

## Exploring Organic Food Supply Chains: Trends and Sustainability

Muhammad Sajid Nadeem<sup>1</sup> and Ijaz Yusuf<sup>2</sup>

### **Abstract**

*The focus of this study is to deal with organic food supply chain by examining the roles of its key stakeholders (farmer, processor, wholesaler, retailer and consumer) through a systematic literature review from 2011 to 2022. Organic food has gained substantial global demand due to health-conscious consumers gravitating towards natural, pesticide-free, and chemical-free food. In contrast, conventional food production has often prioritized profitability over health, resulting in quality control issues. Organic food, however, places a premium on quality and meticulous processes. The study identifies critical research questions, investigating the significant contributions, characteristics, state-of-the-art research, and future directions in organic food supply chains. Through systematic review methodology, this study analyzed 139 papers published from 2011 to 2021. It revealed an increasing trend in organic food research, with top journals like the Journal of Cleaner Production leading the discourse. Italy emerged as the chief publishing country, with China being a prominent funding agency. The primary research methods employed included case studies and modelling, with the logistics and farming sectors of the supply chain receiving the most attention. This research offers a comprehensive overview of the organic food supply chain and its key actors, shedding light on critical research areas and trends, which can guide future studies and further the advancement of sustainable organic food supply chains.*

**Keywords:** Supply Chain, Organic Food Supply Chain Actors, Systematic Literature Review

### **Introduction**

Throughout history, humans have held a deep-seated desire for a healthy life. Central to the sovereignty, development, and transformation of nations is the realm of agriculture, with food serving as an indispensable necessity. This study embarks on an exploration of the organic food supply chain, examining the roles played by all its stakeholders. This examination is conducted through a systematic literature review from 2011 to 2022. The roots of the organic movement can be traced back to the 1960s in the Western world. Over the years, organic food has witnessed a surge in global demand (Khan et al., 2011). In pursuit of health and wellness, individuals have gravitated toward natural, pesticide-free, poison-free, and chemical-free food. While packaged and processed foods have long dominated modern culture, people worldwide are shifting their preferences toward organically grown produce, believing it to be not only healthy but also immune-boosting (Kalra, 2021; Hussain et al., 2011).

In contrast, conventional foods use chemicals, pesticides, and other harmful agricultural practices (Aslam, 2020). In this context, the primary goal has often been maximizing production for profitability, with less emphasis on human health. Quality control in conventional food supply chains is often lacking, from soil to end product and from farmer to consumer, resulting in a

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<sup>1</sup>Ph.D Scholar, Dr. Hasan Murad School of Management, University of Management & Technology, Pakistan.  
Email: [F2016051009@umt.edu.pk](mailto:F2016051009@umt.edu.pk) and [sajidnadeem@yahoo.com](mailto:sajidnadeem@yahoo.com)

<sup>2</sup>Department of Operations and Management, Dr. Hasan Murad School of Management, University of Management & Technology, Pakistan.

diminished focus on product quality (Jensen et al., 2013). In contrast to conventional food, organic food places a premium on quality, employing meticulous processes that eschew harmful pesticides and chemicals (Kilic et al., 2021; Akash et al., 2023). The organic food supply chain demands careful attention from all its actors, from consumers to farmers (Khan et al., 2023). From cultivating chemical-free soil to using healthy and hygienic water and seeds, every step is handled with care. Products are stored and packaged according to organic standards, preserving their integrity (Mayangsari et al., 2018; Khan et al., 2020).

Quality of life is a paramount concern in the modern era. Manufacturers of organic products assert that their offerings are free from artificial chemicals, environmentally friendly, and conducive to health. This assertion has led consumers to favour organic food over conventional options, as organic products reduce the risk of chronic diseases such as carcinoma and type 2 diabetes while benefiting gut microbiota (Akash et al., 2023). The risk may deprive the value of the firms (Khan et al., 2021). Additionally, organic products contribute to healthier living, fostering a sense of well-being by addressing various nutritional deficiencies in the human body (Hurtado-Barroso et al., 2019) (Khan et al., 2020; Kalra, 2021). They can also help control vitamin D deficiency, bolstering immunity and promoting a healthy lifestyle (Gumber & Rana, 2021). The organic products industry is experiencing rapid growth, bringing with it the challenge of managing the complex supply chain associated with organic goods. Achieving sustainability in the organic food chain differs significantly from conventional food supply chains (Akash et al., 2023). The supply chain activities in the organic food sector are real-time and interconnected, linking producers to consumers (Kottila et al., 2005). As a result, various supply chain techniques, such as short-distance and long-distance organic food supply chains, have emerged in the organic food industry (Ahmad et al., 2022). Organizing the organic food supply chain and aligning all stakeholders is imperative for sustainability and reaping the benefits of a value chain (Bui et al., 2021).

