OPERATIONS AND SUPPLY CHAIN MANAGEMENT
Vol. 18, No. 3, 2025, pp. 320–342
ISSN 1979–3561 | EISSN 2579–9363

Logistics Network for Agricultural Products: A Comprehensive Literature Review and Future Directions

Tran Trung Chuyen
Faculty of Business Administration - Marketing, Nam Can Tho University
Ph.D. student at the Malaysia University of Science and Technology (MUST)
Email: ttchuyen@nctu.edu.vn

Premkumar Rajagopal
School of Business, Malaysia University of Science and Technology (MUST)
Email: premkumar@must.edu.my

ABSTRACT

The logistics network for agricultural products is instrumental in maintaining stability and guaranteeing food security for each nation. The organization and operation of logistics networks are essential issues in today's global supply chains. Many existing challenges in agricultural logistics networks need to be explored to comprehensively assess this field. Recognizing the importance of logistics networks for agricultural products based on data sources, this study collected, synthesized, and evaluated 166 academic articles from 2000 to January 2025. The main aim of this research is to provide an overview of various issues examined in the literature. Additionally, the study identifies the sustainability goals for agricultural logistics networks (economic, social, and environmental objectives). Furthermore, the study systematizes theories related to logistics networks and agricultural products. The research employs both bibliometric analysis and a systematic literature review of theoretical foundations. By combining these two methods, the study analyzes the collected literature from the Scopus database, Google, and other reliable sources. The findings indicate that research on logistics networks for agricultural products is primarily concentrated among specific authors and in notable countries such as China, the USA, Iran, and India. The main models used in the literature, including Mixed-Integer Linear Programming, Mixed Integer Programming, and Mixed-Integer Nonlinear Programming, aim to optimize cost, profit, social objectives, and environmental impact. Most studies focus on a diverse range of agricultural products such as fruits, vegetables, and meat. However, the study still has certain limitations regarding the generalizability of the issues, access to data sources, and methodologies.

Keywords: ***Logistics network, Agricultural product, Bibliometric analysis, Systematic literature review, logistics supply chain, Agriculture Supply Chain***

1. INTRODUCTION

Many studies have introduced concepts related to Logistics Networks (LN). Accordingly, LN is defined as a system of interconnected and complementary elements within the supply chain (Albrecht & Steinrücke, 2018). Additionally, LN includes procurement locations, warehousing, transportation, and distribution centers for goods (Zhang *et al.,* 2020; Huang *et al.,* 2020). Moreover, Yang et al. (2019) argue that LN also encompasses information flows throughout the system from the source point to the final destination. To connect farmers with the agricultural export system, LN also includes container logistics centers (CLC) to serve this purpose (Lin *et al.,* 2017). LN is often associated with factors such as temperature and transportation time, making it highly complex (Albrecht & Steinrücke, 2018; Cruz *et al.,* 2019). Additionally, LN involves various risks related to seasonality, weather conditions, price fluctuations, and market demand volatility (Cruz *et al.,* 2019; de Keizer *et al.,* 2015; La Scalia *et al.,* 2016; Shirzadi *et al.,* 2021; Pakdel *et al.,* 2024; Orjuela-Castro *et al.,* 2022). Logistics networks are key to the development and optimization of supply chains (Azab *et al.,* 2023; Fleischmann *et al.,* 2000). This becomes even more significant for seasonal and perishable products (Ghahremani-Nahr *et al.,* 2022; Agahgolnezhad Gerdrodbari *et al.,* 2021; Abbasian *et al.,* 2023). Simultaneously, the optimization of local networks is crucial in guaranteeing food security and impacting the economic well-being of agricultural practitioners.

The concept of agricultural products has also been explored in many studies. Agricultural products are products derived from agricultural production activities, encompassing various aspects such as crop cultivation, livestock farming, and the fisheries sector (Ghahremani-Nahr *et al.,* 2022; Cruz *et al.,* 2019; Sajedi *et al.,* 2020; Wu, 2023; Allaoui *et al.,* 2018; Baghizadeh *et al.,* 2022). Agricultural products can be either raw materials or processed products (Saffari *et al.,* 2023). Regarding agricultural products, fresh products must be mentioned. These products are perishable and deteriorate quickly, high perishability, and frequent challenges in storage and transportation (Agahgolnezhad Gerdrodbari *et al.,* 2021;

Abbasian *et al.,* 2023; Talkhestani *et al.,* 2022; Mohammadi *et al.,* 2023; Yakavenka *et al.,* 2020; Wang *et al.,* 2021). Additionally, Mohammadi & Nikzad (2023) argue that supply chain management for perishable products requires specific planning to minimize losses and maintain product quality.

Some authors define the agricultural logistics network as a complex network that includes various activities throughout the entire system, from the cultivation and delivery of agricultural goods to activities related to agricultural goods from farms to consumers (Fleischmann *et al.,* 2000; He, 2020). An efficient logistics network positively impacts the success of food producers, influencing profitability, pricing, and consumer satisfaction (Bosona & Gebresenbet, 2011). The governance of logistics networks is paramount for facilitating a suitable degree of integration and collaboration among various stakeholders. Adequate governance mechanisms guarantee the timely provision of superior quality products in optimal quantities to consumers, all while proficiently overseeing logistics expenditures (Perdana *et al.,* 2023).

This study presents a summary of studies related to the field of logistics networks for agricultural products. Previous studies have mostly focused on logistics networks in industries such as pharmaceuticals and automobiles. For instance, Dong et al. (2020) and Chandra et al. (2019) explored multimodal distribution networks in the automotive sector, demonstrating that combining truck and sea transport can reduce costs by 9.1% to 25.9% and CO2 emissions by up to 35.8% compared to traditional truck-only networks. These studies emphasize the trade-offs between economic and environmental benefits, offering valuable frameworks for designing sustainable logistics systems. Similarly, in the pharmaceutical sector, Abbasi et al. (2021) and Savadkoohi et al. (2018) developed models to minimize total costs and delivery times while managing perishable inventory and uncertain data. Their findings highlight the importance of flexible, data-driven optimization, achieving efficiency improvements of up to 34.3% in real-world applications. Despite valuable insights from other industries, existing models fail to address the unique challenges of agricultural product logistics, such as perishability, seasonality, and supply fluctuations. Agricultural supply chains, often fragmented with small-scale farmers, require tailored solutions focusing on rapid delivery, localized storage, and resilience. There is very little research specifically and comprehensively examining the logistics network for agricultural products. Consequently, the present investigation seeks to address this deficiency by undertaking an extensive and meticulous examination of logistics networks pertaining to agricultural commodities. Through this, it highlights that in this field, numerous studies have approached the topic from different perspectives, enriching the valuable resource pool for researchers. Both theoretical and empirical studies are examined through a combined approach, using a descriptive method that focuses on concepts, methods, tools, and research outputs. The study integrates bibliometric analysis and a systematic theoretical review. Some key aspects of the issue are discussed, such as prominent authors, countries conducting significant research, and the citation count of each study, all of which are relevant to the research topic.

Based on the research objectives, the remainder of this study presents a review of the employed research methodology. Next, there is content related to the literature review on Logistics Networks for Agricultural Products. The subsequent segment elucidates the findings derived from the examination of the gathered scholarly literature. Subsequently, the study summarizes the key findings. Finally, the study presents the research limitations.

2. REVIEW METHODOLOGY

A review of previous research is an instrument that helps analyze and manage the prevailing concepts in a specific research field (Kamble *et al.,* 2020; Routroy & Behera, 2017). The objective of conducting a literature review is to collect and evaluate existing studies related to a field of interest to achieve verifiable or reproducible results (Paluri & Mishal, 2020). Subsequently, a thorough examination of the relevant studies will be carried out to better understand the research issue.

2.1 Bibliometric analysis

Bibliometric analysis constitutes a quantitative, objective, and empirical methodology employed for the examination of scholarly articles. It uses tools and software to analyze the characteristics of scientific publications such as publication sources, citation frequency, and keywords, with the aim of obtaining deeper insights into the development of a specific research field (Zhou *et al.,* 2021). The primary goal of this method is to assess the development of a research area by analyzing the characteristics of the literature. Bibliometric analysis also helps identify research trends, influential authors and publications, as well as knowledge gaps (Kamewor *et al.,* 2024). The LN for agricultural products is analyzed using a CSV file downloaded from the Scopus database, with the data collection conducted on January 28, 2025. This activity aims to provide a comprehensive assessment of related issues on a global scale, rather than focusing on a specific field or a few journals.

At the beginning phase, this research performed a keyword-based search for relevant sources, utilizing the methods outlined by Paluri & Mishal (2020), Kamble et al. (2020). In the first stage, the research began by searching with the keywords "logistics network" OR "logistics supply chain" OR "Agriculture Supply Chain" OR "Perishable product" OR "agricultural product" and retrieved 56,852 documents from the Scopus database (Figure 1). Then, in the second step, the study performed a search with the keywords "logistics network" OR "logistics supply chain" OR "Agriculture Supply Chain" OR "Perishable product" AND "agricultural product", which yielded 146 documents from 1991 to January 2025. These documents comprised journals, conference proceedings, and literature reviews that had either been released or were under publication, all of which were written in English. Afterward, the publications that failed to satisfy the requirements (papers on supply chains in other industries such as pharmaceuticals, automobiles, etc.,

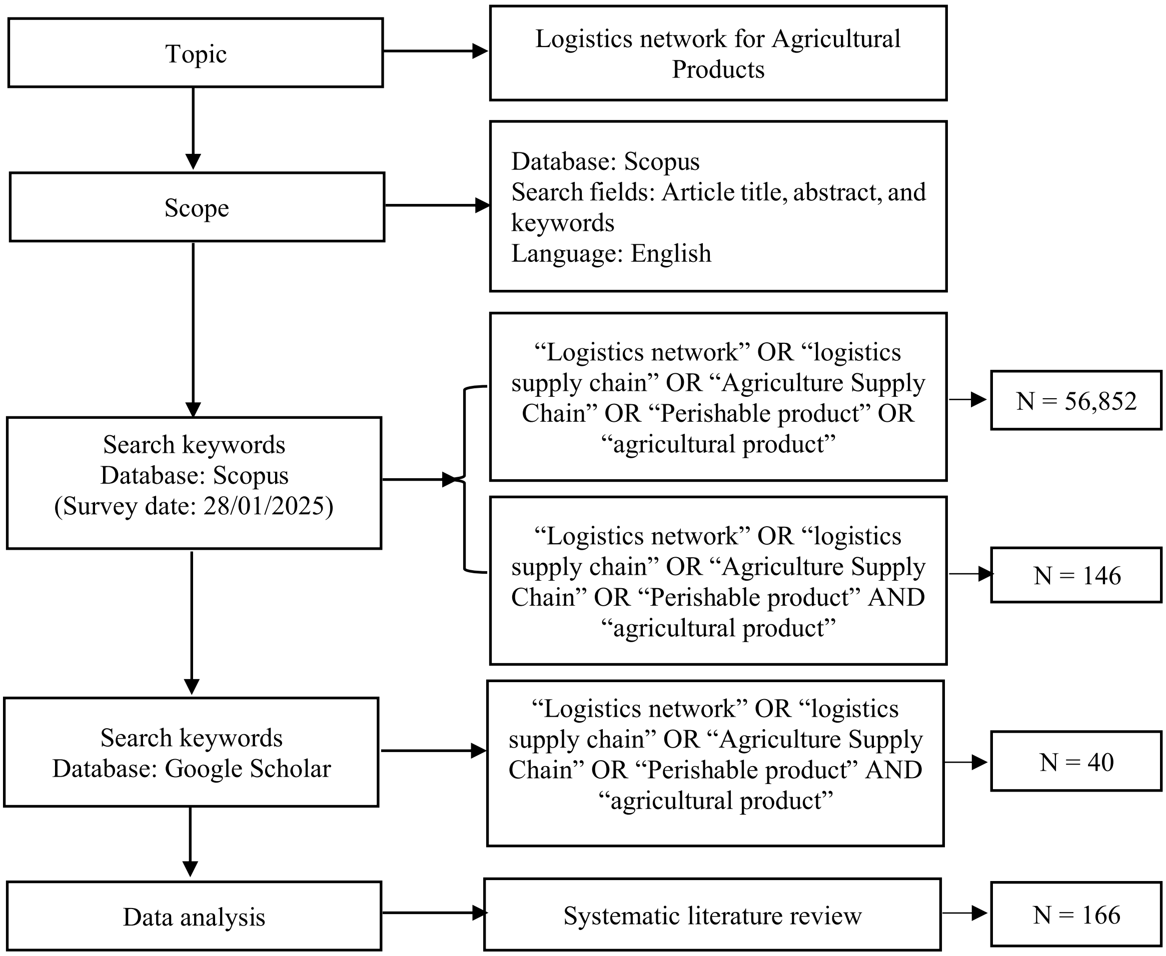

Figure 1. Research Implementation Process

and retracted papers) were excluded. After removing the non-relevant publications, 126 papers remained. Step 3 involved gathering additional relevant sources by searching for publications from Google Scholar. After conducting the search and filtering the relevant materials from Google Scholar, an additional 40 publications were selected. Therefore, after searching and filtering, a total of 166 relevant publications were included for analysis (Step 4).

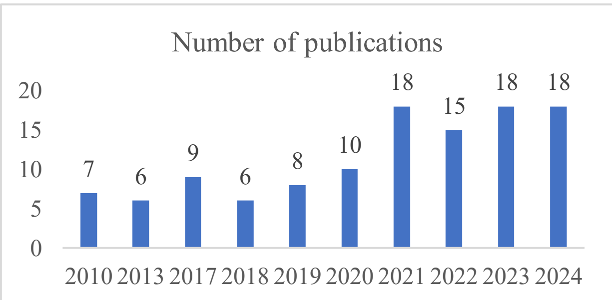

Figure 2. Number of articles published over the years on logistics networks for agricultural products

Figure 2 illustrates the annual frequency of significant scholarly publications disseminated from the year 2010 through 2024. Accordingly, the number of publications on the topic "logistics network for agricultural products" significantly increased during the period from 2021 to 2024, rising from 7 publications in 2010 to 18 publications (in 2021, 2023, and 2024), with 15 publications in 2022.

Regarding the countries with published research, China stands out, with 80 publications, far surpassing other countries. Following China, the United States has 10 publications, India has 9, and Iran and Indonesia each have 7 publications. The remaining countries have fewer publications (3 to 4 publications). These results show that China is the country most interested in the field of logistics network for agricultural products (Table 1).

Table 1. The ten leading countries involved in the literature on logistics networks for agricultural products

No.	Country affiliations of authors	
	Country	Publication count
1	China	80
2	United States	10
3	India	9
4	Iran	7
5	Indonesia	7
6	Italy	4
7	Viet Nam	3
8	Thailand	3
9	Russian Federation	3
10	United Kingdom	2

Table 2. The titles of the most cited publications.

No.	Authors	Title	Source title	Cited by
1	Ahumada & Villalobos, (2011)	Operational model for planning the harvest and distribution of perishable agricultural products	International Journal of Production Economics	181
2	Ahumada *et al.,* (2012)	Tactical planning of the production and distribution of FAP under uncertainty	Agricultural Systems	128
3	de Keizer *et al.,* (2017)	Logistics network design for perishable products with heterogeneous quality decay	European Journal of Operational Research	125
4	Yazdani *et al.,* (2021)	A multi-criteria decision-making framework for agriculture supply chain risk management under circular economy	Management Decision	125
5	Routroy & Behera, (2017)	Agriculture supply chain: A systematic review of literature and implications for future research	Journal of Agribusiness in Developing and Emerging Economies	122
6	La Scalia *et al.,* (2016)	Effect of Vibration on the Quality of Strawberry Fruits Caused by Simulated Transport	Journal of Food Process Engineering	68
7	Niu *et al.,* (2021)	The value of blockchain and agricultural supply chain parties' participation confronting random bacteria pollution	Journal of Cleaner Production	60
8	Song & He, (2019)	Contract coordination of new fresh produce three-layer supply chain	Industrial Management and Data Systems	55
9	Rajabi-Kafshgar *et al.,* (2023)	Utilizing hybrid metaheuristic approach to design an agricultural closed-loop supply chain network	Expert Systems with Applications	54
10	De Keizer *et al.,* (2015)	Hybrid optimization and simulation to design a logistics network for distributing perishable products	Computers and Industrial Engineering	52

To achieve an in-depth view of the research works, this study also considers the aspect of citation counts for each publication. Table 2 shows that among the 10 representative publications, "Ahumada & Villalobos (2011)" with the paper titled "Operational model for planning the harvest and distribution of perishable agricultural products", published in the journal "*International Journal of Production Economics"*, is the most cited publication with 181 citations. Next is the study by "Ahumada et al. (2012)" titled "Tactical planning of the production and distribution of fresh agricultural products (FAP) under uncertainty", published in the journal "*Agricultural Systems"*, with 128 citations. Following them are the studies by the author groups "de Keizer et al. (2017)" (titled "Logistics network design for perishable products with heterogeneous quality decay", published in "*European Journal of Operational Research"*) and "Yazdani et al. (2021)" (titled "A multi-criteria decision-making framework for agriculture supply chain risk management under a circular economy context", published in "*Management Decision"*), each with 125 citations. The publication by "Routroy & Behera (2017)" titled "Agriculture supply chain: A systematic review of literature and implications for future research", published in the "*Journal of Agribusiness in Developing and Emerging Economies"*, also has a high citation count with 122 citations. The remaining publications have citation counts ranging from 52 to 68. Overall, although these publications have been published in recent years, their citation counts are relatively high, signifying that scholarly inquiry within the domain of "logistics network for agricultural products" is gaining increasing attention.

