

Intermediaries in Agricultural Supply Chains: Trends and Insights

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Abstract. The role of intermediaries in the agricultural supply chain has become a significant topic of interest due to their influence on efficiency, market access, and value addition. This study presents a bibliometric analysis aimed at getting a deeper understanding of the evolution of research on agricultural supply chain intermediaries. The analysis intends to identify key trends, influential studies, and emerging areas of interest that will contribute to the field of research. We retrieved metadata from the Scopus database, which included 1.074 articles published between 2014 and 2025. Statistical analysis was conducted to discover the leading publishers and authors in this field. A co-occurrence network and overlay visualization of author keywords were generated using VOS viewer to map the structure and progression of the research landscape. The analysis also presented emerging keywords and research issues corresponding to network visualization, highlighting this field's dynamic and evolving nature. These insights are valuable for researchers, policymakers, and practitioners seeking to understand and enhance the relationship between intermediaries and the agricultural supply chain.

1 Introduction

Over the last 50 years, the increasing global population has been a primary driver of agricultural production intensification. There is a projected increase in global food demand by 70% by 2050 [1]. Agriculture has become one of many countries' most significant economic sectors and the largest generator of jobs worldwide. The agri-food sector faces critical bottlenecks, particularly in the complexity of supply chain operations. Cost-efficiency remains a persistent challenge [2]. The agricultural food supply chain (AFSC) refers to the process of producing and delivering agricultural products from production to consumption through a series of stages [3]. These stages can vary depending on the product type and the specific geographical location, but generally include farming, processing, packaging, transportation, distribution, and marketing. Performance and coordination between supply chain players are crucial to ensure the effective operation of the agri-food supply chain. Farmers, intermediaries, wholesalers, retailers, and consumers are actors typically involved in AFSC.

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In the AFSC, middlemen or intermediaries facilitate the movement of perishable food from the field to the end consumer, performing various functions such as transferring ownership of commodities, facilitating movement, maintaining quality, paying the seller, and delivering commodities to the buyer [4]. They have become a characteristic that distinguishes the fresh food supply chain in developing countries from other supply chains [5]. This is mainly driven by market failure, which often happens, and multiple stages of food chains. In addition, the small-scale and dispersed farmers usually require support from middlemen to connect them with traders and final markets [6, 7]. Intermediary presence is often driven by situations where a group of suppliers and buyers finds it beneficial to seek the service of a third-party agent as an intermediary. Their presence reduces the transaction time between sellers and buyers.

On the other hand, the presence of intermediaries or middlemen is perceived as a challenge for producers or farmers. Their existence prevents information flow and creates poor coordination in the supply chain [8] and reduces the bargaining power of farmers in the market [9]. In addition, it is claimed that informal intermediaries dilute the supply chain’s traceability, making it difficult to monitor the stages in which a product is processed [6]. Intermediaries also have strong control over price determination and prevent farmers from getting a fair price, even though they have to bear a high production cost [7].

The objective of this study is to provide a comprehensive bibliometric review of intermediaries and agriculture supply chains using a VOS viewer, with a database of a decade from 2014 to 2025. This study differs from previous reviews, which focused more on sustainability in supply chain or logistics by mapping the intellectual structure of intermediary-focused research in agricultural supply chains. This paper utilizes VOS viewer software to display bibliometric map results graphically, utilizing its functionality, which is designed to facilitate the easy interpretation of large maps.

2 Methods

2.1 Data Collection

This study considered the Scopus database, the largest database of peer-reviewed research literature. The search strings were defined to retrieve publications related to intermediaries, supply chains, and agriculture. Table 1 illustrates the keywords used in the searching process.