In supply chains, all components and actors need to be interconnected to achieve sustainability. Ecology plays a pivotal role in the organic food supply chain, where sustainability and ecology are intertwined and critical for success (Kottila et al., 2005 Amir, Bilal & Khan, 2023). A sustainable and thriving supply chain hinges on the cohesion of all actors, from the soil and farmer to the processor, distributor, retailer, and consumer. In this context, sustainability and ecology are inseparable, and a successful supply chain cannot exist without ecological harmony (Gunathilaka et al., 2021; Akash et al., 2023). The ultimate objective of this publication is to delve into the academic literature to discern prevalent themes and concepts within the organic food supply chain while identifying potential avenues for further research and areas that merit deeper exploration, ultimately contributing to the enhancement of this field. As a result, the following questions will receive the most attention:

RQ1. What have been the significant contributions and topics in organic food supply chain actors' research during the last decades?

RQ2. What are the key characteristics of OFSCA?

RQ3. What is the current state-of-the-art research on these characteristics?

RQ4. What are the future research directions or gaps that must be addressed in the field of organic food supply chains?

## **Theoretical Framework**

The theoretical framework for this study explores the dynamics and sustainability of the organic food supply chain. It is grounded in several critical theoretical perspectives and concepts, shedding light on the complex interplay of factors and stakeholders involved in organic food production and

distribution. This theoretical framework integrates concepts from Sustainable Supply Chain Management, Resource Dependency Theory, Institutional Theory, Triple Bottom Line Approach, Life Cycle Assessment, Consumer Behavior Theory, and Systems Thinking. It offers a holistic perspective on the organic food supply chain, addressing sustainability, resource interdependence, institutional pressures, and consumer behaviour to promote a healthier and more environmentally conscious food system.

## Research Methodology

A literature review is a meticulous and replicable method for investigating, evaluating, and comprehending the existing body of knowledge within a specific field (Seuring & Müller, 2008; Winter & Knemeyer, 2013). This approach stands as a critical contributor and foundation for advancing research, aiming to offer both a historical context for the subject under study and a comprehensive basis for independent research endeavors (Mentzer & Kahn, 1995). Another perspective suggests that literature reviews generally pursue two principal objectives: firstly, they aim to synthesize the overall body of research on a particular topic by identifying various patterns, themes, and concerns; secondly, they strive to establish the theoretical underpinnings of the field, potentially fostering theory development or advancement (Meredith, 1993; Harland et al., 2006). The research methodology for this study was conducted in three stages, which involved data collection and analysis to investigate the organic food supply chain comprehensively.

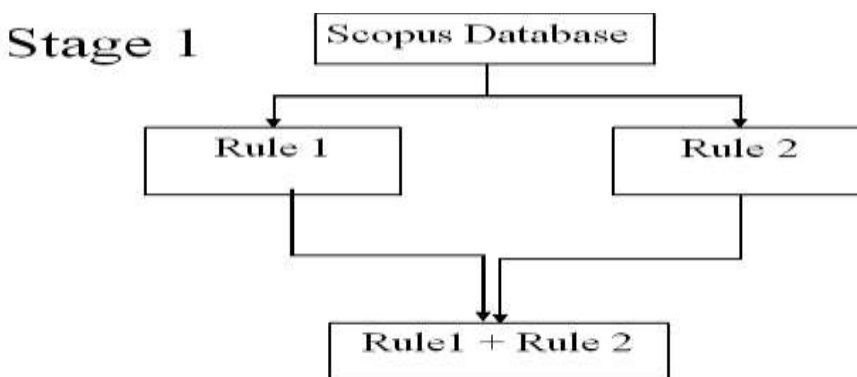
### Stage 1 Data Collection and Initial Search

In the first stage, a systematic approach was employed to identify and gather relevant data for the study. Two primary rules were established to focus the search on organic food and its supply chain. Rule 1 encompassed keywords associated with organic food like "organic farm," "organic product," "organic food," and variations thereof. Rule 2, on the other hand, included keywords related to the various supply chain actors, such as "farmer," "distributor," "processor," "wholesaler," and "consumer." By combining Rule 1 and Rule 2, the search aimed to capture articles that discussed the organic food supply chain comprehensively.