2.2 Systematic literature review

The systematic literature review in this document was conducted to collect and evaluate existing studies relevant to the topic, with the aim of achieving verifiable or reproducible results. It is not merely a grouping of existing literature but also serves as a guide for researchers and specialists in the domain. This study applies the systematic review of literature method based on the works of Paluri & Mishal (2020), Kamewor et al. (2024), and Bhattacharya et al. (2024). The review is executed through three sequential phases:

- ***Stage 1:*** Planning the review, including specifying the need for the review of the literature, refining the key inquiries of the study, and determining the strategy and criteria for selecting articles.
- ***Stage 2:*** Conducting the review, including identifying relevant documents, selecting key studies, collecting data, comprehensively evaluating the data, identifying emerging research trends, and providing suggestions for future research.
- ***Stage 3:*** Reviewing relevant documents, synthesizing data, and writing and validating reports.

The study uses data collected from the Scopus database (126 publications after excluding irrelevant ones, with a search conducted in January 2025) and continues with a repeated search on Google Scholar (adding 40 publications, with a search conducted in January 2025). In total, 166 relevant publications were included in the literature review. These data have been carefully studied and selected as representatives for analysis. The data collected mainly comes from sources such as Elsevier, Emerald, IEEE, Taylor and Francis, Springer, and ResearchGate. This ensures the diversity of data sources. Additionally, the study only uses data from articles presented in English for analysis (conference papers, reviews, book chapters, etc. will be excluded).

However, there are some issues with this database that need attention. The author does not have full access to some research articles, which led to their exclusion. Additionally, the author notes that not all research articles found by the keywords were considered, and not all articles with the search keywords were reviewed.

Table 3. Definitions related to logistics network

No.	Definition of logistics network	Authors
1	LN includes physical elements such as distribution centers, warehouses, freight terminals, transport depots, storage facilities, transfer hubs, and aggregation points. LN also encompasses the flow of information and goods between these elements	Zhang *et al.,* (2020); Shu *et al.,* (2013); Pérez-Mesa *et al.,* (2012); Huang *et al.,* (2020)
2	LN is a system of interconnected and complementary elements in the supply chain, including logistics activities and environmental conditions that affect product quality. This network involves manufacturers, suppliers, distributors, and customers, working together to increase profits by enhancing product value.	Albrecht & Steinrücke, (2018)
3	LN is a system for distributing goods from a source point to one or more destination points, including both information flow and physical goods.	Yang *et al.,* (2019)
4	LN refers to the structure and arrangement of facilities, equipment, and activities related to the transportation and storage of goods.	Shu *et al.,* (2013); Pérez-Mesa *et al.,* (2012)
5	LN is described as a three-dimensional network, connecting different supply chains both horizontally and vertically.	Huang *et al.,* (2020)
6	The LN framework encompasses the creation of sites dedicated to the production, gathering, processing, storage, commerce, and distribution of food, alongside the analysis of the intensity and periodicity of food movement among these sites.	Lin *et al.,* (2018)
7	The logistics network includes container terminals (CLCs) that play a crucial role in collecting goods from farmers and connecting to the agricultural export system.	Lin *et al.,* (2017)
8	The Logistics Supply Chain (LSC) encompasses the entire process from production to sales, as well as contracts and decisions related to pricing and logistics. It includes the management of activities such as harvesting, sorting, packaging, preservation, transportation, distribution, and retail.	Sajedi *et al.,* (2020); Sheikholeslami & Zarrinpoor, (2023); Shu *et al.,* (2013); Fu *et al.,* (2017)
9	LSC is not limited to transportation activities but also includes tasks such as network planning, scheduling, and warehouse management.	Raimbekov *et al.,* (2024)
10	LSC is the process of systematically managing and facilitating the flow of logistics operations, information transmission, and financial transactions utilizing advanced logistics systems and communication tools, by ensuring the seamless integration of various stakeholders and assets involved in the cultivation, processing, marketing, and supply of agricultural goods	Chen & Zhao, (2023)
11	Agricultural Supply Chain (ASC) constitutes a comprehensive series of activities that encompasses the entire journey "from farm to table," integrating processes such as cultivation, processing, quality inspection, packaging, storage, transportation, distribution, and marketing. ASC is also referred to by various alternative designations, including food supply chain, agricultural value chain, post-harvest supply chain, fruit supply chain, agribusiness supply chain, perishable produce supply chain, fresh produce supply chain, and horticultural supply chain.	Ghahremani-Nahr *et al.,* (2022); Raimbekov *et al.,* (2024); Pakdel *et al.,* (2024)
12	ASC comprises the comprehensive continuum from the generation to the utilization of agricultural commodities, incorporating actions such as cultivation, harvesting, processing, distribution, and retailing, as well as the contracts and accords established among the involved parties	Sajedi *et al.,* (2020)
13	The ASC constitutes a comprehensive network comprising producers, processors, wholesalers, importers and exporters, retailers along with specialized retail establishments, suppliers of inputs, logistics service providers, public sector organizations and labor unions, in addition to the requisite infrastructure for both public and private transportation and storage facilities.	Lin *et al.,* (2018)

In conclusion, this study combines both quantitative (bibliometric) and qualitative (content analysis) in a rigorous manner to guarantee the completeness and accuracy of the findings. The application of a strict screening process helps collect important information on research trends, key contributions, and potential areas for future study in the domain of LN for agricultural products.

3. LOGISTICS NETWORK FOR AGRICULTURAL PRODUCTS LITERATURE REVIEW

3.1. Various definitions of logistics network

The research findings from the literature indicate that authors have different definitions of the logistics network (LN) depending on the perspective of each study. Table 3 shows that there are many definitions of LN and some key points of these definitions. Some authors focus on the physical structure of the logistics network (LN), such as distribution centers, warehouses, and consolidation points (Zhang *et al.,* 2020; Shu *et al.,* 2013; Pérez-Mesa *et al.,* 2012; Huang *et al.,* 2020). Many studies emphasize the relationships between the components of the LN (Albrecht & Steinrücke, 2018; Lin *et al.,* 2017; Lin *et al.,* 2018). Some studies have expanded the concept of LN into Logistics Supply Chain (LSC). According to these studies, LN is not limited to transportation activities but also includes the process of network planning, scheduling, warehouse management, and distribution (Sheikholeslami & Zarringrou, 2023; Fu *et al.,* 2017).

In recent years (2020 – 2024), many studies have expanded the concept of LN. These concepts not only focus on the physical structure but also integrate digital technology, big data, and smart supply chain management (Raimbekov *et al.,* 2024; Chen & Zhao, 2023; Trinh & Chuyen, 2024). Most definitions of LN primarily refer to transportation and distribution processes, while studies on LN in the agricultural supply chain (ASC) emphasize the entire cycle from production, harvesting, storage, transportation, to consumption (Ghahremani-Nahr *et al.,* 2022; Raimbekov *et al.,* 2024; Pakdel *et al.,* 2024).

Table 4. Characteristics of logistics networks

No.	Characteristics and Applications	Source
1	ASC is often complex due to the seasonal nature of production, varying production times, low product standardization, and limitations in trade and storage.	Ghahremani-Nahr *et al.,* (2022)
2	The logistics network is often complex due to the requirements for temperature control and transportation time to ensure product quality.	Albrecht & Steinrücke, (2018); Cruz *et al.,* (2019)
3	The logistics supply chain for perishable products often faces many challenges due to their perishable nature, short shelf life, and uncertainty regarding factors such as weather and pricing.	Shirzadi *et al.,* (2021); Yang & Chen, (2021)
4	Agricultural supply chains often face numerous risks due to seasonality, weather conditions, and price fluctuations. Many agricultural products are perishable, requiring special measures for preservation and transportation.	Cruz *et al.,* (2019); de Keizer *et al.,* (2015); La Scalia *et al.,* (2016); Shirzadi *et al.,* (2021)
5	ASC has several characteristics, including raw materials sourced directly from farms; short shelf life and perishable nature; demand and prices for agricultural products can fluctuate depending on the season and market conditions; and the need for traceability.	Shu *et al.,* (2013); Pakdel *et al.,* (2024); Orjuela-Castro *et al.,* (2022)
6	The LN is essential in designing and optimizing the supply chain, especially for perishable products. Optimizing the logistics network can help reduce costs, minimize carbon emissions, and improve product quality.	Azab *et al.,* (2023); Fleischmann *et al.,* (2000); Ghahremani-Nahr *et al.,* (2022); Hiassat *et al.,* (2017); Agahgolnezhad Gerdrodbari *et al.,* (2021); Abbasian *et al.,* (2023)
7	The Logistics Supply Chain (LSC) includes freight movement, storage operations, stock control, and data management	Orjuela Castro *et al.,* (2021); Kailaku *et al.,* (2022); Dwivedi *et al.,* (2020); Yuniarti *et al.,* (2023); Soysal *et al.,* (2018); Soysal *et al.,* (2015); Soysal *et al.,* (2014)
8	The LSC can be improved by enhancing collaboration between e-commerce platforms and logistics businesses, as well as utilizing information technology and the Internet.	Hu, (2024); Hasani *et al.,* (2012)
9	The ASC has a significant impact on food accessibility and sustainability, nutritional well-being, and the livelihoods of millions of farmers	Rashvand Falari *et al.,* (2024); Chuyen et al (2024)

A review of the literature shows that studies approach the issue in diverse ways and highlight the importance of optimizing the logistics network (as presented in Table 4). Some studies focus on analyzing seasonal factors and The short-lived characteristics of products (Ghahremani-Nahr *et al.,* 2022; Pakdel *et al.,* 2024), while other authors emphasize the special requirements for preserving agricultural products, such as temperature control and the duration of product transportation (Albrecht & Steinrücke, 2018; Cruz *et al.,* 2019). This highlights the diversity in research approaches to logistics networks, from the perspective of agricultural supply chain (ASC) management to the optimization of logistics networks in general. Additionally, studies by Azab et al. (2023) and Fleischmann et al. (2000) emphasize that optimizing logistics networks not only helps reduce costs but also minimizes environmental impacts and contributes to improving product quality. This indicates that current research on logistics networks not only focuses on performance but also on sustainability and green development.

Studies on logistics networks also emphasize the important impact of digital technologies on logistics optimization. Some studies (Orjuela Castro *et al.,* 2021; Kailaku *et al.,* 2022; Dwivedi *et al.,* 2020; Yuniarti *et al.,* 2023; Soysal *et al.,* 2018; Soysal *et al.,* 2015; Soysal *et al.,* 2014) describe the logistics network as an integrated system that encompasses freight movement, storage solutions, stock control, and data management. Furthermore, other studies (Hu, 2024; Hasani *et al.,* 2012) propose strengthening cooperation between e-commerce platforms and logistics companies as an important direction for the future. Many studies also emphasize the importance of food security (Rashvand Falari *et al.,* 2024; Chuyen *et al.,* 2024) in the context of global food supply chains, which are increasingly impacted by factors such as climate change, economic crises, and global instability.

The research from the literature also reveals that there are certain limitations in the definitions of LN. Many definitions are still general and fail to distinguish between traditional logistics networks and smart logistics networks (Gumzej, 2023; Lei *et al.,* 2022; Kalkha *et al.,* 2023). The intelligent logistics system employs advanced technologies to enhance coordination, transparency, and interoperability, enabling efficient movement and management of goods, improving responsiveness to customer demands, and boosting business competitiveness. In contrast, traditional logistics networks typically rely on manual processes, manual labor, low levels of information technology, and limited communication, resulting in inefficiencies, prolonged procurement cycles, and high operational costs (Gumzej, 2023). Distinguishing between traditional and intelligent logistics networks is critical as it directly affects operational efficiency, costs, and business competitiveness in the context of a globalized market (Lei *et al.,* 2022). Furthermore, adopting intelligent networks can promote sustainable development, reduce carbon emissions, and enhance corporate social responsibility. The consequence of failing to transition to an intelligent model is that businesses may lose their competitive edge in the rapidly growing e-commerce landscape, where customers demand fast and transparent delivery (Kalkha *et al.,* 2023).

Table 5. Definitions related to agricultural products

No.	Definition of agricultural products (AP)	Authors
1	APs are derived from farming practices such as crop production, animal husbandry, and fish farming	Ghahremani-Nahr *et al.,* (2022); Cruz *et al.,* (2019); Sajedi *et al.,* (2020); Wu, (2023); Ahumada & Villalobos, (2011)
2	AP can be raw materials such as grains, vegetables, and fruits, or manufactured goods like packaged snacks, bottled juices, and preserved foods	Saffari *et al.,* (2023)
3	AP can include various types such as vegetables, fruits, meat, eggs, milk, seafood, and grains.	Allaoui *et al.,* (2018); Baghizadeh *et al.,* (2022)
4	FAP are characterized by a short shelf life, difficulty in preservation, and high perishability; the aspect of freshness constitutes a significant variable that impacts consumer purchasing behavior, alongside the factor of price.	Agahgolnezhad Gerdrodbari *et al.,* (2021); Abbasian *et al.,* (2023); Talkhestani *et al.,* (2022)
5	Perishable products are items with a short shelf life and whose quality deteriorates over time.	Mohammadi *et al.,* (2023); Yakavenka *et al.,* (2020); Shu *et al.,* (2013); Wang *et al.,* (2021); Belamkar *et al.,* (2023); Ji *et al.,* (2021); Orjuela-Castro *et al.,* (2023); Allaoui *et al.,* (2018)
6	Perishable products can include fresh foods such as fruits, vegetables, meat, seafood, and dairy products.	Golestani *et al.,* (2021)
7	A product is defined as perishable if at least one of the following conditions occurs during the handling process: (1) its quality or quantity significantly decreases, (2) its value decreases over time, and (3) its reduced functionality leads to hazardous consequences.	Hiassat *et al.,* (2017)
8	Perishable products need to be transported and stored in low-temperature environments to maintain quality and extend shelf life. Managing the supply chain for perishable products requires careful planning of transportation and inventory to minimize spoilage and preserve the value of the products.	Mohammadi & Nikzad, (2023)
9	The agricultural logistics network is a complex system that includes operations related to the production and distribution of agricultural or horticultural products from farms to end users.	Fleischmann *et al.,* (2000); Abbasi *et al.,* (2021); He, (2020)

There is also a lack of clarity between regional logistics networks and global logistics networks, despite this being an important factor in LN research. Global logistics helps balance the supply and demand for food but faces major challenges such as high transportation costs and risks from climate change, with losses for fruits and vegetables reaching up to 50-60%. Regional logistics, through infrastructure improvements and packaging standards, can significantly reduce losses while enhancing local distribution efficiency (FAO, 2022). According to GTS (2024), 10% of global trade involves agricultural commodities, with global logistics playing a crucial role in transitioning from subsistence farming to commercial agriculture. However, regional logistics helps reduce transportation costs and damage, particularly for perishable products, supports local economies, and promotes sustainable development.

In the era of Industry 4.0, it is necessary to update the content regarding the influence of artificial intelligence (AI), blockchain, and big data on LN management. According to Chuyen et al. (2024), these technologies help address issues such as food safety, sustainability, and increasing demand. Gumzej (2023) emphasizes that the Intelligent Logistics System (iLS), with smart agents and Big Data, enables route optimization and process automation, reducing transportation costs and delivery times. Kalkha et al. (2023) add that IoT and Blockchain provide real-time tracking and traceability, ensuring food safety and building consumer trust. While digital technologies (such as AI, IoT, Blockchain, and cloud computing) are key components of Industry 4.0, they differ in approach and level of integration. Digital technologies often focus on individual solutions, such as using AI for demand forecasting or IoT for tracking shipments (Gumzej, 2023). In contrast, Industry 4.0 represents an integrated ecosystem, where these digital technologies are combined with elements like automation, Big Data analytics, and autonomous systems to create superior value (Chuyen *et al.,* 2024).