Table 1. Search string used in the study

Code	Search Criteria	Keywords
SS-1	TITLE-ABS-KEY	"middleman*" OR "middlemen*" OR "intermediar*" OR "intermedia*" OR "trader*" OR "broker*"
SS-2	TITLE-ABS-KEY	"supply chain" OR "chain*" OR "value chain"
SS-3	TITLE-ABS-KEY	"agri*" OR "agro*" OR "food*" OR "farm*"
Search formula		SS-1 AND SS-2 AND SS-3

The publication dates were limited to the last ten years to cover the published articles for the previous decade. The search for significant articles was limited to peer-reviewed articles published in academic journals with full-text content written in English. The results are confined to English-language papers indexed in Scopus, potentially leading to an underrepresentation of local case studies. In the final refinement, we restricted the search to the subject areas of “Engineering,” “Business, Management and Accounting,” “Decision Sciences,” “Computer Sciences,” “Social Sciences,” and “Economics, Econometrics, and Finance.” This search was conducted in April 2025 and resulted in 1.074 documents.

Afterward, the articles are reviewed and sorted based on their titles and abstracts. The final result is 330 articles, which are analyzed using bibliometric analysis. Table 2 illustrates the refinement process of the articles.

Table 2. The refinement process

Step	Refine	Number of Papers
1st	Year: 1931 – Present; Doc. Type: All Source Type: All; Language: All	5.165
2nd	Source Type: Journal Language: English Document type: Article, Review	4.186
3rd	Year: 2014 – Present; Subject area: Engineering; Business, Management and Accounting; Decision Sciences; Computer Sciences; Social Sciences, Economics, Econometrics and Finance	1.074
4th	Title and abstract refinement	330

3 Results

3.1 Descriptive Analysis

Figure 1 illustrates the exponential growth in articles in the yearly publication on intermediaries and the agricultural supply chain from 2014 to 2025. The number of articles published each year reached a peak of 56 in 2024. The figure shows an increasing trend with a slope of $y = 12.851e^{0.0986x}$. This implies that interest in this research is increasing and developing swiftly. This is primarily driven by the fact that sustainability in agriculture has been extensively discussed within the agricultural and food industries. The involvement of intermediaries in supporting the sustainability implementation in agri-food supply chains has not been explored, mostly because they are believed to be unproductive and bring a negative impact to the farmers [10]. However, some authors have been exploring the potential of intermediaries, particularly traders, as actors in supporting the sustainable development of the agricultural supply chain [11].