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**Figure1 Data Collection and Initial Search**

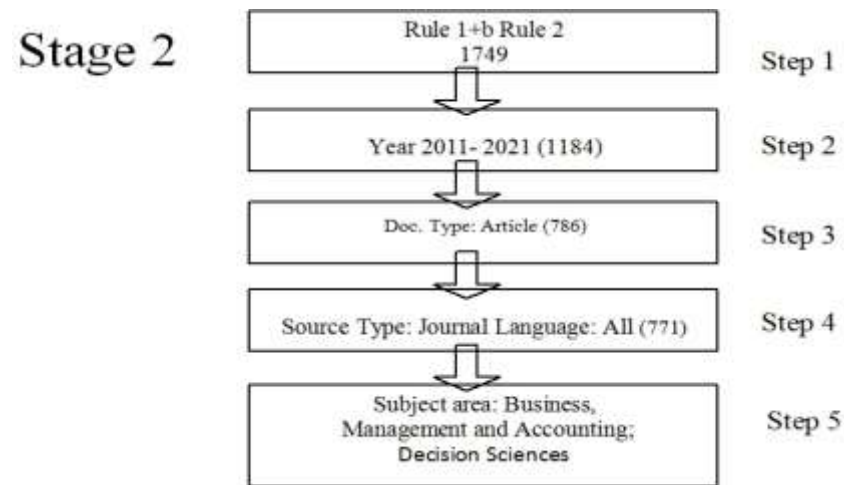
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### Stage 2 Data Analysis and Refinement

The second stage of data analysis involved several steps to narrow down the search results further. The search focused on articles published between 2011 and 2021, representing a decade of research in the field. The selection was further refined by including only articles classified as "Article" regarding document type. To ensure a diverse and comprehensive data set, the search spanned all source types while keeping the language unrestricted. Furthermore, the research was constrained to specific subject areas, namely "Business, Management, and Accounting" and "Decision Sciences," the primary domain of supply chain management.

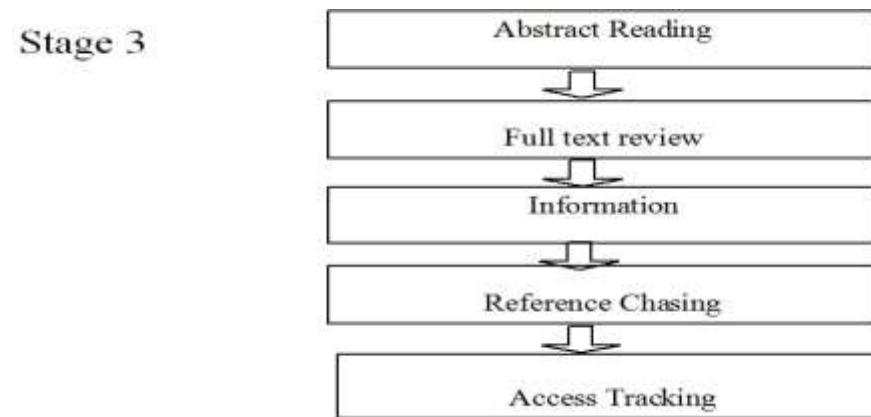
**Figure 2 Data analysis and refinement**



### Stage 3 Data Review and Content Analysis

The final stage of the research methodology involved an in-depth analysis of the collected data, which encompassed a broad spectrum of research articles. This stage consisted of various components, such as abstract reading, full-text review, information extraction, reference tracking, and access tracking.

**Figure 3 Data review and content analysis**



### Abstract Reading

A preliminary understanding of each article was established by thoroughly reading and comprehending the abstracts. This process allowed for the identification of critical topics and research themes.

**Full Text Review:** Articles with promising abstracts were subjected to a more detailed content review. This step aimed to extract essential information, gather insights and identify contributions and findings made by the authors.

**Information Extraction:** Relevant information, statistics, and data from the reviewed articles were extracted to facilitate comprehensive analysis.