3.2. Various reported definitions of agricultural products

The synthesis of research results from various sources, as presented in Table 5, shows that authors have different perspectives on the definition of “agricultural product”, reflecting the diversity of types and uses. Authors such as Ghahremani-Nahr et al. (2022), Cruz et al. (2019), Sajedi et al. (2020), Wu (2023), and Ahumada & Villalobos (2011) emphasize that agricultural products include crops, livestock, and aquaculture. In contrast, other studies specify agricultural products to include vegetables, fruits, meat, milk, grains, and seafood (Saffari *et al.,* 2023; Allaoui *et al.,* 2018; Baghizadeh *et al.,* 2022).

Researchers like Agahgolnezhad Gerdrodbari et al. (2021), Abbasian et al. (2023), and Talkhestani et al.

Table 6. Characteristics of agricultural products

No.	Characteristics of Agricultural Products (AP)	Authors
1	AP, especially fresh ones, are perishable, have a short lifespan, quality deteriorates over time, are sensitive to environmental conditions such as temperature and humidity, and are prone to post-harvest losses	Abbasian *et al.,* 2023; Belamkar *et al.,* 2023; Daneshvar *et al.,* 2023; Ghahremani-Nahr *et al.,* 2022; He, 2020; Huaizhi & Abdullah, 2024; Saffari *et al.,* 2023; Sajedi *et al.,* 2020; Talkhestani *et al.,* 2022; Wang *et al.,* 2021; Zhou *et al.,* 2024; Zhu *et al.,* 2023
2	AP have uncertain quality, fluctuate over time, are inconsistent, depend on shelf life, and may vary in different quality levels	Ahumada & Villalobos, 2011; Allaoui *et al.,* 2018; Cruz *et al.,* 2019; Daneshvar *et al.,* 2023; Ji *et al.,* 2021; Mohammadi & Nikzad, 2023; Mohammadi *et al.,* 2023; Sajedi *et al.,* 2020; Sun *et al.,* 2020; Xu *et al.,* 2019; Yakavenka *et al.,* 2020
3	AP require temperature control, careful quality management, cold chain, and accurate transportation time to maintain quality and reduce losses, due to their sensitivity to environmental conditions and time.	Agahgolnezhad Gerdrodbari *et al.,* 2021; Costopoulou & Lambrou, 2000; Ghahremani-Nahr *et al.,* 2022; He, 2020; Huaizhi & Abdullah, 2024; Orjuela-Castro *et al.,* 2023; Sajedi *et al.,* 2020; Wang *et al.,* 2021; Yao *et al.,* 2023; Zhu *et al.,* 2023
4	Agricultural production is influenced by seasonality, weather, pests, and uncertain market demand, leading to fluctuations in yield and prices	Ahumada *et al.,* 2012; Costopoulou & Lambrou, 2000; Daneshvar *et al.,* 2023; Hu, 2024; Wang *et al.,* 2021
5	Agricultural logistics is closely related to the geographic/climatic characteristics of the region, through a network of dispersed facilities (farms, collection centers, distribution, warehouses, retailers) and interregional/international transportation, influenced by distance, infrastructure, and transportation conditions	Belamkar *et al.,* 2023; Daneshvar *et al.,* 2023; He, 2020; Huaizhi & Abdullah, 2024; Hu, 2024; Ji *et al.,* 2021; Saffari *et al.,* 2023; Wu, 2023; Xu *et al.,* 2019; Yao *et al.,* 2023; Zhou *et al.,* 2024; Zhu *et al.,* 2023
6	Agricultural logistics requires network design and optimal location decisions based on distance, spoilage rates, regional characteristics, and transportation speed to reduce costs and losses	Abbasian *et al.,* 2023; Agahgolnezhad Gerdrodbari *et al.,* 2021; Ji *et al.,* 2021; Mohammadi & Nikzad, 2023; Orjuela-Castro *et al.,* 2023; Saffari *et al.,* 2023; Talkhestani *et al.,* 2022; Wang *et al.,* 2021; Yakavenka *et al.,* 2020
7	AP play a crucial role in maximizing profits, increasing farmers' income, and improving livelihoods, especially for small-scale farmers	Belamkar *et al.,* 2023; Costopoulou & Lambrou, 2000; He, 2020; Hu, 2024; Sun *et al.,* 2020; Talkhestani *et al.,* 2022; Wu, 2023; Yakavenka *et al.,* 2020; Yao *et al.,* 2023; Zhou *et al.,* 2024
8	Optimizing agricultural logistics aims to reduce transportation costs, storage costs, post-harvest losses, and stockouts, while enhancing supply chain efficiency	Ahumada & Villalobos, 2011; Costopoulou & Lambrou, 2000; Daneshvar *et al.,* 2023; He, 2020; Hu, 2024; Ji *et al.,* 2021; Mohammadi & Nikzad, 2023; Mohammadi *et al.,* 2023; Sun *et al.,* 2020; Xu *et al.,* 2019; Yao *et al.,* 2023
9	Agricultural logistics contributes to creating job opportunities, reducing lost labor days, supporting rural economies, and promoting local economic development	Belamkar *et al.,* 2023; He, 2020; Huaizhi & Abdullah, 2024; Mohammadi & Nikzad, 2023; Mohammadi *et al.,* 2023; Saffari *et al.,* 2023; Sun *et al.,* 2020; Wang *et al.,* 2021; Yakavenka *et al.,* 2020; Yao *et al.,* 2023
10	AP play a crucial role in ensuring food safety, food security, and consumer health	Ahumada *et al.,* 2012; Allaoui *et al.,* 2018; Daneshvar *et al.,* 2023; He, 2020; Huaizhi & Abdullah, 2024; Mohammadi & Nikzad, 2023; Orjuela-Castro *et al.,* 2023; Saffari *et al.,* 2023; Sun *et al.,* 2020; Wang *et al.,* 2021; Yakavenka *et al.,* 2020; Zhu *et al.,* 2023
11	Agricultural logistics needs to balance economic, environmental, and social factors, aiming for sustainable development, reducing carbon emissions, minimizing pollution, and enhancing social responsibility	Daneshvar *et al.,* 2023; Ji *et al.,* 2021; Mohammadi *et al.,* 2023; Orjuela-Castro *et al.,* 2023; Saffari *et al.,* 2023; Talkhestani *et al.,* 2022; Wang *et al.,* 2021; Yakavenka *et al.,* 2020; Zhou *et al.,* 2024
12	Effective ASC management helps improve product quality, meet consumer demand, and enhance customer satisfaction	Abbasian *et al.,* 2023; Costopoulou & Lambrou, 2000; Hu, 2024; Ji *et al.,* 2021; Sun *et al.,* 2020; Zhu *et al.,* 2023
13	AP often have small, scattered supplies geographically, with low value and small profits, making logistics management challenging	Huaizhi & Abdullah, 2024; Wu, 2023; Zhu *et al.,* 2023
14	The ASC needs to be managed to enhance resiliency against risks such as price fluctuations, weather, and environmental conditions	Abbasian *et al.,* 2023; Ahumada *et al.,* 2012; Hu, 2024

(2022) emphasize the perishable nature, limited usability period, and strict storage requirements of FAP. Research by Mohammadi et al. (2023), Yakavenka et al. (2020), Shu et al. (2013), Wang et al. (2021), Belamkar et al. (2023), Ji et al. (2021), Orjuela-Castro et al. (2023), and Allaoui et al. (2018) focuses on the perishability over time and the cold storage requirements of the products. Thus, most definitions of agricultural products recognize that the perishable nature of the product is a characteristic of agricultural goods, which necessitates proper storage and transportation planning.

Additionally, in the study by Hiassat et al. (2017), three criteria are provided to determine whether a product can be considered perishable: (1) Decrease in quality or quantity over time, (2) Decrease in market value over time, and (3) Reduction in functionality to a level that poses a risk to consumers. This is seen as a systematic approach that could help classify agricultural products in future studies. To maintain product quality and shelf life, Mohammadi & Nikzad (2023) emphasize that cold storage and transportation under low-temperature conditions are crucial for perishable products.

The results from Table 6 show that agricultural products, particularly fresh ones, have complex characteristics with a short lifespan, perishability (Abbasian *et al.,* 2023; Belamkar *et al.,* 2023; Daneshvar *et al.,* 2023; Ghahremani-Nahr *et al.,* 2022), and fluctuating quality, requiring strict logistics management with cold chains and optimal location decisions to reduce losses (Agahgolnezhad Gerdrodbari *et al.,* 2021; Costopoulou & Lambrou, 2000; Ghahremani-Nahr *et al.,* 2022). Seasonality, small and scattered supplies, and geographic dispersion further increase challenges in transportation and storage (Ahumada *et al.,* 2012; Costopoulou & Lambrou, 2000; Belamkar *et al.,* 2023; Daneshvar *et al.,* 2023; He, 2020; Huaizhi & Abdullah, 2024). Socio-economically, agricultural products play an essential role in food security and job creation, while also contributing to increasing farmers' income, rural development, and promoting sustainability through reducing emissions and social responsibility (Ahumada *et al.,* 2012; Allaoui *et al.,* 2018; Daneshvar *et al.,* 2023; He, 2020; Belamkar *et al.,* 2023; Huaizhi & Abdullah, 2024). However, the inconsistency in quality and environmental risks require modern, flexible logistics solutions with high resiliency to meet market demand and optimize the supply chain (Cruz *et al.,* 2019; Daneshvar *et al.,* 2023; Ji *et al.,* 2021; Mohammadi & Nikzad, 2023; Mohammadi *et al.,* 2023; Abbasian *et al.,* 2023; Ahumada *et al.,* 2012; Hu, 2024).

4. EXPLORATORY ANALYSIS

4.1. Research methodology

The results summarized in Table 7 show that, for logistics network for agricultural products, various models have been used to address different research objectives. Specifically, as shown in Table 7, the studies employed mathematical models to tackle the issues. Mathematical Programming Models dominate the literature due to their ability to optimize complex logistics problems. The most common models include:

Mixed Integer Programming (MIP): MIP is a broad class of optimization models that combine continuous and integer variables to address problems such as facility location, routing, and scheduling. MIP includes both linear and nonlinear formulations. In the reviewed studies, MIP accounts for 5.4% (9 out of 166 papers), as seen in works like Pitakaso et al. (2022); Chen et al. (2022); Orjuela-Castro et al. (2023); Mohammadi & Nikzad (2023).

Mixed-Integer Linear Programming (MILP): A subset of MIP, MILP restricts the objective function and constraints to linear relationships, making it computationally efficient for problems like cost minimization or profit maximization. MILP is the most frequently used model, appearing in 33.1% (55 out of 166 papers), including studies by Fleischmann et al. (2000); Hasani et al. (2012); de Keizer et al. (2015); Rezaei-Malek et al. (2016); Daroudi et al. (2021). The popularity of MILP stems from its flexibility in handling large-scale logistics problems with discrete decisions.

Mixed-Integer Nonlinear Programming (MINLP): Another subset of MIP, MINLP allows nonlinear objective functions or constraints, suitable for complex problems involving nonlinear relationships. MINLP also accounts for 5.4% (9 out of 166 papers), with examples like Navazi et al. (2019); Patidar & Agrawal (2020); Dwivedi et al. (2020); Asghari et al. (2021). MINLP extends MILP's capabilities but is more computationally intensive.

Simulation Model (SIM): Unlike optimization models, SIM replicates system behavior to evaluate scenarios, such as logistics performance under varying conditions. SIM accounts for 4.2% (7 out of 166 papers), with studies like Lütjen et al. (2013); La Scalia et al. (2016); Xu et al. (2019); Perdana et al. (2023); Miao & Ni (2023); Jin (2024). SIM is particularly useful for testing network resilience without requiring a strict optimization framework.

Linear Programming (LP): LP involves continuous variables and linear constraints, typically applied to simpler optimization problems (such as in studies by Munhoz & Morabito, 2014; Ji *et al.,* 2021). LP is less common due to its inability to handle discrete decisions, which are common in logistics networks.

Inventory Routing Problem (IRP): IRP combines inventory management and vehicle routing, focusing on optimizing delivery schedules for perishable products (e.g. Soysal *et al.,* 2015; Soysal *et al.,* 2018). IRP is a distinct model but can be formulated as an MILP or MINLP.

Genetic Algorithm (GA): GA is a heuristic optimization technique inspired by natural evolution, used to solve complex, nonlinear problems where exact methods are computationally infeasible (studies like Malashin *et al.,* 2024; Wang, 2022; Nanthasamroeng *et al.,* 2022). GA complements mathematical programming by providing approximate solutions for large-scale problems.

Bi-level Programming: A specialized form of MIP, bi-level programming models hierarchical decision-making, where an upper-level decision (e.g., network design) influences lower-level decisions (e.g., routing). This approach often falls under MIP but is distinguished by its multi-level structure.

Stochastic Programming: This method incorporates random variables to handle uncertainties, such as demand fluctuations or transportation times. Stochastic programming can be integrated into MILP, MIP, or MINLP frameworks, depending on the problem's structure. Its overlap with other models depends on whether the underlying formulation is linear or nonlinear.

In addition, an overview of other studies in the 166 documents shows various methods used in many studies. For instance, in the studies by Wang *et al.,* (2024); Zhu *et al.,* (2023), the "bi-level programming model" was used to plan convenient delivery routes for multi-point deliveries and to design the early-stage cold chain logistics network for AP. Additionally, in other studies, the authors used regression analysis methods to identify the relationship between cooperation and the operational efficiency of suppliers of perishable fruits and vegetables; identify ways to diversify sales channels; build logistics networks for agricultural products; and organize and efficiently arrange logistics infrastructure for the storage, marketing, and business of agricultural food products (Zhang & Li, 2023; Yao *et al.,* 2023; Raimbekov *et al.,* 2024; Pu *et al.,* 2021). In the studies by Chen *et al.,* (2018); Violi *et al.,* (2024), the "Stochastic Programming" method was used to build models for optimal distribution and inventory planning over a short or medium time period. Many other studies also applied methods such as information synthesis, analysis, evaluation, descriptive statistics, reliability testing, value analysis, and factor analysis to evaluate and analyze the cold chain logistics in the agricultural sector; identify areas for improvement in the current cold chain logistics system; and assess the factors affecting logistics service quality (LSQ) in the e-commerce of fresh products (Huaizhi & Abdullah, 2024; Wang *et al.,* 2024; de Keizer *et al.,* 2015; Tyukhtenko *et al.,* 2024; Pal & Kant, 2019; Wu, 2023; Hammond *et al.,* 2022; Zhao *et al.,* 2022).

An analysis of 166 studies reveals clear trends in method selection. MILP dominates (33.1%) due to its computational efficiency and ability to model discrete decisions in large-scale logistics networks, particularly for perishable products such as fruits, vegetables, and meat (Table 7). MIP and MINLP, though less common (each accounting for 5.4%), are preferred for problems requiring flexibility (MIP) or nonlinear relationships (MINLP), such as quality degradation or complex cost structures. Time-based trends in research methods show notable changes. From 2000 to 2010, simpler models such as LP were applied (Fleischmann *et al.,* 2000), focusing on cost optimization. From 2011 to 2020, the use of MILP surged (e.g., Hasani *et al.,* 2012; de Keizer *et al.,* 2015; Rezaei-Malek *et al.,* 2016), reflecting an increasing focus on multi-product logistics and perishable goods. After 2020, more advanced methods emerged, including MINLP (e.g., Asghari *et al.,* 2021), stochastic programming (e.g., Violi *et al.,* 2024), and GA (e.g., Malashin *et al.,* 2024), aimed at addressing uncertainties and nonlinear dynamics. This development aligns with the growing complexity of supply chains, driven by globalization, e-commerce, and the demand for sustainability.