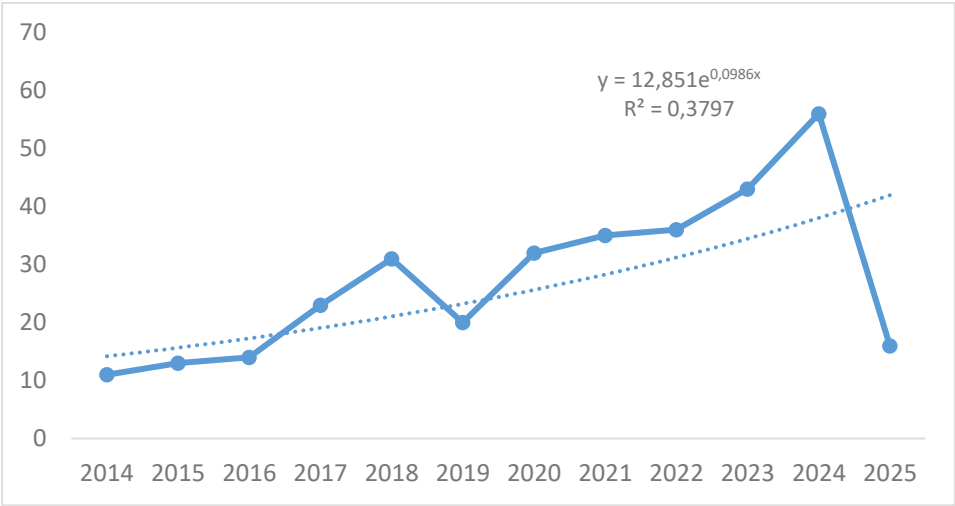


Fig. 1. Research trends on intermediaries and the agriculture supply chain

The data presented in Figure 2 refers to publication channels and emphasizes ten most productive and prominent journals. This assessment was conducted using Tableau Public version 2024.2 and considered the following attributes: total publications (by length), the mean number of citations (by thickness), and publication year (by color gradation). The analysis presented these aspects to enhance knowledge for aspiring authors considering influential and current journals. For example, “Sustainability (Switzerland)” obtained the highest number of publications (19 articles), with an average of 33.8 citations and an average publication year of 2020.737. On the other hand, “Resource, Conservation and Recycling” had only two publications but had a higher average citation of 159,5. However, the average publication year for the latter is 2018,5.

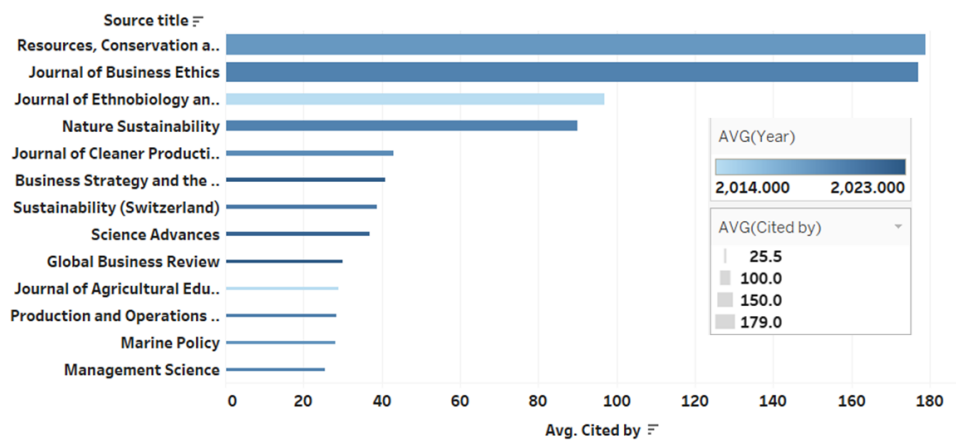


Fig. 2. Top-10 most productive and influential journals

Figure 3 illustrates the most influential authors, highlighting the 20 most-cited authors from 2014 to 2024. The most cited authors were Balaji & Arshinder [8], who studies the causes of food waste and the driving forces and dependencies behind these causes, while analyzing their interactions with intermediaries. This article has 239 citations, an average of 29.9 citations per year. Gobel et al. [12] is the second-most cited author who presents the origins and impacts of food waste based on expert interviews analysis, exploring the process and its relationship with intermediaries within the German food chain. This article has 237 citations and an average of 26,3 citations per year. The third-most-cited article was by Brunori et al. [13], which analyzes the sustainability status of global and intermediate supply chain case studies beyond different countries and commodities, employing review criteria comprising social, health, economic, environmental, and ethical sustainability dimensions.