**Reference Chasing:** Further exploration was conducted by following up on the references mentioned in the articles. This step often leads to the discovery of related or foundational research.

**Access Tracking:** The research also tracked the accessibility of articles, which is necessary for citation and future reference.

The three-stage research methodology was meticulously designed to ensure a comprehensive and systematic analysis of the organic food supply chain literature. This approach facilitated the extraction of valuable insights, the identification of trends, and the exploration of research directions within this critical field. The result is a comprehensive and informative study that can guide future researchers, professionals, and stakeholders in the realm of organic food supply chains and contribute to the advancement of sustainable practices.

### Search Result

A systematic review of the literature (SLR) approach was used to complete this analysis. In our four-stage SLR procedure, we first determined the rule governing the search stages, then conducted an initial search, a second search, and a third search. A crucial step in the SLR approach to creating a procedure to carry out a thorough review is the initial stage (Khannan et al., 2021). In this study, the first, second, and third steps of the search process focused on retrieved research publications on the Scopus database in 2021. The supply chain and organic food are the guiding principles of search (Khan et al., 2023). Table 1 displays two rules, subjects, and a variety of keywords. The second stage involved searching papers about the Scopus database from 2011 to 2021 using Rule 1 for organic food and Rule 2 for the supply chain.

**Table 1 Topic and Keywords**

Rule	Topic	Keywords	Numbers of Papers
Rule 1	Organic Food	"organic farm*"OR"organic product*" OR"organic food*"OR organic *"	1,548,653
Rule 2	Supply Chain	"farmer*"OR "distributor*"OR "processor*"OR "wholesaler*"OR "consumer*"	1,856,250
Rule 1 (organic food "organic farm*" OR "organic product*"OR "organic food*"OR "organic*") + Rule 2 (supply chain OR "farmer*"OR "distributor*"OR "processor*"OR "wholesaler*"OR "consumer*")			1749

When Rule No. 1 and Rule No. 2 are coupled together in the first stage from the period 1971 to 2021, the number of the document obtained is 1749. After that, at the 2nd step, all documents

published from one decade, 2011 to 2021, are sorted out, which remains 1184. In the third step, articles from 2011 to 2021 from all sources are sorted out, which are 786 in numbers. In the fourth step, the 771 research articles with the source of journals from 2011 to 2021 were classified. In step 5, using rule 1 and rule 2 articles of journals from 2011 to 2021 with a limited search of two subject areas: Business, Management, Accounting, and Decision Sciences, we found 139 papers. After screening, we found 139 papers at the final stage. Table 2 displays the number of papers with multiple keywords and rules 1 and 2.

**Table 2 Third and Fourth Stages Results**

Step	Combination	Refine	Numbers of Papers
1 <sup>st</sup>	Rule 1 and Rule 2	Year: 1971 – 2023	1749
		Doc. Type: All	
		Source Type: All	
		Language: All	
2 <sup>nd</sup>	Rule 1 and Rule 2	Year: 2011 – 2021	1184
		Doc. Type: All	
		Source Type: All	
		Language: All	
3 <sup>rd</sup>	Rule 1 and Rule 2	Year: 2011 – 2021	786
		Doc. Type: Article	
		Source Type: All	
		Language: All	
4 <sup>th</sup> Step	Rule 1 and Rule 2	Year: 2011 – 2021	771
		Doc. Type: Article	
		Source Type: Journal	
		Language: All	
5 <sup>th</sup> Step	Rule 1 and Rule 2	Year: 2011 – 2021	139
		Doc. Type: Article	
		Source Type: Journal	
		Language: English Subject area: Business, Management and Accounting; Decision Sciences	