4.2 Research Objectives

A synthesis of the literature indicates that authors employ various models to optimize objectives related to cost, profit, and environmental and social impacts. The results from Table 7 reveal that among these objectives, most authors focus on maximizing profit and minimizing production, transportation, and storage costs (Fleischmann *et al.,* 2000; Ahumada & Villalobos, 2011; Pérez-Mesa *et al.,* 2012; Rezaei-Malek *et al.,* 2016; Cruz *et al.,* 2019; Liao *et al.,* 2020; Asghari *et al.,* 2021; Talkhestani *et al.,* 2022; Rahbari *et al.,* 2023; Gholian-Jouybari *et al.,* 2024; Shafiee Motlaq-Kashani *et al.,* 2025, and others). Environmental impact and emissions reduction goals are also emphasized in studies by Soysal *et al.,* (2014); Soysal *et al.,* (2015); Allaoui *et al.,* (2018); Roghanian & Cheraghalipou, (2019); Biuki *et al.,* (2020); Ji *et al.,* (2021); Meidute-Kavaliauskiene *et al.,* (2022); Drofenik *et al.,* (2023); and Aghajani *et al.,* (2024). Regarding social impact objectives, several notable studies include those by Allaoui *et al.,* (2018); Navazi *et al.,* (2019); Biuki *et al.,* (2020); Agahgolnezhad Gerdrodbari *et al.,* (2021); Orjuela-Castro *et al.,* (2023); Ahvan *et al.,* (2024), among others. Notably, authors have utilized models such as MILP, MIP, MCDM, and MINLP to simultaneously optimize all three objectives (social, environmental, and profit-related) (Allaoui *et al.,* 2018; Navazi *et al.,* 2019; Biuki *et al.,* 2020; Yakavenka *et al.,* 2020; Mohebalizadehgashti *et al.,* 2020; Sajedi *et al.,* 2020; Jouzdani & Govindan, 2021; Drofenik *et al.,* 2023; Mohammadi *et al.,* 2023; Mohammadi & Nikzad, 2023; Aghajani *et al.,* 2024; Ahvan *et al.,* 2024; Gholian-Jouybari *et al.,* 2024; Pan & Shan, 2024).

Moreover, Table 7 also presents other objectives that studies have focused on, such as minimizing total distribution time (Li *et al.,* 2019; Wang *et al.,* 2021; Li & Shi, 2024; Wang, 2022; Chen *et al.,* 2022; Daroudi *et al.,* 2021); Improving the smart capabilities of fresh food e-commerce logistics networks (Zhang *et al.,* 2020); optimizing the coordination of barges and tugboats per trip along with key supply chain decisions (Aghalari *et al.,* 2020); ensuring product quality (Golestani *et al.,* 2021; La Scalia *et al.,* 2016; de Keizer *et al.,* 2015); minimizing product waste (Khalafi *et al.,* 2020); and reducing average response time (Rezaei-Malek *et al.,* 2016). On the other hand, studies have also aimed to optimize objectives such as minimizing the number of refrigerated vehicles used in the fresh logistics distribution network (Wang *et al.,* 2021); minimizing value loss (Zhang & Li, 2023); determining location, allocation, inventory, and routing planning (Aloui *et al.,* 2021); and minimizing the loss of product value during transportation (Li & Zhao, 2023; Patidar & Agrawal, 2020; Biza *et al.,* 2024; Orjuela-Castro *et al.,* 2023). Additionally, other objectives include maximizing the total coverage of the network (Sheikholeslami & Zarrinpoor, 2023); predicting product prices (Miao & Ni, 2023; Jin, 2024); evaluating the efficiency of logistics networks and identifying the minimal product loss flow (Lozano & Adenso-Diaz, 2018; Su *et al.,* 2022); optimizing supplier reliability in providing raw materials to manufacturers (Hashemi-Amiri *et al.,* 2023); forecasting future sales volumes for each seller cluster (Shi, 2024); and modeling how prices and product flows interact across different supply and demand markets (Nagurney & Besik, 2022).

In many other studies, research objectives are also highly diverse. These objectives are categorized into groups such as: the group focusing on optimizing agricultural supply chains and logistics; the group studying risks and fluctuations in agricultural supply chains; the group examining e-commerce and agricultural product distribution channels; the group analyzing sustainability and policy support for agricultural supply chains; and the group investigating technology and innovation in agricultural logistics.

Within the group focusing on optimizing ASC and logistics, notable objectives include: optimizing multi-point delivery routes and reducing operational costs (Wang *et al.,* 2024; Li, 2022; Esmizadeh & Mellat Parast, 2021); planning production and distribution to enhance the efficiency of perishable product supply chains (Boudahri *et al.,* 2013; Sinaga *et al.,* 2022; Raimbekov *et al.,* 2024); developing cold chain logistics systems to improve the preservation and transportation of agricultural products

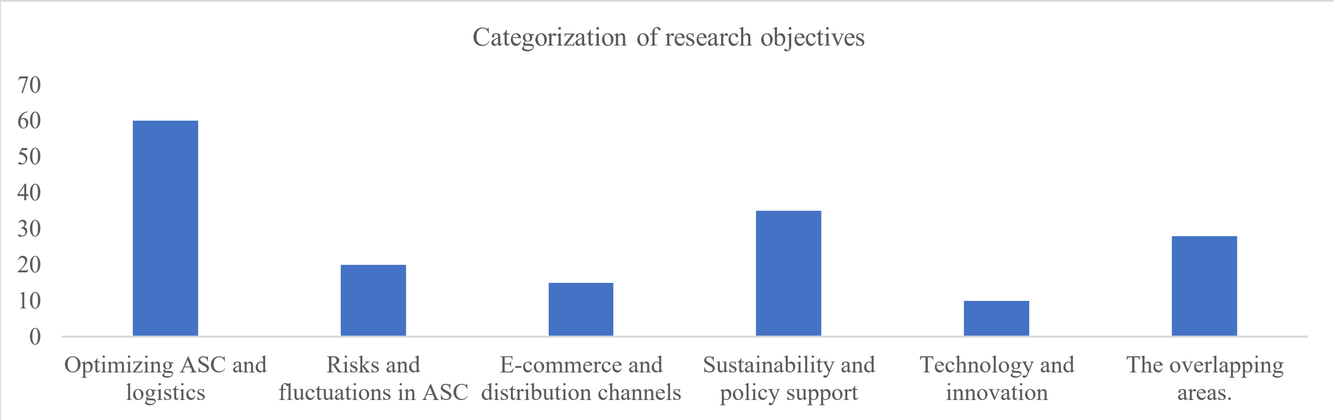

Figure 3. Categorization of the research objectives of the paper

(Huaizhi & Abdullah, 2024; Huang *et al.,* 2020; He, 2020; Fan *et al.,* 2024); developing product status tracking systems for better cargo monitoring (Woo *et al.,* 2009); and building optimal inventory models that account for factors such as storage, deterioration over time, and transportation costs (Lejarza & Baldea, 2022; Yang *et al.,* 2019; Claassen *et al.,* 2024; Violi *et al.,* 2024).

The research group on risks and fluctuations in ASC: This group focuses on identifying and assessing risks that may affect the ASC, Covering risks related to logistics and infrastructure; market-related risks; risks in cold chain logistics networks (Nguyen, 2022; Zheng *et al.,* 2021); risks from COVID-19 and its impact on agricultural supply, distribution, and consumption (Sharma *et al.,* 2024); flood risks and their effects on the sustainability of ASC (Yazdani *et al.,* 2021); risks from cross-border e-commerce logistics, particularly issues related to the movement of goods between countries (Hu, 2024); and evaluating agricultural supply chain dynamics, including factors influencing logistics service quality (LSQ) (Wang *et al.,* 2024; Fu *et al.,* 2017; Ramos *et al.,* 2022; Wang & Gao, 2024).

The research group on e-commerce and agricultural product distribution channels: Studies in this group focus on selecting optimal distribution channels for AP in the context of e-commerce (Song & He, 2019; Yan *et al.,* 2021; Li *et al.,* 2022; Wu, 2023; Zheng *et al.,* 2019; Pérez-Mesa *et al.,* 2021); the impact of cold chain logistics on e-commerce channels for FAP (Hu, 2023); and developing virtual agricultural market models to better connect farmers with consumers (Costopoulou & Lambrou, 2000).

The research group on sustainability and policy support for ASC: This group aims to develop sustainable supply chain models, including evaluating the impact of government subsidies on cold chain logistics development (Zhu *et al.,* 2023); designing ASC ecosystems based on coordination between farmers, businesses, and stakeholders (Lingjuan *et al.,* 2018; Sun *et al.,* 2020; Zhou *et al.,* 2024; Zhang & Li, 2023; Yao *et al.,* 2023; Okdinawati *et al.,* 2020; Chen & Zhao, 2023; Cai *et al.,* 2013; Liu *et al.,* 2018; Bourlakis & Bourlakis, 2005); identifying barriers to cold chain logistics development and proposing solutions (Huaizhi & Abdullah, 2024); analyzing and recommending solutions to enhance the efficiency of agricultural supply chains (Feng *et al.,* 2023; de Keizer *et al.,* 2015; Tyukhtenko *et al.,* 2024; Zhuang *et al.,* 2022; Pu *et al.,* 2021; Hammond *et al.,* 2022; Zhao *et al.,* 2022; Kumar & Kumar Singh, 2022; Fan *et al.,* 2021; Adugna *et al.,* 2023; Chen *et al.,* 2018).

The research group on technology and innovation in agricultural logistics: These studies focus on applying technology to logistics and agricultural supply chains, including using blockchain for product tracking to increase transparency and traceability (Niu *et al.,* 2021; Li *et al.,* 2023); developing smart logistics systems that utilize big data and AI to optimize supply chains (Zhu, 2024; Hemmelgarn *et al.,* 2023; Pal & Kant, 2019); and applying artificial neural networks to optimize logistics hub locations (Hu, 2023).

Figure 3 highlights a strong focus on logistics optimization (60/166 articles) and sustainability (35/166 articles), reflecting the need to enhance efficiency and reduce environmental impact. The risk (20 articles), e-commerce (15 articles), and technology (10 articles) groups receive less attention, indicating research gaps, particularly in digital transformation and e-commerce. The overlap of 28 articles across groups demonstrates interdisciplinary research, but deeper integration is needed to address the complex challenges of the agricultural supply chain (ASC).

Overall, these studies have high practical significance, especially as agricultural supply chains are increasingly affected by climate fluctuations and market demands. At the same time, the integration of artificial intelligence, blockchain, and smart logistics systems is an important research direction pursued by scholars to improve supply chain efficiency. Furthermore, risk assessment helps stakeholders in the supply chain develop appropriate response strategies to market changes. The synthesis results also indicate that many studies focus on e-commerce and product distribution channels in the context of global e-commerce. Technology application is also a highly regarded research direction, particularly in blockchain, big data, and AI. Lastly, assessing and analyzing conditions to propose policies and strategies for developing sustainable supply chains is also a topic of interest among many researchers.

4.3 Product Type

A synthesis of the literature shows that approximately 42.2% of research studies are based on multi-product analysis (including 70 out of 166 documents). The remaining studies focus on a single product or a case study of a specific enterprise within the agricultural logistics network. The summary results from Table 7 also indicate that researchers focus on product categories such as fruits, vegetables, meats, dairy, seafood, staple foods, and flowers. Among these, vegetables are the most studied product, accounting for approximately 25% (Jing & Mu, 2020; Patidar & Agrawal, 2020; Solina & Mirabelli, 2021; Pitakaso *et al.,* 2022; Chen & Chen, 2023; Khazaeli *et al.,* 2024, and others). Next, fruits are also extensively researched, comprising about 23.9% (including studies by Pérez-Mesa *et al.,* 2012; Ahumada *et al.,* 2012; Roghanian & Cheraghalipou, 2019; Liao *et al.,* 2020; Orjuela-Castro *et al.,* 2022, and others).

Additionally, meat and meat products have been widely studied, accounting for approximately 13% (Soysal *et al.,* 2014; Mohebalizadehgashti *et al.,* 2020; Daroudi *et al.,* 2021; Mohammadi *et al.,* 2023; Jin, 2024; Miao & Ni, 2023, and others). Milk is also a product of interest, making up around 12% (Rezaei-Malek *et al.,* 2016; Yavari & Geraeli, 2019; Khalafi *et al.,* 2020; Jouzdani & Govindan, 2021; Talouki *et al.,* 2021; Meidute-Kavaliauskiene *et al.,* 2022; Abbasian *et al.,* 2023, and many other studies). Moreover, other products have also been studied, such as seafood (Pan *et al.,* 2022; Wang, 2022; Li *et al.,* 2019) and flowers (de Keizer *et al.,* 2015; de Keizer *et al.,* 2017; Antonio Violi *et al.,* 2024), along with other products like coffee, staple crops, and various types of seeds. These results indicate that vegetables, fruits, meat, and meat products are essential in maintaining the long-term viability of the ASC.

In many documents related to the topic, authors employ various methods to achieve their research objectives. At the same time, the research subjects are highly diverse. The studied products include: FAP in general (Fresh agricultural products, Perishable products, Fresh products, etc.) (Chen *et al.,* 2018; Wang *et al.,* 2024; Lejarza & Baldea, 2022; Tyukhtenko *et al.,* 2024; Khalili-Fard *et al.,* 2024; Zhuang *et al.,* 2022; Zheng *et al.,* 2021, etc.); logistics networks, agricultural supply chains, and agricultural product logistics (Fresh food, Perishable agri-food products, etc.) (Raimbekov *et al.,* 2024; Niu *et al.,* 2021; Zhu, 2024; Fan *et al.,* 2024); and cold supply chains (Cold supply chain, Cold chain logistics) (Huaizhi & Abdullah, 2024; He, 2020). Additionally, some studies focus on businesses operating within the agricultural supply chain (Nguyen, 2022; Sharma *et al.,* 2024). In general, beyond research focusing on specific products such as blueberries (Sun *et al.,* 2020), tomatoes, onions, and garlic (Adugna *et al.,* 2023), and apples (Feng *et al.,* 2023), many studies also examine the structure of the entire agricultural supply chain or businesses operating within the logistics network. This indicates the diversity of research subjects across various studies.

4.4. Overview of Software and Tools

Systematizing the literature shows that authors use various software and tools to address different research objectives, including CPLEX, LINGO, Gurobi, MATLAB, OpenSolver, Python, and SPSS. Among them, CPLEX is the most frequently used software to solve optimization problems and handle models such as MILP, MIP, and MCDM (Ahumada & Villalobos, 2011; Soysal *et al.,* 2014; La Scalia *et al.,* 2016; Allaoui *et al.,* 2018; and many other studies). IBM ILOG CPLEX is a powerful optimization tool widely recognized for its advanced capabilities in solving complex Linear Programming (LP) and Mixed-Integer Programming (MIP) problems. Its Academic Research version provides free access for educational and non-commercial research, encouraging its use in academic environments. CPLEX's powerful C++ API facilitates the implementation of various constraints and optimization techniques, making it appropriate for numerous applications (Kucharzak *et al.,* 2012). The studies of Hasani et al. (2012), Patidar & Agrawal (2020), Mohebalizadehgashti et al. (2020), and Dwivedi et al. (2020) used LINGO software to solve optimization problems related to costs, profits, environmental impacts, or social objectives. Additionally, MATLAB software has shown its effectiveness in handling models such as LRP (Wang *et al.,* 2018), Bayesian network models (Zhang *et al.,* 2020), MOPSO (Sajedi *et al.,* 2020), and even MILP models (Tabatabaei *et al.,* 2021). This indicates that MATLAB has various features that cater to different models. Simulation tools like FlexSim and ProModel are also used, reflecting some studies that combine simulation to verify the feasibility of models (Xu *et al.,* 2019; Jin, 2024). Other tools are also employed to handle research models, such as Gurobi (Aghalari *et al.,* 2020; Ji *et al.,* 2021; Esteso *et al.,* 2021; Orjuela-Castro *et al.,* 2022) or Microsoft Excel software, which is used to solve optimization problems (Al-Ashhab *et al.,* 2021).

Overall, Mixed-Integer Linear Programming (MILP, 33.1%) is the most prevalent method in ASC research, particularly in the optimization group (60/166 papers), focusing on cost and profit maximization for vegetables (25%) and fruits (23.9%). CPLEX and Gurobi dominate these studies due to their computational efficiency in handling large-scale logistics models. In sustainability research (35/166 papers), LINGO is widely used for Mixed-Integer Nonlinear Programming (MINLP) models, addressing environmental and social objectives, often for meat (13%) and dairy (12%). Technology and innovation studies (10/166 papers) prefer MATLAB and Python for AI, big data, and blockchain applications, primarily targeting fresh agricultural products in e-commerce contexts. Simulation tools like FlexSim and ProModel are common in risk and fluctuation studies (20/166 papers), evaluating logistics resilience for perishable goods like meat and vegetables. E-commerce research (15/166 papers) leverages MATLAB and Python for virtual market models. CPLEX leads in optimization-heavy studies, while MATLAB and Python are emerging in technology-driven and e-commerce research. These trends reflect a clear alignment between methods, software, and product types, with vegetables and fruits driving optimization efforts, while technology focuses on digital transformation across diverse products.

5. DISCUSSION

5.1. Synthesis of Key Findings

This study synthesized and analyzed 166 academic articles published from 2000 to January 2025, using a bibliometric analysis combined with a systematic review to explore the LN for AP. The results reveal a significant increase in the number of publications in this field, especially from 2021 to 2024, with China leading the way, followed by the United States, India, Iran, and Indonesia.