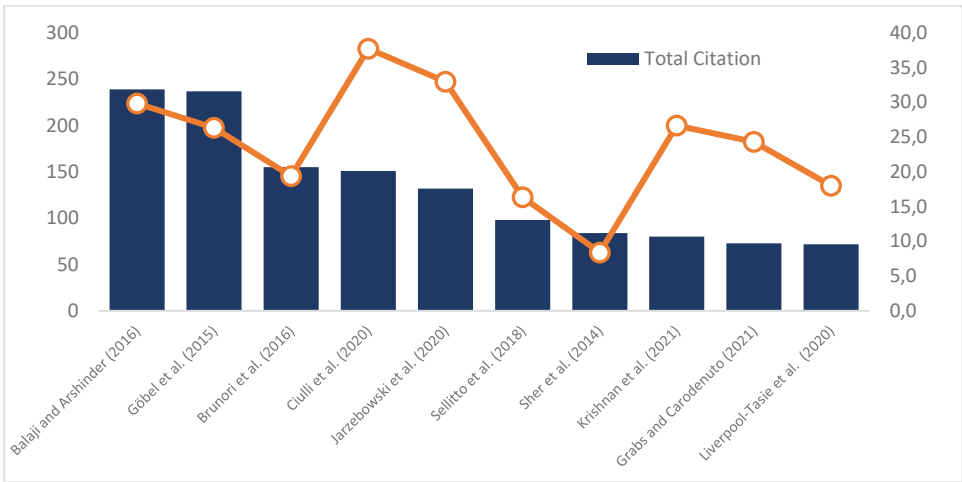


Fig. 3. Top-ten most influential authors

3.2 Bibliometric Analysis

We conducted a bibliometric analysis of 330 articles screened from the data collection. The objective is to understand the various studies on intermediaries in the supply chain, particularly in the agricultural sector. The keywords of these articles were uploaded to VOS Viewer (version 1.6.16), a software tool for visualizing bibliometric networks. The conception of the bibliometric analysis focuses on the visualization of authors' keywords co-occurrence, which contains the network and overlay visualization.

Subject to the data, we identified 1.776 keywords across 330 articles. We only consider keywords with at least 5 occurrences for further analysis, totaling 90 keywords. These keywords are then visualized along with their related settings, as shown in Figure 4. Every keyword is denoted by a circle of a certain size, dependent on the number of occurrences. The circle size increases as the keywords occur more frequently, and vice versa.

Further analysis of the network map introduces four clusters. We set a minimum cluster size of 10 themes in VOSviewer to limit the number of clusters generated in the analysis. Every term in each cluster is connected to other keywords, either within the same cluster or across different clusters. Each cluster was assigned a distinctive label referring to the common themes among the keywords: intermediaries and the sustainable agriculture value chain (red), the food industry in emerging markets (green), governance and price mechanisms in the agricultural commodity market (blue), and sustainable food systems (yellow). For example, "sustainability," "value chains," and "agribusiness" are keywords in the red cluster that suggest research related to sustainability in the agricultural value chain. In the green cluster, we see keywords related to the food industry in emerging markets, including "food industry," "global value chain," and "developing countries". Intermediaries, which become the focus of this research, are located in the red cluster, indicating the relationship between this term and agriculture and sustainability.