## Review Results

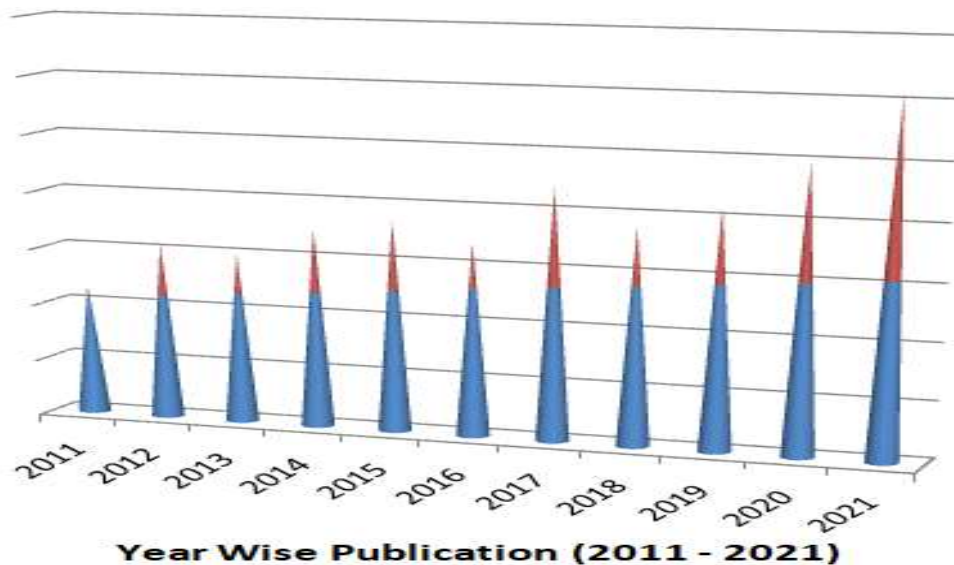
### Description Analysis

Descriptive studies necessitate directly observing behaviour and environmental events in real-world settings. When experimental manipulation is impossible, descriptive analysis involves observing the behaviour of interest in its natural context to gather information about nearby and potentially influential environmental factors. In essence, descriptive analyses identify events linked to the occurrence of a specific response. Before conducting an experimental functional analysis, descriptive analysis is commonly used as a component of a comprehensive assessment of problematic behaviour (Sloman, 2010).

## Trend Publications

A total of 139 papers were used in this study to investigate description and content analysis. The annual distribution can identify the trend publication based on the number of papers used (see Figure 1). Figure 1 shows that the trend in the organic food supply chain is growing gradually, and the number of papers increased significantly between 2011 and 2021. From 2019, there was the most significant increase in 2021. The trend of increasing organic food research was also demonstrated by (Gruauskas et al., 2019), who wrote that the contribution of small and medium farmers will increase in the future due to the increasing demand for organic food products based on research (Alleweldt et al., 2013).

**Figure 4 Trend publication on organic food in the supply chain**



## Top Journals

Table 3 shows the top 15 journals that published papers on organic food in the supply chain from 2011 to 2021. Journal of Cleaner Production (49 papers), British Food Journal (11 papers), International Journal On Food System Dynamics (8 papers), International Food and Agribusiness Management Review (5 papers), International Food And Agribusiness Management Review (5 papers) and Journal Of Food Products Marketing (5) are the top significant journals. The top six journals published 60% of the papers on organic food in the supply chain while using Rule 1 + Rule 2.

**Table 3 Total Number of Journal per Paper**

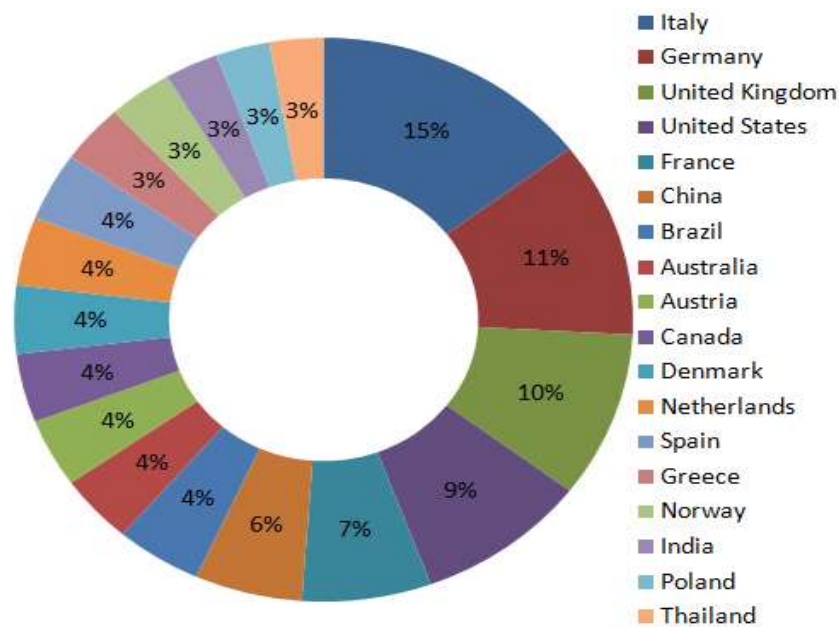
No.	Journal Name	2011-2021
1	Journal Of Cleaner Production	49
2	British Food Journal	11
3	International Journal On Food System Dynamics	8