The logistics network is not solely a physical framework (like warehouses and distribution centers) but also a cohesive system that integrates digital technologies, big data, and smart supply chains. The ASC encompasses the complete journey from production and processing to inspection, packaging, transportation, distribution, and marketing. This chain is characterized by various complexities, including seasonality, a lack of standardization, and risks associated with weather patterns and pricing. Agricultural products, such as raw materials (grains, vegetables, fruits) and processed items (snacks, juices), are especially perishable, necessitating cold storage and meticulous management to reduce losses.

The research utilized optimization models like MILP (33.1%), MIP (5.4%), and MINLP (5.4%), as well as other frameworks such as SIM, LP, IRP, and GA, to achieve supply chain optimization goals, including cost reduction, profit maximization, and the minimization of environmental and social impacts. The research aims were grouped into five primary categories: logistics optimization (60 papers), sustainability (35 papers), risk assessment (20 papers), e-commerce (15 papers), and technological innovation (10 papers). Technologies such as blockchain, artificial intelligence, and big data were highlighted as means to improve efficiency and sustainability. The primary products analyzed included vegetables (25%), fruits (23.9%), meat (13%), and dairy (12%). Various software tools, including CPLEX, LINGO, MATLAB, Gurobi, and Python, were employed to solve optimization and simulation challenges.

5.2. Limitations of the Study

Even though studies on logistics networks for agricultural products have achieved significant results, there are still some limitations in terms of data review and synthesis, as well as analysis that need to be addressed. These limitations are related to data and the generalization capability of the problem, or they are linked to the methodology and scalability of the research. Specifically, the limitations are as follows.

Firstly, some articles related to LN for AP may have been overlooked in this review due to limitations in the search methodology or the accessibility of data sources. A significant amount of data may have been missed. Therefore, this review does not fully reflect all the issues in the research. Additionally, the study only synthesizes data from articles published in reputable journals, so it may have overlooked papers, conference papers, or book chapters from other journals. Thus, the results presented do not fully reflect the research issues. At the same time, many authors, when conducting research, have proposed different perspectives on the logistics network for agricultural products, which may lead to the absence of a clear and comprehensive definition of the issue. Therefore, when discussing definitions related to logistics networks and agricultural products, a detailed analysis and synthesis of the different definitions is necessary.

Although some studies address the relationship between different components in the LN of AP, these studies are quite limited. Consequently, these studies have not fully analyzed the collaborative relationships between parties in order to bring long-term and sustainable benefits to the entire network. At the same time, some studies have not considered factors such as market conditions, government policies, or political risks. These factors also significantly impact the development of logistics networks in general. Although some studies mention new technological trends (blockchain, AI, big data), they have not thoroughly examined how these technologies are integrated into logistics networks or reflected the full efficiency and optimization of these trends.

Many studies focus only on certain types of products, such as fruits, apples, and vegetables, so they do not fully reflect all the existing issues in the agricultural sector. External variables such as weather, diseases, and market conditions have not been fully considered. Furthermore, the studies focus only on certain segments of logistics and do not cover the entire agricultural supply chain. Besides, some studies use simplified assumption models but do not accurately reflect market demand, return rates, or practical operational factors such as loading times. Optimization models face limitations when scaling up. Additionally, some computational tools are not well-suited for handling extensive and intricate problems.

5.3. Future Research Directions

Future research should broaden data sources to encompass conference proceedings and unconventional publications to enhance thoroughness. It is vital to create a standardized definition of logistics networks through comprehensive analysis. A thorough exploration of supply chain collaboration, taking into account elements such as governmental policies, political risks, and market conditions, is required to guarantee sustainable advantages. The effectiveness of technologies like blockchain, AI, and IoT should be evaluated for their practical application. Furthermore, research should be extended to other agricultural commodities and encompass the complete supply chain, while considering factors like weather conditions, diseases, and market variations. Finally, the creation of flexible optimization models that accurately represent market demand and genuine operational factors will elevate the practical significance of future research.

6. CONCLUSIONS

The primary motivation of this study is to address the critical research gap in comprehensively examining logistics networks for agricultural products, which play an essential role in ensuring food security, economic stability, and sustainability in global supply chains. The research question centers on synthesizing and evaluating existing literature to identify key trends, methodologies, and objectives in optimizing these networks, particularly for perishable agricultural products. Through a systematic literature review and bibliometric analysis of 166 academic articles from 2000 to January 2025, sourced from Scopus and Google Scholar, the study reveals that logistics networks for agricultural products are pivotal in balancing economic, social, and environmental goals. The findings highlight a predominant focus on cost optimization, profit maximization, and minimizing environmental impacts, with Mixed-Integer Linear Programming (MILP) being the most widely used model due to its efficiency in addressing complex logistics challenges. Vegetables, fruits, and meat are the most studied products, reflecting their significance in agricultural supply chains. The integration of advanced technologies, such as artificial intelligence, blockchain, and big data, is identified as a transformative trend, enhancing supply chain transparency, traceability, and efficiency. Additionally, the study underscores the importance of addressing risks like seasonality, climate change, and market volatility to ensure network resilience. Despite these insights, limitations in data access and methodological generalizability highlight the need for further research, particularly in integrating digital technologies and exploring e-commerce-driven distribution channels. Ultimately, this study emphasizes that optimizing logistics networks for agricultural products is crucial for sustainable development, supporting food security, and fostering economic and environmental resilience in the face of global challenges, paving the way for innovations in agricultural supply chain management.

ACKNOWLEDGEMENTS

This topic is part of the doctoral dissertation. Therefore, the author expresses gratitude to Nam Can Tho University, where the author is currently working. Additionally, the author extends thanks to the Malaysia University of Science and Technology, where the author is pursuing a PhD program.

CONFLICTS OF INTEREST

No conflicts of interest regarding the subject matter.

REFERENCES

Abbasian, M., Sazvar, Z., & Mohammadisiahroudi, M. (2023). A hybrid optimization method to design a sustainable resilient supply chain in a perishable food industry. *Environmental science and pollution research*, 30(3), 6080-6103. https://doi.org/10.1007/s11356-022-22115-8

Abbasi, S., Saboury, A., & Jabalameli, M. S. (2021). Reliable supply chain network design for 3PL providers using consolidation hubs under disruption risks considering product perishability: An application to a pharmaceutical distribution network. *Computers & Industrial Engineering*, 152. https://doi.org/10.1016/j.cie.2020.107019

Adugna, M., Tilahun, A., Petros, T., & Adino, K. (2023). Analysis of rural–urban vegetable market dynamics in Central Gondar Zone, Ethiopia. *Agriculture & Food Security*, 12(1), 8. https://doi.org/10.1186/s40066-023-00414-8

Agahgolnezhad Gerdrodbari, M., Harsej, F., Sadeghpour, M., & Molani Aghdam, M. (2021). A green closed-loop supply chain for production and distribution of perishable products. *Journal of Quality Engineering and Production Optimization*, 6(1), 189-214. https://doi.org/10.22070/jqepo.2021.14469.1184

Aghajani, D., Seraji, H., Kaur, H., & Vilko, J. (2024). A sustainable integrated model for multi-objective planning of an agri-food supply chain under uncertain parameters: A case study. *Computers & Chemical Engineering*. https://doi.org/10.1016/j.compchemeng.2024.108766

Aghalari, A., Nur, F., & Marufuzzaman, M. (2020). A Bender's based nested decomposition algorithm to solve a stochastic inland waterway port management problem considering perishable product. *International Journal of Production Economics*, 229. https://doi.org/10.1016/j.ijpe.2020.107863

Ahmadi-Javid, A., Mansourfar, M., Lee, C. G., & Liu, L. (2023). Optimal distribution of perishable foods with storage temperature control and quality requirements: an integrated vehicle routing problem. *Computers & Industrial Engineering*, 182. https://doi.org/10.1016/j.cie.2023.109215

Ahumada, O., & Villalobos, J. R. (2011). Operational model for planning the harvest and distribution of perishable agricultural products. *International Journal of Production Economics*, 133(2), 677-687. https://doi.org/10.1016/j.ijpe.2011.05.015

Ahumada, O., Villalobos, J. R., & Mason, A. N. (2012). Tactical planning of the production and distribution of fresh agricultural products under uncertainty. *Agricultural Systems*, 112, 17-26. https://doi.org/10.1016/j.agsy.2012.06.002

Ahvan Javanmardan, Hêriş Golpîra, Vahid Baradaran (2024). A socio-economic and quality-oriented optimal fruit supply chain network design in a multi-market and multi-product environment: A real case study. *Socio-Economic Planning Sciences*. 94, 0038-0121. https://doi.org/10.1016/j.seps.2024.101910.

Al-Ashhab, M. S., Nabil, O. M., & Afia, N. H. (2021). Perishable products supply chain network design with sustainability. *Indian Journal of Science and Technology*, 14(9), 787-800. https://doi.org/10.17485/IJST/v14i9.24

Albrecht, W., & Steinrücke, M. (2018). Coordinating continuous-time distribution and sales planning of perishable goods with quality grades. *International Journal of Production Research*, 56(7), 2646-2665. https://doi.org/10.1080/00207543.2017.1384584

Allaoui, H., Guo, Y., Choudhary, A., & Bloemhof, J. (2018). Sustainable agro-food supply chain design using two-stage hybrid multi-objective decision-making approach. *Computers & Operations Research*, 89, 369-384. https://doi.org/10.1016/j.cor.2016.10.012

Aloui, A., Hamani, N., & Delahoche, L. (2021). Designing a resilient and sustainable logistics network under epidemic disruptions and demand uncertainty. *Sustainability*, 13(24). https://doi.org/10.3390/su132414053

Antonio Violi, Annarita De Maio, Gerarda Fattoruso (2024). Inventory management and delivery of perishable products with stochastic demands and risks consideration. *Procedia Computer*. 232, 2941–2949. Doi: https://doi.org/10.1016/j.procs.2024.02.110

Asghari, T., Aghamohamadi-Bosjin, S., & Rabbani, M. (2021). A location-inventory-pricing supply chain network design for perishable products under disruptions. *Interdisciplinary Journal of Management Studies (Formerly known as Iranian Journal of Management Studies)*, 14(3), 487-507. https://doi.org/10.22059/ijms.2020.287086.673754

Azab, R., Mahmoud, R. S., Elbehery, R., & Gheith, M. (2023). A Bi-Objective Mixed-Integer Linear Programming Model for a Sustainable Agro-Food Supply Chain with Product Perishability and Environmental Considerations. *Logistics*, 7(3), 46. https://doi.org/10.3390/logistics7030046

Baghizadeh, K., Cheikhrouhou, N., Govindan, K., & Ziyarati, M. (2022). Sustainable agriculture supply chain network design considering water-energy-food nexus using queuing system: A hybrid robust possibilistic programming. *Natural Resource Modeling*, 35(1). https://doi.org/10.1111/nrm.12337

Belamkar, P., Biswas, S., Baidya, A., Majumder, P., & Bera, U. K. (2023). Multi-objective optimization of agro-food supply chain networking problem integrating economic viability and environmental sustainability through type-2 fuzzy-based decision making. *Journal of Cleaner Production*, 421. https://doi.org/10.1016/j.jclepro.2023.138294

Bhattacharya, S., Govindan, K., Dastidar, S. G., & Sharma, P. (2024). Applications of artificial intelligence in closed-loop supply chains: Systematic literature review and future research agenda. *Transportation Research Part E: Logistics and Transportation Review*, 184. https://doi.org/10.1016/j.tre.2024.103455

Biuki, M., Kazemi, A., & Alinezhad, A. (2020). An integrated location-routing-inventory model for sustainable design of a perishable products supply chain network. *Journal of Cleaner Production*, 260. https://doi.org/10.1016/j.jclepro.2020.120842

Biza, A., Montastruc, L., Negny, S., & Admassu, S. (2024). Strategic and tactical planning model for the design of perishable product supply chain network in Ethiopia. *Computers & Chemical Engineering*, 190. https://doi.org/10.1016/j.compchemeng.2024.108814

Bosona, T. G., & Gebresenbet, G. (2011). Cluster building and logistics network integration of local food supply chain. *Biosystems engineering*, 108(4), 293-302. https://doi.org/10.1016/j.biosystemseng.2011.01.001

Boudahri, F., Aggoune-Mtalaa, W., Bennekrouf, M., & Sari, Z. (2013). Application of a clustering based location-routing model to a real agri-food supply chain redesign. In Advanced methods for computational collective intelligence (pp. 323-331). *Springer Berlin Heidelberg*. https://doi.org/10.1007/978-3-642-34300-1_31

Bourlakis, C., & Bourlakis, M. (2005). Information technology safeguards, logistics asset specificity and fourth-party logistics network creation in the food retail chain. *Journal of Business & Industrial Marketing*, 20(2), 88-98. https://doi.org/10.1108/08858620510583687

Cai, X., Chen, J., Xiao, Y., Xu, X., & Yu, G. (2013). Fresh-product supply chain management with logistics outsourcing. *Omega*, 41(4), 752-765. https://doi.org/10.1016/j.omega.2012.09.004

Chandra, S., Christiansen, M., & Fagerholt, K. (2019). Analysing the modal shift from road-based to coastal shipping-based distribution – a case study of outbound automotive logistics in India. *Maritime Policy & Management*, 47(2), 273–286. https://doi.org/10.1080/03088839.2019.1707313

Chen, G., Kaveh, F., & Peivandizadeh, A. (2022). Resilient supply chain planning for the perishable products under different uncertainty. *Mathematical Problems in Engineering*, 2022(1). https://doi.org/10.1155/2022/1606331

Chen, J., & Zhao, Z. (2023). Research on the Network Equilibrium of Fresh Agricultural Product Supply Chain with Third Party Logistics Participation in Decision Making. *Frontiers in Business, Economics and Management*, 12(2), 58-67. https://doi.org/10.54097/fbem.v12i2.14597

Chen, J., Dong, M., & Xu, L. (2018). A perishable product shipment consolidation model considering freshness-keeping effort. *Transportation Research Part E: Logistics and Transportation Review*, 115, 56-86. https://doi.org/10.1016/j.tre.2018.04.009

Chen, S., & Chen, Y. (2023). Designing a resilient supply chain network under ambiguous information and disruption risk. *Computers & Chemical Engineering*, 179. https://doi.org/10.1016/j.compchemeng.2023.108428

Chuyen, T. T., Huy, T. T., & Minh, H. N. T. (2024). Applying artificial intelligence (AI) in agricultural supply chain management. *Journal of Science and Development Economics*, (26), 12-19. Query from https://jsde.nctu.edu.vn/jsde/article/view/344

Claassen, G. D. H., Kirst, P., Van, A. T. T., Snels, J. C. M. A., Guo, X., & van Beek, P. (2024). Integrating time-temperature dependent deterioration in the economic order quantity model for perishable products in multi-echelon supply chains. *Omega*, 125. https://doi.org/10.1016/j.omega.2024.103041

Costopoulou, C. I., & Lambrou, M. A. (2000). An architecture of Virtual Agricultural Market systems: The case of trading perishable agricultural products. *Information services & use,* 20(1), 39-48. https://doi.org/10.3233/ISU-2000-20105

Cruz, L., Pires-Ribeiro, J., & Barbosa-Póvoa, A. (2019). Design and planning of agri-food supply chains. *In Computer Aided Chemical Engineering (Vol. 46, pp. 55-60). Elsevier*. https://doi.org/10.1016/B978-0-12-818634-3.50010-2

Daneshvar, A., Radfar, R., Ghasemi, P., Bayanati, M., & Pourghader Chobar, A. (2023). Design of an optimal robust possibilistic model in the distribution chain network of agricultural products with high perishability under uncertainty. *Sustainability*, 15(15). https://doi.org/10.3390/su151511669

Daroudi, S., Kazemipoor, H., Najafi, E., & Fallah, M. (2021). The minimum latency in location routing fuzzy inventory problem for perishable multi-product materials. *Applied Soft Computing*, 110. https://doi.org/10.1016/j.asoc.2021.107543

de Keizer, M., Akkerman, R., Grunow, M., Bloemhof, J. M., Haijema, R., & van der Vorst, J. G. (2017). Logistics network design for perishable products with heterogeneous quality decay. *European Journal of Operational Research*, 262(2), 535-549. https://doi.org/10.1016/j.ejor.2017.03.049

de Keizer, M., Haijema, R., Bloemhof, J. M., & Van Der Vorst, J. G. (2015). Hybrid optimization and simulation to design a logistics network for distributing perishable products. *Computers & Industrial Engineering*, 88, 26-38. https://doi.org/10.1016/j.cie.2015.06.017

de Keizer, M., Van Der Vorst, J. G. A. J., Bloemhof, J. M., & Haijema, R. (2015). Floricultural supply chain network design and control: industry needs and modelling challenges. *Journal on Chain and Network Science*, 15(1), 61-81. https://doi.org/10.3920/JCNS2014.0001