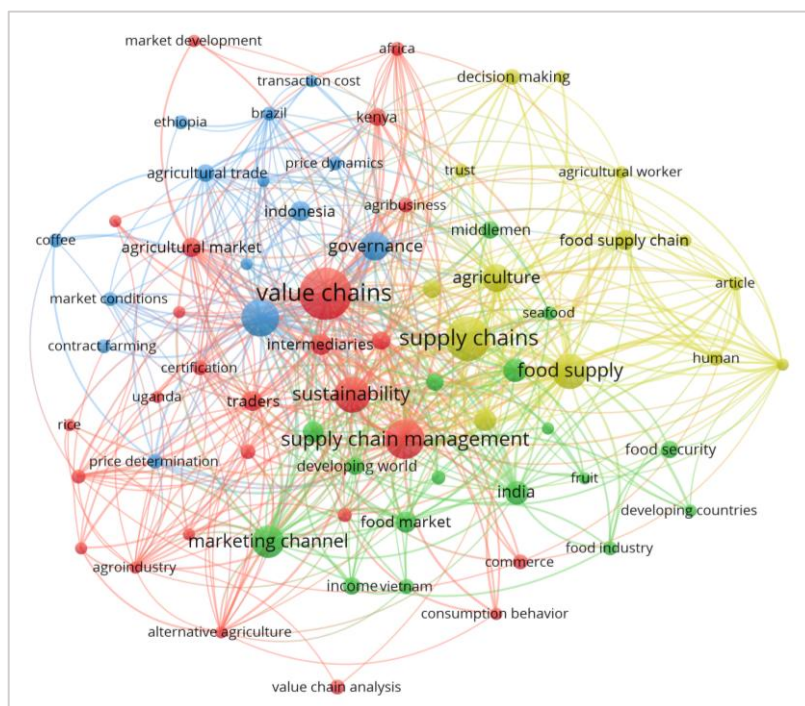


Fig. 4. The author's keywords co-occurrence network visualization

To better understand the significance of keywords, we examined three key metrics: the number of occurrences, the number of links, and the total link strength. The number of links represents how many other keywords a particular term co-occurs with. Meanwhile, the total link strength quantifies the overall intensity of these co-occurrence connections, reflecting how closely a term is linked within the research network. Table 3 presents the top five keywords for occurrence, number of links, and total link strength values.

Table 3. Number of links and total link strength of the top-5 keyword occurrences

Rank	Keyword	Number of occurrences	Number of Links	Total link strength
1	value chain	58	58	142
2	supply chain	45	47	96
3	supply chain management	37	56	140
4	smallholders	34	50	112
5	sustainability	32	51	114

Figure 5 illustrates the overlay visualization of the author's keywords. The visualization colors span from blue (lowest) to yellow (highest) based on the average publication year. This provides information to identify prospective research topics in the agriculture supply chain with low publication rates or relatively new emerging issues. Intermediaries, sustainability, food security, and agroindustry are examples of keywords that represent recent topics explored in research related to agricultural supply chains and intermediaries.