4	International Food And Agribusiness Management Review	5
5	International Journal Of Supply Chain Management	5
6	Journal Of Food Products Marketing	5
7	International Journal Of Consumer Studies	4
8	Journal Of Agricultural And Food Industrial Organization	3
9	Quality Access To Success	3
10	Agricultural And Resource Economics	2
11	Ecological Indicators	2
12	European Journal Of Operational Research	2
13	International Journal Of Production Economics	2
14	Journal Of International Food And Agribusiness Marketing	2
15	Production And Operations Management	2

### Top Most Publishing Countries

Following image shows that the trend in countries about organic food supply chain. The research indicates that Italy is the country where most papers about organic food supply chain are published which is 15%. Germany, United Kingdom, United States, France and China are following. The research states that more than 60% literature upon organic food supply chain is published in developed countries.

**Figure 5 Top Publishing Countries**



### Top Funding Agencies

As below table indicates that the top funding agency in the area of organic food supply chain is from China so it illustrates that the China, Canada etc. are regularly investing upon the organic food supply chain.

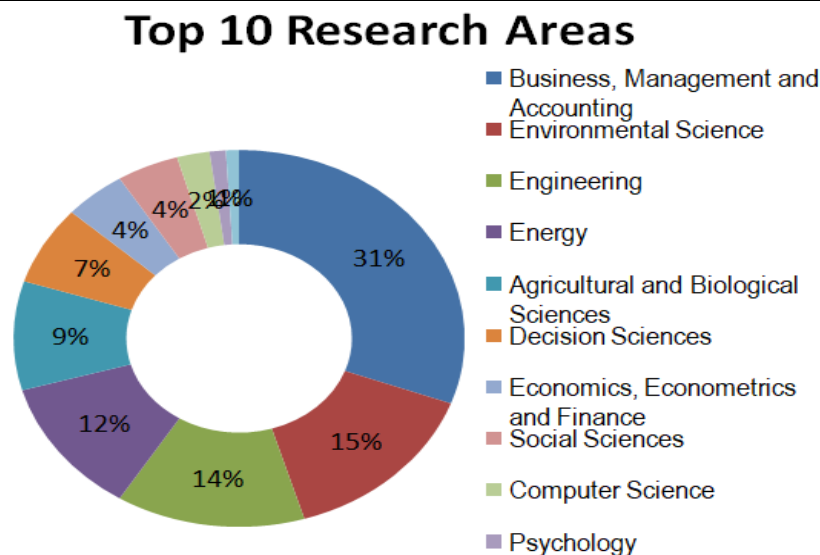


**Table 4 Top Funding Agencies**

No.	Funding Agencies	2011-2021
1	National Natural Science Foundation of China	6
2	Conselho Nacional de Desenvolvimento Científico e Tecnológico	3
3	European Commission	3
4	Horizon 2020 Framework Programme	3
5	Bundesanstalt für Landwirtschaft und Ernährung	2
6	Bundesministerium für Ernährung und Landwirtschaft	2
7	Social Sciences and Humanities Research Council of Canada	2

### Top 10 Research Areas

Top 10 research areas in organic food supply chain research where the selected articles fall are given below in which 31% research is done in the area of Business Management and Accounting 15% in Environment Sciences , 14% in Engineering , 12% in Energy, 9% in Agriculture and Biological Sciences and 7% in Decision Sciences.

**Figure 6 Top Research Areas**

### Top Cited Papers

The following are the top 20 most frequently cited articles by researchers. We must examine the They cited the top paper since it demonstrates that the top paper is advantageous and is utilized by many researchers to refer to anything and become a reference. The top paper has the same total citation value, which is 132 and ranges from 2011 to 2021. Overall, the top 20 articles reveal that the dominating ones are related to organic food supply chains, such as consumer behaviour, policy makers, farmers, processors, readymade supply chains, sustainable supply chains, climate-friendly food consumption and supply, retail, pricing, and distribution. 40% of the top papers exploring this topic since 2001 show a tendency of supply chain study on perishable items. Surprisingly, the Driver of and Barriers to organic purchase behaviour by Ven Doorn, published in 2015 and an

evaluation of environmental sustainability in the food industry through Life Cycle Assessment: The industry Life Cycle Assessment: The case study of tomato products supply chain in 2014 are the most cited article. Profiles of sustainable food consumption: Consumer behaviour toward organic food in the southern region of Brazil is the most recent article among all the top 20 most cited articles, with a total citation of 69. It demonstrates that organic research is at its height.