Dong, B., Christiansen, M., Fagerholt, K., & Chandra, S. (2020). Design of a sustainable maritime multi-modal distribution network–Case study from automotive logistics. *Transportation Research Part E: Logistics and Transportation Review*, 143. https://doi.org/10.1016/j.tre.2020.102086

Drofenik, J., Pahor, B., Kravanja, Z., & Pintarič, Z. N. (2023). Multi-objective scenario optimization of the food supply chain–Slovenian case study. *Computers & Chemical Engineering*, 172. https://doi.org/10.1016/j.compchemeng.2023.108197

Dwivedi, A., Jha, A., Prajapati, D., Sreenu, N., & Pratap, S. (2020). Meta-heuristic algorithms for solving the sustainable agro-food grain supply chain network design problem. *Modern Supply Chain Research and Applications,* 2(3), 161-177. https://doi.org/10.1108/MSCRA-04-2020-0007

Esmizadeh, Y., & Mellat Parast, M. (2021). Logistics and supply chain network designs: incorporating competitive priorities and disruption risk management perspectives. *International Journal of Logistics Research and*

Applications, 24(2), 174-197. https://doi.org/10.1080/13675567.2020.1744546

Esteso, A., Alemany, M. M. E., & Ortiz, Á. (2021). Impact of product perishability on agri-food supply chains design. *Applied Mathematical Modelling*, 96, 20-38. https://doi.org/10.1016/j.apm.2021.02.027

Fahmy, S. A., Zaki, A. M., & Gaber, Y. H. (2023). Optimal locations and flow allocations for aggregation hubs in supply chain networks of perishable products. *Socio-Economic Planning Sciences*, 86. https://doi.org/10.1016/j.seps.2022.101500

Fan, X., Nan, Z., Ma, Y., Zhang, Y., & Han, F. (2021). Research on the Spatio-temporal impacts of environmental factors on the fresh agricultural product supply chain and the spatial differentiation issue—an empirical research on 31 Chinese provinces. *International Journal of Environmental Research and Public Health*, 18(22). https://doi.org/10.3390/ijerph182212141

Fan, X., Zhang, Y., Xue, J., & Cao, Y. (2024). Exploring the path to the sustainable development of cold chain logistics for fresh agricultural products in China. *Environmental Impact Assessment Review*, 108. https://doi.org/10.1016/j.eiar.2024.107610

Fatemi Ghomi, S. M. T., & Asgarian, B. (2019). Development of metaheuristics to solve a transportation inventory location routing problem considering lost sale for perishable goods. *Journal of Modelling in Management,* 14(1), 175-198. https://doi.org/10.1108/JM2-05-2018-0064

Feng, Y., Mei, D., & Zhao, H. (2023). Auction-based deep learning-driven smart agricultural supply chain mechanism. *Applied Soft Computing*, 149. https://doi.org/10.1016/j.asoc.2023.111009

Fleischmann, M., Krikke, H. R., Dekker, R., & Flapper, S. D. P. (2000). A characterisation of logistics networks for product recovery. *Omega*, 28(6), 653-666. https://doi.org/10.1016/S0305-0483(00)00022-0

Fu, S., Zhan, Y., & Tan, K. H. (2017). Managing social responsibility in Chinese agriculture supply chains through the "a company+ farmers" model. *European Business Review*, 29(3), 344-359. https://doi.org/10.1108/EBR-01-2016-0012

Ghahremani-Nahr, J., Najafi, S. E., & Nozari, H. (2022). A combined transportation model for the fruit and vegetable supply chain network. *Journal of Optimization in Industrial Engineering*, 15(2), 131-145. https://doi.org/10.22094/joie.2022.1948231.1925

Gholian-Jouybari, F., Hajiaghaei-Keshteli, M., Smith, N. R., Calvo, E. Z. R., Mejía-Argueta, C., & Mosallanezhad, B. (2024). An in-depth metaheuristic approach to design a sustainable closed-loop agri-food supply chain network. *Applied Soft Computing*, 150. https://doi.org/10.1016/j.asoc.2023.111017

Golestani, M., Moosavirad, S. H., Asadi, Y., & Biglari, S. (2021). A multi-objective green hub location problem with multi item-multi temperature joint distribution for perishable products in cold supply chain. *Sustainable production and consumption*, 27, 1183-1194. https://doi.org/10.1016/j.spc.2021.02.026

Gumzej, R. (2023). Intelligent logistics systems in E-commerce and transportation. *Mathematical Biosciences and Engineering*, 20(2), 2348–2363. https://doi.org/10.3934/mbe.2023110

Guo, J., Wang, X., Fan, S., & Gen, M. (2017). Forward and reverse logistics network and route planning under the environment of low-carbon emissions: A case study of Shanghai fresh food E-commerce enterprises. *Computers & Industrial Engineering*, 106, 351-360. https://doi.org/10.1016/j.cie.2017.02.002

Hammond, J., Siegal, K., Milner, D., Elimu, E., Vail, T., Cathala, P., ... & van Wijk, M. (2022). Perceived effects of COVID-19 restrictions on smallholder farmers: Evidence from seven lower-and middle-income countries. *Agricultural Systems*, 198. https://doi.org/10.1016/j.agsy.2022.103367

Hasani, A., Zegordi, S. H., & Nikbakhsh, E. (2012). Robust closed-loop supply chain network design for perishable goods in agile manufacturing under uncertainty. *International journal of production research*, 50(16), 4649-4669. https://doi.org/10.1080/00207543.2011.625051

Hashemi-Amiri, O., Ghorbani, F., & Ji, R. (2023). Integrated supplier selection, scheduling, and routing problem for perishable product supply chain: A distributionally robust approach. *Computers & Industrial Engineering,* 175. https://doi.org/10.1016/j.cie.2022.108845

He, X. D. (2020). Research Framework of Fresh Agricultural Products Logistics Network Optimization Based on Cold Chain. In IOP Conference Series: Earth and Environmental Science (Vol. 615, No. 1, p. 012032). *IOP Publishing*. https://doi.org/10.1088/1755-1315/615/1/012032

Hemmelgarn, A. B., Lin, Y., Wendt, L. M., Hartley, D. S., & Digman, M. F. (2023). Techno-economic assessment of single-stream feedstock logistics supply chain for corn stover and grain. *Biofuels, Bioproducts and Biorefining,* 17(3), 437-448. https://doi.org/10.1002/bbb.2459

Higgins, A., McFallan, S., Marinoni, O., McKeown, A., Bruce, C., Chilcott, C., & Pinkard, L. (2018). Informing transport infrastructure investments using TraNSIT: A case study for Australian agriculture and forestry. *Computers and electronics in agriculture*, 154, 187-203. https://doi.org/10.1016/j.compag.2018.09.008

Hu, N. (2023). Hopfield artificial neural network-based optimization method for selecting nodes of fresh agricultural products international logistics network. *Pakistan Journal of Agricultural Sciences,* 60(3). https://doi.org/10.21162/PAKJAS/23.131

Hu, N. (2024). Risk Assessment Method of Agricultural Products Cross-border E-commerce Logistics Based on Fuzzy Neural Network. *Pakistan Journal of Agricultural Sciences*, 61(1), 327-335. https://doi.org/10.21162/PAKJAS/24.10

Huaizhi, Y., & Abdullah, A. R. (2024). Article on Cold Chain Logistics of Agricultural Products in Shandong, China. *International Journal of Business and Technology Management*, 6(2), 378-395. https://doi.org/10.55057/ijbtm.2024.6.2.34

Huang, X., Xie, R., & Huang, L. (2020). Real-time emergency management mode of cold chain logistics for agricultural products under the background of "Internet+". *Journal of Intelligent & Fuzzy Systems*, 38(6), 7461-7473. https://doi.org/10.3233/JIFS-179819

Ji, Y., Du, J., Wu, X., Wu, Z., Qu, D., & Yang, D. (2021). Robust optimization approach to two-echelon agricultural cold chain logistics considering carbon emission and stochastic demand. *Environment, Development and Sustainability,* 1-24. https://doi.org/10.1007/s10668-021-01236-z

Jin, L. (2024). Exploration of cross-border e-commerce and its logistics supply chain innovation and development path for agricultural exports based on deep learning. *Applied Mathematics and Nonlinear Sciences,* 9(1). https://doi.org/10.2478/amns.2023.2.01529

Jing, F., & Mu, Y. (2020). Dynamic lot-sizing model under perishability, substitution, and limited storage capacity. *Computers & Operations Research*, 122. https://doi.org/10.1016/j.cor.2020.104978

Jouzdani, J., & Govindan, K. (2021). On the sustainable perishable food supply chain network design: A dairy products case to achieve sustainable development goals. *Journal of Cleaner Production*, 278. https://doi.org/10.1016/j.jclepro.2020.123060

Kailaku, S. I., Arkeman, Y., Purwanto, Y. A., & Udin, F. (2022). Logistics network configuration: The solution for quality-related problems in long-distance transportation of mango in Indonesia. *In IOP Conference Series: Earth and Environmental Science*, 1063, 1. https://doi.org/10.1088/1755-1315/1063/1/012057

Kamble, S. S., Gunasekaran, A., & Gawankar, S. A. (2020). Achieving sustainable performance in a data-driven agriculture supply chain: A review for research and applications. *International Journal of Production Economics,* 219, 179-194. https://doi.org/10.1016/j.ijpe.2019.05.022

Kamewor, F. T., Kwateng, K. O., & Mensah, J. (2024). Green logistics practices: A bibliometric and systematic methodological review and future research opportunities. *Journal of Cleaner Production.* https://doi.org/10.1016/j.jclepro.2024.143735

Khalafi, S., Hafezalkotob, A., Mohamaditabar, D., & Sayadi, M. K. (2020). A novel model for a network of a closed-loop supply chain with recycling of returned perishable goods: A case study of dairy industry. *Journal of Industrial and Systems Engineering*, 12(4), 136-153. https://doi.org/20.1001.1.17358272.2019.12.4.7.0

Kalkha, H., Khiat, A., Bahnasse, A., & Ouajji, H. (2023). The rising trends of smart e-commerce logistics. *IEEE Access*, 11, 33839-33857. doi: 10.1109/ACCESS.2023.3252566

Khalili-Fard, A., Hashemi, M., Bakhshi, A., Yazdani, M., Jolai, F., & Aghsami, A. (2024). Integrated relief pre-positioning and procurement planning considering non-governmental organizations support and perishable relief items in a humanitarian supply chain network. *Omega,* 127. https://doi.org/10.1016/j.omega.2024.103111

Khazaeli, S., Kalvandi, R., & Sahebi, H. (2024). A multi-level multi-product supply chain network design of vegetables products considering costs of quality: A case study. *PloS one*, 19(9). https://doi.org/10.1371/journal.pone.0303054

Kucharzak, M., Zydek, D., & Poźniak-Koszałka, I. (2012). Overlay Multicast Optimization: IBM ILOG CPLEX. *International Journal of Electronics and Telecommunications*, 58(4), 381-388. https://doi.org/10.2478/v10177-012-0052-0

Kumar, M., Kumar, D., Saini, P., & Pratap, S. (2022). Inventory routing model for perishable products toward circular economy. *Computers & Industrial Engineering*, 169. https://doi.org/10.1016/j.cie.2022.108220

Kumar, P., & Kumar Singh, R. (2022). Strategic framework for developing resilience in Agri-Food Supply Chains during COVID 19 pandemic. *International Journal of Logistics Research and Applications,* 25(11), 1401-1424. https://doi.org/10.1080/13675567.2021.1908524

Kurniawati, D. A., & Rochman, M. A. (2023). Two stages of halal food distribution model for perishable food products. *International Journal of Production Management and Engineering*, 11(2), 147-166. https://doi.org/10.4995/ijpme.2023.18233

La Scalia, G., Aiello, G., Miceli, A., Nasca, A., Alfonzo, A., & Settanni, L. (2016). Effect of vibration on the quality of strawberry fruits caused by simulated transport. *Journal of Food Process Engineering,* 39(2), 140-156. https://doi.org/10.1111/jfpe.12207

Lei, F., Yi, X., Zhan, Y., Lv, X., Xiao, Q., Tong, Z., & Lei, S. (2022). Study on the Smart Logistics Supply Chain Path for Smart Manufacturing Enterprises in the Post-Epidemic Era - Taking Dongguan BG Technology Co. as an Example. *In 2022 5th World Conference on Mechanical Engineering and Intelligent Manufacturing (WCMEIM) (pp. 1071-1075). IEEE.* 10.1109/WCMEIM56910.2022.10021410

Lei, J., Che, A., & Van Woensel, T. (2024). Collection-disassembly-delivery problem of disassembly centers in a reverse logistics network. *European Journal of Operational Research*, 313(2), 478-493. https://doi.org/10.1016/j.ejor.2023.07.008

Lejarza, F., & Baldea, M. (2022). An efficient optimization framework for tracking multiple quality attributes in supply chains of perishable products. *European Journal of Operational Research*, 297(3), 890-903. https://doi.org/10.1016/j.ejor.2021.04.057

Li, C., & Shi, X. (2024). Optimisation of a multilevel logistics network for prepositioned warehouses under an omni-channel retail model. *Humanities and Social Sciences Communications*, 11(1), 1-14. https://doi.org/10.1057/s41599-024-03496-2

Li, J., Gao, X., Guo, B., & Wu, M. (2020). Production plan for perishable agricultural products with two types of harvesting. *Information Processing in Agriculture*, 7(1), 83-92. https://doi.org/10.1016/j.inpa.2019.05.001

Li, L., Li, S., Li, W., & Zhou, F. (2023). Freshness-driven vehicle routing problem: Modeling and application to the fresh agricultural product pick-storage-transportation. *Journal of Industrial and Management Optimization*, 19, 6218-6243. https://doi.org/10.3934/jimo.2022213

Li, P., Lan, H., & Saldanha-Da-Gama, F. (2019). A bi-objective capacitated location-routing problem for multiple perishable commodities. *IEEE access*, 7, 136729-136742. https://doi.org/10.1109/ACCESS.2019.2941363

Li, P., Lan, H., & Saldanha-Da-Gama, Francisco. (2016). Capacitated Location-Routing Problem with Bi-Objective Multi-Vehicle and Multi-Perishable Commodity, *IEEE access* 4. https://doi.org/10.1109/ACCESS.2019.2941363

Li, S., He, Y., & Salling, M. (2022). Strategic rationing and freshness keeping of perishable products under transportation disruptions and demand learning. *Complex & Intelligent Systems,* 8(6), 4513-4527. https://doi.org/10.1007/s40747-021-00492-w

Li, X. (2022). Application of Collaborative Optimization in Urban Fresh Product Logistics Inventory and Distribution System. *Scientific Programming*, 2022(1). https://doi.org/10.1155/2022/4516499

Li, Z., & Zhao, P. (2023). Designing a resilient retail supply network for fresh products under disruption risks. *Frontiers in Public Health*, 11. https://doi.org/10.3389/fpubh.2023.1099227

Liao, W., & Chen, J. (2024). Fresh Agricultural Products Logistics Network Optimization Incorporating Departure Time Under the Origin E-Commerce Model. *SSRN*, Available at http://dx.doi.org/10.2139/ssrn.4772865

Liao, Y., Kaviyani-Charati, M., Hajiaghaei-Keshteli, M., & Diabat, A. (2020). Designing a closed-loop supply chain network for citrus fruits crates considering environmental and economic issues. *Journal of Manufacturing Systems*, 55, 199-220. https://doi.org/10.1016/j.jmsy.2020.02.001

Lin, X., Negenborn, R. R., Duinkerken, M. B., & Lodewijks, G. (2018). Reducing unmet demand and spoilage in cut rose logistics: Modeling and control of fast moving perishable goods. *Transportation Research Record,* 2672(9), 130-140. https://doi.org/10.1177/036119811878

Lin, Y. K., Yeh, C. T., & Huang, C. F. (2017). Reliability assessment of a multistate freight network for perishable merchandise with multiple suppliers and buyers. *International Journal of Systems Science*, 48(1), 74-83. https://doi.org/10.1080/00207721.2016.1157222

Lingjuan, T., Linhong, L., & Menghan, L. (2018). Optimization of the front-end logistics routes of agricultural products based on network platform. *International Journal for Engineering Modelling*, 31(4 Special issue), 1-14. https://doi.org/10.31534/engmod.2018.4.si.01g