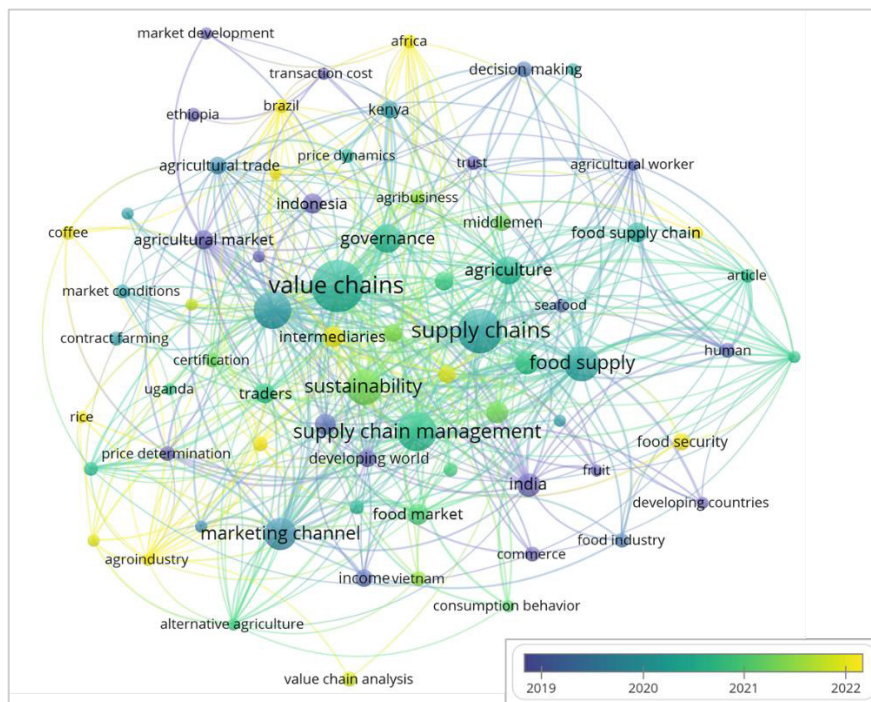


Fig. 5. Author's keywords overlay visualization

Further investigation of emerging topics through keywords is performed by assessing the centrality and density value of each keyword. Centrality indicates the extent of interactions within networks, whilst the density reflects the internal strength of the network. The centrality and density for each keyword are finalized based on the logarithmic value of occurrence and total link strength [14]. Using centrality and density, we can visualize a research field as a sequence of themes plotted onto a two-dimensional strategic diagram and distributed into four quadrants. The upper-right quadrant (quadrant 1) represents the well-developed and crucial topics to the construction of the research field. These are recognized as the domain driver themes due to their high centrality and density. The next quadrant, located at the upper-left quadrant (quadrant 2), has well-developed internal but insignificant external links and is of minimal importance to the field. These topics are very specialized and minor. The lower-left quadrant, or quadrant 3, presents a lack of adequately developed research subjects. The topics in this quadrant have low density and low centrality. They mainly indicate either emerging or declining themes. The last quadrant, or quadrant 4, refers to topics important to a research field that need to be developed. This quadrant contains general and essential issues

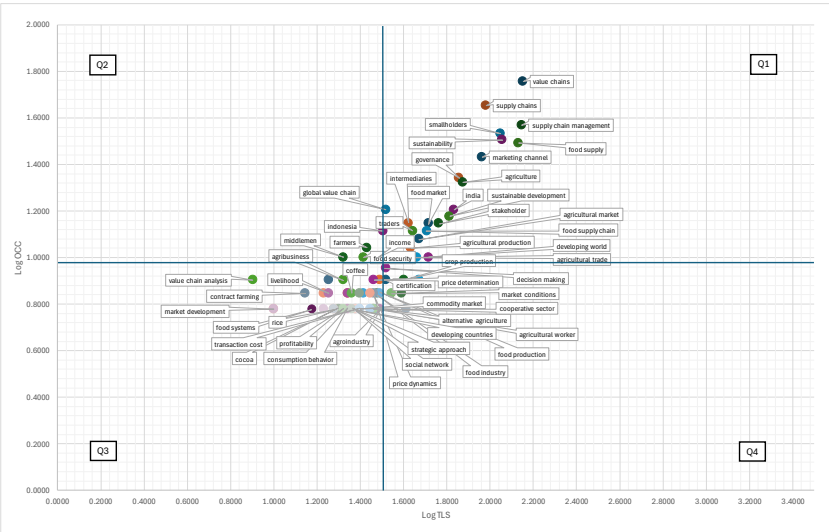


Fig. 6. Strategic diagram for the research theme

This analysis focuses on quadrant 3, which specifies emerging or declining topics related to intermediaries and the agriculture supply chain. The themes in this quadrant are separated into three sub-periods: declining themes (prior to 2019), semi-emerging themes (2019–2020), and emerging themes (post-2020). There are 38 keywords in quadrant 3, with the emerging topic comprising 14 keywords (36.84%), semi-emerging topics comprising 15 keywords (39.47%), and declining issues comprising nine keywords (23.68%). Some of the emerging keywords include agribusiness, certification, value chain analysis, food systems, social networks, and strategic approaches.

4 Conclusion

This study presents the key findings from a bibliometric analysis of agriculture supply chains and intermediaries. The analysis reveals a positive trend in annual publications over the last decade, with Balaji and Arshider as the leading authors, particularly for their work on food wastage and intermediary dynamics in perishable supply chains. Four clusters were established from the visualization of the author’s keyword co-occurrence network: (1) intermediaries and sustainable agriculture value chains, (2) the food industry in emerging markets, (3) governance and pricing mechanisms in agricultural commodity markets, and (4) sustainable food systems. These clusters highlight the diverse areas in which intermediaries operate and their connections to broader issues, including sustainability, smallholder integration, and market governance. The bibliometric mapping also emphasized the significance of certain keywords, such as value chain, supply chain, smallholders, and sustainability, as central nodes within the research network. Additionally, the overlay visualization indicated that topics such as intermediaries, food security, and agroindustry have gained attention in recent years, pointing to their relevance as emerging research areas. Through strategic diagram analysis, the study further identified 38 keywords in the "emerging or declining" quadrant, of which over one-third represent emerging themes post-2020. These include agribusiness, certification, strategic approach, and social networks, suggesting a shift in research toward more nuanced, system-oriented, and sustainability-linked perspectives on intermediary roles.

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