**Table 5 Top Funding Agencies**

No.	Title	Author Name	T C	Year
1	Drivers of and Barriers to Organic Purchase Behavior	Van Doorn J., Verhoef P.C.	132	2015
2	An evaluation of environmental sustainability in the food industry through Life Cycle Assessment: The case study of tomato products supply chain	Del Borghi A., Gallo M., Strazza C., Del Borghi M.	132	2014
3	Religion and motives for sustainable behaviors: A cross-cultural comparison and contrast	Minton E.A., Kahle L.R., Kim C.-H.	130	2015
4	Closing loops in agricultural supply chains using multi-objective optimization: A case study of an industrial mushroom supply chain	Banasik A., Kanellopoulos A., Claassen G.D.H., Bloemhof-Ruwaard J.M., van der Vorst J.G.A.J.	112	2017
5	The role of consumers in transitions towards sustainable food consumption. the case of organic food in Norway	VittersÅ, G., Tangeland T.	100	2015
6	Life cycle environmental impacts of convenience food: Comparison of ready and home-made meals	Schmidt Rivera X.C., Espinoza Orias N., Azapagic A.	99	2014
7	Environmentally friendly practices among restaurants: Drivers and barriers to change	Kasim A., Ismail A.	93	2012
8	Narrowing the gap: Factors driving organic food consumption	Chekima B., Oswald A.I., Wafa S.A.W.S.K., Chekima K.	90	2017
9	Environmental impact assessment of organic and conventional tomato production in urban greenhouses of Beijing city, China	He X., Qiao Y., Liu Y., Dendler L., Yin C., Martin F.	90	2016
10	Logistics network design for perishable products with heterogeneous quality decay	de Keizer M., Akkerman R., Grunow M., Bloemhof J.M., Haijema R., van der Vorst J.G.A.J.	84	2017
11	The water footprint of soy milk and soy burger and equivalent animal products	Ercin A.E., Aldaya M.M., Hoekstra A.Y.	84	2012
12	Environmental sustainability of agri-food supply chains: An LCA comparison between two alternative forms of	Tasca A.L., Nessi S., Rigamonti L.	78	2017

	production and distribution of endive in northern Italy			
13	Critical success factors in Short Food Supply Chains: Case studies with milk and dairy producers from Italy and Brazil	Sellitto M.A., Vial L.A.M., Viegas C.V.	71	2018
14	Consumer reactions to the availability of organic food in discount supermarkets	Gottschalk I., Leistner T.	70	2013
15	Profiles of sustainable food consumption: Consumer behavior toward organic food in southern region of Brazil	Feil A.A., Cyrne C.C.D.S., Sindelar F.C.W., Barden J.E., Dalmoro M.	69	2020
16	Sustainable Consumption and the Attitude-Behaviour-Gap Phenomenon - Causes and Measurements towards a Sustainable Development	Terlau W., Hirsch D.	64	2015
17	How stable is the value basis for organic food consumption in China?	ThÃgersen J., Zhou Y., Huang G.	63	2016
18	Conservation tillage and nutrient management effects on productivity and soil carbon sequestration under double cropping of rice in north eastern region of India	Yadav G.S., Lal R., Meena R.S., Babu S., Das A., Bhowmik S.N., Datta M., Layak J., Saha P.	61	2019
19	Consumers' preferences for carbon labels and the underlying reasoning. A mixed methods approach in 6 European countries	Feucht Y., Zander K.	58	2018
20	A sustainable supply chain for organic, conventional agro-food products: The role of demand substitution, climate change and public health	Sazvar Z., Rahmani M., Govindan K.	56	2018

### Content Analysis

This research section assigns content analysis from articles, including study methods and supply chain scope.