Liu, H., Pretorius, L., & Jiang, D. (2018). Optimization of cold chain logistics distribution network terminal. *EURASIP Journal on Wireless Communications and Networking,* 2018(1), 1-9. https://doi.org/10.1186/s13638-018-1168-4

Lozano, S., & Adenso-Diaz, B. (2018). Increasing sustainability of logistic networks by reducing product losses: a network DEA approach. *Mathematical Problems in Engineering*, 2018(1). https://doi.org/10.1155/2018/3479251

Lütjen, M., Dittmer, P., & Veigt, M. (2013). Quality driven distribution of intelligent containers in cold chain logistics networks. *Production Engineering*, 7, 291-297. https://doi.org/10.1007/s11740-012-0433-3

Malashin, I. P., Tynchenko, V. S., Masich, I. S., Sukhanov, D. A., Ageev, D. A., Nelyub, V. A., ... & Borodulin, A. S. (2024). Two-Stage Genetic Algorithm for Optimization Logistics Network for Groupage Delivery. *Applied Sciences*, 14(24). https://doi.org/10.3390/app142412005

Meidute-Kavaliauskiene, I., Yıldırım, F., Ghorbani, S., & Činčikaitė, R. (2022). The design of a multi-period and multi-echelon perishable goods supply network under uncertainty. *Sustainability*, 14(4), 2472. https://doi.org/10.3390/su14042472

Miao, X., & Ni, C. (2023). Exploring the cross-border e-commerce of agricultural exports and its logistics supply chain innovation and development strategy under digital technology. *Applied Mathematics and Nonlinear Sciences*, 9(1). https://doi.org/10.2478/amns.2023.2.01487

Mohammadi, M., & Nikzad, A. (2023). Sustainable and reliable closed-loop supply chain network design during pandemic outbreaks and disruptions. *Operations Management Research*, 16(2), 969-991. https://doi.org/10.1007/s12063-022-00312-5

Mohammadi, Z., Barzinpour, F., & Teimoury, E. (2023). A location-inventory model for the sustainable supply chain of perishable products based on pricing and replenishment decisions: A case study. *PloS one*, 18(7), e0288915. https://doi.org/10.1371/journal.pone.0288915

Mohebalizadehgashti, F., Zolfagharinia, H., & Amin, S. H. (2020). Designing a green meat supply chain network: A multi-objective approach. *International Journal of Production Economics*, 219, 312-327. https://doi.org/10.1016/j.ijpe.2019.07.007

Munhoz, J. R., & Morabito, R. (2014). Optimization approaches to support decision making in the production planning of a citrus company: A Brazilian case study. *Computers and Electronics in Agriculture*, 107, 45-57. https://doi.org/10.1016/j.compag.2014.05.016

Nagurney, A., & Besik, D. (2022). Spatial price equilibrium networks with flow-dependent arc multipliers. *Optimization Letters*, 16(8), 2483-2500. https://doi.org/10.1007/s11590-022-01868-8

Nanthasamroeng, N., Khonjun, S., Srichok, T., Pitakaso, R., Akkararungroeungkul, R., Jirasirilerd, G., & Sirisan, S. (2022). Transborder logistics network design for agricultural product transportation in the Greater Mekong Subregion. *The Asian Journal of Shipping and Logistics*, 38(4), 245-262. https://doi.org/10.1016/j.ajsl.2022.10.001

Navazi, F., Tavakkoli-Moghaddam, R., Sazvar, Z., & Memari, P. (2019). Sustainable design for a bi-level transportation-location-vehicle routing scheduling problem in a perishable product supply chain. In Service Orientation in Holonic and Multi-Agent Manufacturing: Proceedings of SOHOMA 2018 (pp. 308-321). *Springer International Publishing*. https://doi.org/10.1007/978-3-030-03003-2_24

Nguyen, P. H. (2022). Agricultural Supply Chain Risks Evaluation with Spherical Fuzzy Analytic Hierarchy Process. *Computers, Materials & Continua*, 73(2). https://doi.org/10.32604/cmc.2022.030115

Niu, B., Shen, Z., & Xie, F. (2021). The value of blockchain and agricultural supply chain parties' participation confronting random bacteria pollution. *Journal of Cleaner Production*, 319, 128579. https://doi.org/10.1016/j.jclepro.2021.128579

Okdinawati, L., Sunitiyoso, Y., Simatupang, T. M., Hermawan, P., Noerhatini, P., & Sitadewi, D. (2020). Interaction model of agribusiness: the case of tomato farming in West Java. *International Journal of Business and Globalisation*, 26(1-2), 24-40. https://doi.org/10.1504/IJBG.2020.109827

Orjuela Castro, J. A., Orejuela-Cabrera, J. P., & Adarme-Jaimes, W. (2021). Logistics network configuration for seasonal perishable food supply chains. *Journal of industrial engineering and management (JIEM)*, 14(2), 135-151. https://doi.org/10.3926/jiem.3161

Orjuela-Castro, J. A., Orejuela-Cabrera, J. P., & Adarme-Jaimes, W. (2022). Multi-objective model for perishable food logistics networks design considering availability and access. *OPSEARCH*, 59(4), 1244-1270. https://doi.org/10.1007/s12597-022-00594-0

Orjuela-Castro, J. A., Orejuela-Cabrera, J. P., & Adarme-Jaimes, W. (2023). Supply Chain Network Design of Perishable Food in Surplus Periods. *International Journal on Food System Dynamics,* 14(1), 110-127. https://dx.doi.org/10.18461/ijfsd.v14i1.E8

Pakdel, G. H., He, Y., & Pakdel, S. H. (2024). Multi-Objective Green Closed-Loop Supply Chain Management with Bundling Strategy, Perishable Products, and Quality Deterioration. *Mathematics*, 12(5), 737. https://doi.org/10.3390/math12050737

Pal, A., & Kant, K. (2019). Internet of perishable logistics: Building smart fresh food supply chain networks. *IEEE Access*, 7, 17675-17695. https://doi.org/10.1109/ACCESS.2019.2894126

Paluri, R. A., & Mishal, A. (2020). Trust and commitment in supply chain management: a systematic review of literature. *Benchmarking: an international journal,* 27(10), 2831-2862. https://doi.org/10.1108/BIJ-11-2019-0517

Pan, F., Pan, S., Zhou, W., & Fan, T. (2022). Perishable product bundling with logistics uncertainty: Solution based on physical internet. *International Journal of Production Economics*, 244. https://doi.org/10.1016/j.ijpe.2021.108386

Pan, L., & Shan, M. (2024). Optimization of Sustainable Supply Chain Network for Perishable Products. *Sustainability*, 16(12). https://doi.org/10.3390/su16125003

Patidar, R., & Agrawal, S. (2020). Restructuring the Indian agro-fresh food supply chain network: a mathematical model formulation. *Clean Technologies and Environmental Policy,* 22, 2053-2077. https://doi.org/10.1007/s10098-020-01955-3

Perdana, T., Tjahjono, B., Kusnandar, K., Sanjaya, S., Wardhana, D., & Hermiatin, F. R. (2023). Fresh agricultural product logistics network governance: Insights from small-holder farms in a developing country. *International Journal of Logistics Research and Applications*, 26(12), 1761-1784. https://doi.org/10.1080/13675567.2022.2107625

Pérez-Mesa, J. C., Galdeano-Gómez, E., & Andújar, J. A. S. (2012). Logistics network and externalities for short sea transport: An analysis of horticultural exports from southeast Spain. *Transport Policy,* 24, 188-198. https://doi.org/10.1016/j.tranpol.2012.08.010

Pérez-Mesa, J. C., Serrano-Arcos, M. M., Jiménez-Guerrero, J. F., & Sánchez-Fernández, R. (2021). Addressing the location problem of a perishables redistribution center in the middle of Europe. *Foods,* 10(5). https://doi.org/10.3390/foods10051091

Pitakaso, R., Nanthasamroeng, N., Srichok, T., Khonjun, S., Weerayuth, N., Kotmongkol, T., ... & Pranet, K. (2022). A novel artificial multiple intelligence system (AMIS) for agricultural product Transborder logistics network Design in the Greater Mekong Subregion (GMS). *Computation*, 10(7), 126. https://doi.org/10.3390/computation10070126

Pu, M., Chen, X., & Zhong, Y. (2021). Overstocked agricultural produce and emergency supply system in the COVID-19 pandemic: Responses from China. *Foods*, 10(12). https://doi.org/10.3390/foods10123027

Rahbari, M., Khamseh, A. A., & Mohammadi, M. (2023). Robust optimization and strategic analysis for agri-food supply chain under pandemic crisis: Case study from an emerging economy. *Expert Systems with Applications,* 225. https://doi.org/10.1016/j.eswa.2023.120081

Raimbekov, Z., Syzdykbayeva, B., Rakhmetulina, A., Rakhmetulina, Z., Abylaikhanova, T., Doltes, L., & Kinasheva, Z. (2024). Designing and improving the efficiency of placement of logistics infrastructure for storage, distribution and trade of agri-food products. *Journal of Industrial Engineering and Management*, 17(3), 777-808. https://doi.org/10.3926/jiem.6081

Rajabi-Kafshgar, A., Gholian-Jouybari, F., Seyedi, I., & Hajiaghaei-Keshteli, M. (2023). Utilizing hybrid metaheuristic approach to design an agricultural closed-loop supply chain network. *Expert Systems with Applications,* 217. https://doi.org/10.1016/j.eswa.2023.119504

Ramos, E., Coles, P. S., Chavez, M., & Hazen, B. (2022). Measuring agri-food supply chain performance: insights from the Peruvian kiwicha industry. *Benchmarking: An International Journal*, 29(5), 1484-1512. https://doi.org/10.1108/BIJ-10-2020-0544

Rashvand Falari, S., Fathi Hafshjani, K., & Afshar Kazemi, M. A. (2024). Smart multi-commodity location-routing model for perishable goods with an emphasis on big data under uncertainty and congestion. *Interdisciplinary Journal of Management Studies*, 17(2), 653-668. https://doi.org/10.22059/ijms.2023.359254.675865

Rezaei-Malek, M., Tavakkoli-Moghaddam, R., Zahiri, B., & Bozorgi-Amiri, A. (2016). An interactive approach for designing a robust disaster relief logistics network with perishable commodities. *Computers & Industrial Engineering,* 94, 201-215. https://doi.org/10.1016/j.cie.2016.01.014

Roghanian, E., & Cheraghalipour, A. (2019). Addressing a set of meta-heuristics to solve a multi-objective model for closed-loop citrus supply chain considering CO2 emissions. *Journal of cleaner production,* 239. https://doi.org/10.1016/j.jclepro.2019.118081

Routroy, S., & Behera, A. (2017). Agriculture supply chain: A systematic review of literature and implications for future research. *Journal of Agribusiness in Developing and Emerging Economies*, 7(3), 275-302. https://doi.org/10.1108/JADEE-06-2016-0039

Saffari, H., Abbasi, M., & Gheidar-Kheljani, J. (2023). A robust, sustainable, resilient, and responsive model for forward/reverse logistics network design with a new approach based on horizontal collaboration. *Environment, Development and Sustainability,* 1-44. https://doi.org/10.1007/s10668-023-02954-2

Sajedi, S., Sarfaraz, A. H., Bamdad, S., & Khalili-Damghani, K. (2020). Designing a sustainable reverse logistics network considering the conditional value at risk and uncertainty of demand under different quality and market scenarios. *International journal of Engineering,* 33(11), 2252-2271. https://doi.org/10.5829/ije.2020.33.11b.17

Savadkoohi, E., Mousazadeh, M., & Torabi, S. A. (2018). A possibilistic location-inventory model for multi-period perishable pharmaceutical supply chain network design. *Chemical engineering research and design*, 138, 490-505. https://doi.org/10.1016/j.cherd.2018.09.008

Shafiee Motlaq-Kashani, A., Rabbani, M., & Aghsami, A. (2025). A sustainable and resilient humanitarian relief chain network design for distributing assembled relief items dynamically considering perishability, under disruption. *Journal of Modelling in Management*. https://doi.org/10.1108/JM2-10-2023-0252

Sharma, R., Shishodia, A., Kamble, S., Gunasekaran, A., & Belhadi, A. (2024). Agriculture supply chain risks and COVID-19: mitigation strategies and implications for the practitioners. *International Journal of Logistics Research and Applications,* 27(11), 2351-2377. https://doi.org/10.1080/13675567.2020.1830049

Sheikholeslami, M., & Zarrinpoor, N. (2023). Designing an integrated humanitarian logistics network for the preparedness and response phases under uncertainty. *Socio-Economic Planning Sciences*, 86. https://doi.org/10.1016/j.seps.2022.101496

Shi, J. (2024). Optimization of frozen goods distribution logistics network based on k-means algorithm and priority classification. *Scientific Reports,* 14(1), 22477. https://doi.org/10.1038/s41598-024-72723-2

Shirzadi, S., Ghezavati, V., Tavakkoli-Moghaddam, R., & Ebrahimnejad, S. (2021). Developing a green and bipolar fuzzy inventory-routing model in agri-food reverse logistics with postharvest behavior. *Environmental Science and Pollution Research,* 28, 41071-41088. https://doi.org/10.1007/s11356-021-13404-9

Shu, J., Wang, G., & Zhang, K. (2013). Logistics distribution network design with two commodity categories. *Journal of the Operational Research Society,* 64(9), 1400-1408. https://doi.org/10.1057/jors.2012.107

Sinaga, T. S., Hidayat, Y. A., Wangsaputra, R., & Bahagia, S. N. (2022). The development of a conceptual rural logistics system model to improve products distribution in Indonesia. *Journal of Industrial Engineering and Management,* 15(4), 670-687. https://doi.org/10.3926/jiem.4011

Solina, V., & Mirabelli, G. (2021). Integrated production-distribution scheduling with energy considerations for efficient food supply chains. *Procedia Computer Science*, 180, 797–806. https://doi.org/10.1016/j.procs.2021.01.355

Song, Z., & He, S. (2019). Contract coordination of new fresh produce three-layer supply chain. *Industrial Management & Data Systems,* 119(1), 148-169. https://doi.org/10.1108/IMDS-12-2017-0559

Song, Z., & He, S. (2019). Contract coordination of new fresh produce three-layer supply chain. *Industrial Management & Data Systems*, 119(1), 148-169. https://doi.org/10.1108/IMDS-12-2017-0559

Soysal, M., Bloemhof-Ruwaard, J. M., & Van Der Vorst, J. G. (2014). Modelling food logistics networks with emission considerations: The case of an international beef supply chain. *International Journal of Production Economics*, 152, 57-70. https://doi.org/10.1016/j.ijpe.2013.12.012

Soysal, M., Bloemhof-Ruwaard, J. M., Haijema, R., & van der Vorst, J. G. (2018). Modeling a green inventory routing problem for perishable products with horizontal collaboration. *Computers & Operations Research,* 89, 168-182. https://doi.org/10.1016/j.cor.2016.02.003

Soysal, M., Bloemhof-Ruwaard, J. M., Haijema, R., & Van Der Vorst, J. G. (2015). Modeling an inventory routing problem for perishable products with environmental considerations and demand uncertainty. *International Journal of*

Production Economics, 164, 118-133. https://doi.org/10.1016/j.ijpe.2015.03.008

Su, J., Zhang, F., Chen, S., Yu, X., & Suntrayuth, S. (2022). Path optimization of fresh products logistics distribution under new retail mode. *International Journal of Innovative Computing, Information and Control,* 18(2), 511-523. https://doi.org/10.24507/ijicic.18.02.511

Sun, B., Ma, M., Li, Y., & Zheng, L. (2020). Analysis on the stability and evolutionary trend of the symbiosis system in the supply chain of fresh agricultural products. *Plos one*, 15(7). https://doi.org/10.1371/journal.pone.0236334

Tabatabaei, S. M., Safi, M., & Shafiei Nikabadi, M. (2021). A mathematical model for scheduling of transportation, routing, and cross-docking in the reverse logistics network of the green supply chain. *International Journal of Nonlinear Analysis and Applications*, 12(2), 1909-1927. https://doi.org/10.22075/ijnaa.2021.5325

Talkhestani, H. R. A., Jahromi, M. H. M. A., & Keshavarzfard, R. (2022). A Location-Inventory Model for Multi-Product Supply Chain with Perishable Products and Price-Dependent Demand. *Advances in Industrial Engineering,* 56(2), 1-12. https://doi.org/10.22059/AIE.2022.338983.1825

Talouki, R. Z., Javadian, N., & Movahedi, M. M. (2021). Optimization and incorporating of green traffic for dynamic vehicle routing problem with perishable products. *Environmental Science and Pollution Research*, 28, 36415-36433. https://doi.org/10.1007/s11356-021-13059-6

