" OR "marketing cooperatives" OR "farmer cooperative" OR "agricultural marketing cooperative" OR "agriculture coop" OR "agri-coop" OR "marketing coop" OR "agriculture co-op" OR "cooperative societies") AND ALL ("supply chain") AND ALL ("value chain"))
Area		Agriculture and biological sciences; social sciences; economics, econometrics, and finance; environmental science; decision sciences; business management and accounting.
Countries		All countries
Language		English Literature
Period		2013–2023

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