### Research Methods Applied

The classification of research methods in this review paper employs five categories of research methods (Kothari, 2004): modelling, case study research, conceptual framework, empirical studies, and literature review. One of the research methodologies is modelling research, in which the proposed model is assumed to represent the actual system and requires the necessary information (e.g., input, parameters) (Sulistyo, 2013). Case study research is a type of qualitative research that involves a survey or observation of an organization, social unit, institution, or other entity. In general, the study's scope is broad, and the period is extensive (Kothari, 2004). As stated by Kothari (2004), conceptual research is the generation of new ideas or concepts from pre-existing ideas or theories. Empirical studies, on the other hand, are based on experience or experiments from a study in which researchers can manipulate the research factors. A conceptual model is a set

of concepts that symbolize (but do not explain) an event, object, or process. A conceptual model's premises are only logical statements, not epistemological links (Meredith, 1993). The empirical study was motivated by observations of a phenomenon, which typically begins with questions about what happened, what the event entails, and how frequently it occurs. Empirical research examining observed events, on the other hand, must have a well-thought-out explanation for the study, such as why it is intriguing or potentially relevant (Helfat, 2007). A literature review distills the available literature in a discipline to summarize the state of the art. Based on this analysis of earlier and recent work, it is possible to suggest areas where more research may be beneficial (Slack, 2004).

**Table 6 Research Methodology**

Research Methodology	No of Papers
Case Study	55
Modeling	20
Empirical	13
Conceptual	11
Literature Review	06

### Scopes of Supply Chain

The food supply chain has several links and operates globally, including many stakeholders, from farmers to forks (Verhoosel et al., 2018). Various participants in the fresh food supply chain (fruit and vegetables) in the United Kingdom have realized the relevance of process integration and have launched measures to strengthen their vertical coordination (Wilson, 1996). It suggests that organic food supply chain management should be explored. Table 6 illustrates the number of research articles published in each supply chain domain. The logistics and farming sectors of the supply chain have received the most attention. The food supply chain has several links and operates globally, including many stakeholders, from farmers to forks (Verhoosel et al., 2018). Various participants in the fresh food supply chain (fruit and vegetables) in the world have realized the relevance of process integration and have launched measures to strengthen their vertical coordination (Wilson, 1996). It demonstrates that not only processes and activities in the farming area but also processes and activities in the logistics area must be regulated.

**Table 7 Scopes of Supply Chain**

Scopes of Chain	Number of Papers	Authors (example)
Farmer/Farming	30	Del Borghi, A., Gallo, M., Strazza, C., & Del Borghi, M. (2014); He, X., Qiao, Y., Liu, Y., Dendler, L., Yin, C., & Martin, F. (2016)
Processor/Food Processing	26	Banasik, A., Angelopoulos., Claassen, G. D. H., Bloemhof-Reward, J. M., & van der Vorst, J. G. (2017);
Distributor/Logistics	23	Rivera, X. C. S., Orias, N. E., & Azapagic, A. (2014); Tasca, A. L., Nessi, S., & Rigamonti, L. (2017)
Whole seller/Retail	17	Kasim, A., & Ismail, A. (2012); Sellitto, M. A., Vial, L. A. M., & Viegas, C. V. (2018)
Consumer/End customer	43	Van Doorn, J., & Verhoef, P. C. (2015); Minton, E. A., Kahle, L. R., & Kim, C. H. (2015);
Total	139	

## Conclusion

This study has explained a comprehensive assessment of organic food along the supply chain and all five supply chain actors (farmer, distributor, processor, wholesaler, and consumer) across time-based on bibliometric and content research. Based on the scientific papers contribute to organic food supply chain research along with its actors and how researchers contribute to the growing discipline of supply chain management in the organic food business. To the best of our knowledge, this is the first study to employ content analysis as a research strategy to determine Trend articles, Top Journals, Top 10 Most Publication Countries, Top Funding Agencies, Top 10 Research Topics, Top Cited Papers, Research methods used, and Supply Chain Scopes. Despite its limitations, in this study, along with leading actors, provides knowledge and inspiration to future researchers interested in organic food supply chain research. It also opens new horizons for coming generations and researchers. This research will also help the organic food supply chain professionals to introduce a new, resilient, sustainable, automated framework. These frameworks not only serve in the organic food industry, but they will also reduce the medicine cost expended by promoting mental sustainability, well-being and a healthy lifestyle.

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