Trinh, P. T. X., & Chuyen, T. T. (2024). The impact of the fourth industrial revolution on the agricultural supply chain system in the Mekong Delta. *Journal of Science and Development Economics*, (26), 63-69. https://jsde.nctu.edu.vn/jsde/article/view/349

Tyukhtenko, N., Churkina, I., Pavlovych, O., Mokhnenko, A., & Burak, V. (2024). Foreign market entry strategy as a key to the competitiveness of enterprises. *Ekonomika APK*, 31(5), 86-98. https://doi.org/10.32317/ekon.apk/5.2024.86

Violi, A., De Maio, A., & Fattoruso, G. (2024). Inventory management and delivery of perishable products with stochastic demands and risks consideration. *Procedia Computer Science*, 232, 2941-2949. https://doi.org/10.1016/j.procs.2024.02.110

Wang, C. N., Nhieu, N. L., Chung, Y. C., & Pham, H. T. (2021). Multi-objective optimization models for sustainable perishable intermodal multi-product networks with delivery time window. *Mathematics*, 9(4), 379. https://doi.org/10.3390/math9040379

Wang, L., Tang, Y. M., Chau, K. Y., & Zheng, X. (2024). Empirical Research of Cold-Chain Logistics Service Quality in Fresh Product E-Commerce. *Journal of Theoretical and Applied Electronic Commerce Research,* 19(3), 2543-2556. https://doi.org/10.3390/jtaer19030122

Wang, N. (2022). Research on the Optimization Problem of Agricultural Product Logistics based on Genetic Algorithm under the Background of Sharing Economy. *International Journal of Advanced Computer Science and Applications,* 13(12). https://doi.org/10.14569/IJACSA.2022.0131295

Wang, S., Tao, F., & Shi, Y. (2018). Optimization of location–routing problem for cold chain logistics considering carbon footprint. *International journal of environmental research and public health,* 15(1), 86. https://doi.org/10.3390/ijerph15010086

Wang, Y., & Gao, B. (2024). Dual-Channel Supply Chain of Agricultural Products under Centralised and Decentralised Decision-Making. *Applied Sciences*, 14(17). https://doi.org/10.3390/app14178039

Wang, Y., Wang, Y., & Leng, J. (2024). A Study on the Vehicle Routing Planning Method for Fresh Food Distribution. *Applied Sciences*, 14(22). https://doi.org/10.3390/app142210499

Wang, Y., Zhang, J., Guan, X., Xu, M., Wang, Z., & Wang, H. (2021). Collaborative multiple centers fresh logistics distribution network optimization with resource sharing and temperature control constraints. *Expert Systems with Applications*, 165. https://doi.org/10.1016/j.eswa.2020.113838

Woo, S. H., Choi, J. Y., Kwak, C., & Kim, C. O. (2009). An active product state tracking architecture in logistics sensor networks. *Computers in Industry,* 60(3), 149-160. https://doi.org/10.1016/j.compind.2008.12.001

Wu, Y. (2023). Operation Mechanism of Agricultural Product Logistics Based on E-commerce Logistics Policy. *Manufacturing and Service Operations Management*, 4(1), 29-34. https://doi.org/10.23977/msom.2023.040105

Xu, G., Feng, J., Chen, F., Wang, H., & Wang, Z. (2019). Simulation-based optimization of control policy on multi-echelon inventory system for fresh agricultural products. *International Journal of Agricultural and Biological Engineering,* 12(2), 184-194. https://doi.org/10.25165/j.ijabe.20191202.2834

Yakavenka, V., Mallidis, I., Vlachos, D., Iakovou, E., & Eleni, Z. (2020). Development of a multi-objective model for the design of sustainable supply chains: The case of perishable food products. *Annals of Operations Research*, 294, 593-621. https://doi.org/10.1007/s10479-019-03434-5

Yan, B., Fan, J., & Wu, J. W. (2021). Channel choice and coordination of fresh agricultural product supply chain. *RAIRO-operations Research*, 55(2), 679-699. https://doi.org/10.1051/ro/2021014

Yang, Y., & Chen, Y. (2021). Designing closed-loop supply chain network for high-salvage perishable products under uncertain environment. *IEEE Access*, 9, 102236-102250. https://doi.org/10.1109/ACCESS.2021.3097548

Yang, Y., Chi, H., Tang, O., Zhou, W., & Fan, T. (2019). Cross perishable effect on optimal inventory preservation control. *European Journal of Operational Research*, 276(3), 998-1012. https://doi.org/10.1016/j.ejor.2019.01.069

Yao, J., Lian, D., Liu, Y., Li, D., Geng, Y., Li, X., & Xiao, C. (2023). Construction of Agricultural Products Logistics Network in Hebei Province Based on Improved Gravity Mode. *Journal of World Economy,* 2(3), 82-92. https://doi.org/10.56397/JWE.2023.09.11

Yavari, M., & Geraeli, M. (2019). Heuristic method for robust optimization model for green closed-loop supply chain network design of perishable goods. *Journal of Cleaner Production*, 226, 282-305. https://doi.org/10.1016/j.jclepro.2019.03.279

Yazdani, M., Gonzalez, E. D., & Chatterjee, P. (2021). A multi-criteria decision-making framework for agriculture supply chain risk management under a circular economy context. *Management Decision*, 59(8), 1801-1826. https://doi.org/10.1108/MD-10-2018-1088

Yuniarti, R., Masudin, I., Rusdiansyah, A., & Handayani, D. I. (2023). Model of multiperiod production-distribution for closed-loop supply chain considering carbon emission and traceability for agri-food products. *International Journal of Industrial Engineering and Operations Management*, 5(3), 240-263. https://doi.org/10.1108/IJIEOM-10-2022-0045

Zhang, H., Liu, Y., Zhang, Q., Cui, Y., & Xu, S. (2020). A Bayesian network model for the reliability control of fresh food e-commerce logistics systems. *Soft Computing*, 24, 6499-6519. https://doi.org/10.1007/s00500-020-04666-5

Zhang, J., & Li, Y. (2023). Collaborative vehicle-drone distribution network optimization for perishable products in the epidemic situation. *Computers & Operations Research*, 149. https://doi.org/10.1016/j.cor.2022.106039

Zhao, Y., Cheng, S., & Lu, F. (2022). Seasonal characteristics of agricultural product circulation network: A case study in Beijing, China. *Agronomy*, 12(11). https://doi.org/10.3390/agronomy12112827

Zheng, C., Pang, Q., Li, T., Wang, G., Cai, Y., & Yang, L. (2019). The Farmers' Channel Selection and Sustainable Analysis under Carbon Tax Policy. *Sustainability*, 11(10), 2765. https://doi.org/10.3390/su11102765

Zheng, C., Peng, B., & Wei, G. (2021). Operational risk modeling for cold chain logistics system: a Bayesian network approach. *Kybernetes*, 50(2), 550-567. https://doi.org/10.1108/K-10-2019-0653

Zhou, L., Hou, G., & Rao, W. (2024). Collaborative logistics for agricultural products of'farmer+ consumer integration purchase'under platform empowerment. *Expert Systems with Applications*. https://doi.org/10.1016/j.eswa.2024.124521

Zhou, X., Wei, X., Lin, J., Tian, X., Lev, B., & Wang, S. (2021). Supply chain management under carbon taxes: A review and bibliometric analysis. *Omega*, 98. https://doi.org/10.1016/j.omega.2020.102295.

Zhu, H., Liu, C., Wu, G., & Gao, Y. (2023). Cold Chain Logistics Network Design for Fresh Agricultural Products with Government Subsidy. *Sustainability*, 15(13). https://doi.org/10.3390/su151310021

Zhu, X. (2024). The role of agricultural product logistics supply chain in agricultural economic development in the context of big data and in-depth learning. *International Journal of Innovative Computing, Information and Control,* 20(2), 525-540. https://doi.org/10.24507/ijicic.20.02.525

Zhuang, D., Abbas, J., Al-Sulaiti, K., Fahlevi, M., Aljuaid, M., & Saniuk, S. (2022). Land-use and food security in energy transition: Role of food supply. *Frontiers in Sustainable Food Systems*, 6. https://doi.org/10.3389/fsufs.2022.1053031

APPENDIX A

Table 7. Literature review of related topics

Studies	Model type	Objective Functions				UCT	Multi-Product	Type of Products	Real case
		Social purposes	E-Impact	Cost/Profit	Others				
Fleischmann *et al.,* (2000)	MILP			√	√			N/A	Netherlands, Germany, the USA, Belgium
Ahumada & Villalobos, (2011)	MIP			√	√	√	√	Bell pepper, Tomato	USA
Pérez-Mesa *et al.,* (2012)	MCDM			√	√		√	Fruits and Vegetables	Spain
Ahumada *et al.,* (2012)	STP			√		√	√	Fruits and Vegetables	Mexico
Hasani *et al.,* (2012)	MILP			√	√	√	√	Food	Iran
Lütjen *et al.,* (2013)	SIM			√				Banana	Costa Rica
Soysal *et al.,* (2014)	MOLP		√	√		√		Beef	Brazil
Munhoz & Morabito, (2014)	LP			√		√		Orange juice	Brazil
de Keizer *et al.,* (2015)	MILP			√	√		√	Flowers	Netherlands
Soysal *et al.,* (2015)	IRP		√	√		√		Fresh Tomatoes	Turkey
Rezaei-Malek *et al.,* (2016)	MILP			√	√	√		Milk	Iran
Li *et al.,* (2016)	MILP			√	√	√	√	Meat, Seafood, Dairy products, Fruits, Vegetables	China
La Scalia *et al.,* (2016)	SIM				√	√		Strawberry	Italy
Guo *et al.,* (2017)	MIP			√		√		N/A	China
de Keizer *et al.,* (2017)	MILP			√		√	√	Flower	EU
Albrecht & Steinrücke, (2018)	MILP			√		√	√	Strawberries, Raspberries	Germany
Lozano & Adenso-Diaz, (2018)	NDEA				√		√	N/A	Spain
Allaoui *et al.,* (2018)	MCDM	√	√	√				N/A	EU
Soysal *et al.,* (2018)	IRP		√	√		√	√	Figs, Cherries	Turkey
Wang *et al.,* (2018)	LRP			√		√	√	N/A	China
Higgins *et al.,* (2018)	TraNSIT				√	√	√	Sugar, Cotton, Cottonseed	Australia
Lin *et al.,* (2018)	DMPC, MILP			√	√	√		Rose	Netherlands
Cruz *et al.,* (2019)	MILP			√		√		Sugar beet	Netherlands
Li *et al.,* (2019)	MILP			√	√	√	√	Foods (meat, seafood,…)	China
Fatemi Ghomi & Asgarian, (2019)	TILRP			√				N/A	Iran
Roghanian & Cheraghalipou, (2019)	MILP		√	√				Citrus	Iran
Yavari & Geraeli (2019)	MILP		√	√		√		Milk	Iran
Xu *et al.,* (2019)	SIM			√		√	√	N/A	China
Navazi *et al.,* (2019)	MINLP	√	√	√			√	Milk, Fruit, Vegetables, Meat	Iran
Biuki *et al.,* (2020)	MIP	√	√	√		√	√	N/A	Iran
Jing & Mu, (2020)	DLS				√	√	√	Vegetables, Fruits, Meat	China
Liao *et al.,* (2020)	MILP		√	√				Citrus fruits	Iran
Zhang *et al.,* (2020)	Bayesian network model			√	√	√	√	Fruit, Vegetables, Meat, Seafood	China
Patidar & Agrawal, (2020)	MINLP			√	√	√	√	Vegetables	India

Studies	Model type	Objective Functions				UCT	Multi-Product	Type of Products	Real case
		Social purposes	E-Impact	Cost/Profit	Others				
Li *et al.*, (2020)	IP			√		√		Tomato	China
Yakavenka *et al.*, (2020)	MILP	√	√	√		√	√	Fruit	North-Eastern Europe
Mohebalizadehgashti *et al.*, (2020)	MILP	√	√	√			√	Meat	Canada
Khalafi *et al.*, (2020)	MILP			√	√			Milk	Iran
Aghalari *et al.*, (2020)	MILP			√	√	√		Corn and Soybeans	USA
Sajedi *et al.*, (2020)	MOPSO	√	√	√		√	√	N/A	Iran
Dwivedi *et al.*, (2020)	MINLP		√	√		√	√	Food grains	India
Agahgolnezhad Gerdrodbari *et al.*, (2021)	MILP	√		√			√	Food, dairy, Vegetables, Meat, Medicine	Iran
Asghari *et al.*, (2021)	MINLP			√		√	√	N/A	Iran
Ji *et al.*, (2021)	LP		√	√		√	√	N/A	China
Al-Ashhab *et al.*, (2021)	MINLP		√	√		√	√	Milk, Pharmaceuticals, Blood	Egypt, Saudi Arabia
Tabatabaei *et al.*, (2021)	MILP		√	√		√	√	N/A	Iran
Esteso *et al.*, (2021)	MILP			√		√	√	Fresh fruit, Vegetables	Spain
Orjuela-Castro., et al (2021)	MILP			√		√		Fruit	Columbia
Gilani & Sahebi, (2021)	MILP		√	√		√		Pistachio	Iran
Golestani *et al.*, (2021)	MILP			√	√		√	N/A	Iran
Solina & Mirabelli, (2021)	MILP			√				Vegetables	Italy
Wang *et al.*, (2021)	MILP			√	√	√		N/A	China
Aloui *et al.*, (2021)	MILP				√	√		N/A	France
Jouzdani & Govindan, (2021)	MIP	√	√	√				Milk	Iran
Wang *et al.*, (2021)	MIP		√	√	√		√	Fruit	Vietnam
Daroudi *et al.*, (2021)	MILP		√	√	√	√	√	Smoked sausages, Food	Iran
Yang & Chen, (2021)	FCCP			√	√	√	√	N/A	China
Shirzadi *et al.*, (2021)	MINP			√		√		Tomato	Iran
Talouki *et al.*, (2021)	DVRP		√	√		√		Milk	Iran
Talkhestani *et al.*, (2022)	MINP			√				N/A	Iran
Ghahremani-Nahr *et al.*, (2022)	RFSO			√		√		Fruit and Vegetable	N/A
Nanthasamroeng *et al.*, (2022)	GA, DE, VaNSAS			√		√	√	Rice, Rubber and Cassava	GMS
Orjuela-Castro *et al.*, (2022)	MILP			√		√		Fruit	Columbia
Meidute-Kavaliauskiene *et al.*, (2022)	MILP		√	√		√		Milk	Turkey
Kumar *et al.*, (2022)	NMIP		√	√	√	√		N/A	India
Pitakaso *et al.*, (2022)	MIP			√		√	√	Vegetable	GMS
Pan *et al.*, (2022)	PI			√		√	√	Seafood	China
Kailaku *et al.*, (2022)	GP, SM			√	√			Mango	Indonesia
Su *et al.*, (2022)	PO			√	√	√	√	N/A	China
Wang, (2022)	GA			√	√	√	√	Seafood	China
Nagurney & Besik, (2022)	SPE				√	√		N/A	USA
Baghizadeh *et al.*, (2022)	MINLP		√	√	√	√		Fruit	Iran
Chen *et al.*, (2022)	MIP			√	√	√	√	N/A	China
Rahbari *et al.*, (2023)	MILP			√		√		Canned food	Iran
Orjuela-Castro *et al.*, (2023)	MIP	√		√	√	√	√	Blackberry, Strawberry, Mango, Tangerine, Orange	Colombia
Drofenik *et al.*, (2023)	MILP	√	√	√			√	Fruits, Vegetable, Grapes	Slovenia
Kurniawati & Rochman, (2023)	MILP			√		√	√	Meat, Fish, Vegetables, Fruits	Indonesia
Hashemi-Amiri *et al.*, (2023)	MILP			√	√	√	√	Poultry meat	Iran
Clavijo-Buritica *et al.*, (2023)	MILP			√				Coffee	Colombia
Chen & Chen, (2023)	MILP			√	√	√	√	Vegetables	China
Zhang & Li, (2023)	DLAP, VRPD			√	√	√		N/A	China
Belamkar *et al.*, (2023)	MILP		√	√		√		Apple	India
Chen *et al.*, (2023)	MILP			√		√		Fruits, Vegetables	China
Yuniarti *et al.*, (2023)	MILP			√			√	Organic Vegetables, Food waste and Compost	Indonesia
Sheikholeslami & Zarrinpoor, (2023)	FCCP			√	√	√	√	N/A	Iran
Azab *et al.*, (2023)	MILP	√		√				Sugar beet	Netherlands
Abbasian *et al.*, (2023)	HMCGP-UFGA		√	√		√		Milk	Iran
Perdana *et al.*, (2023)	SIM			√	√	√		French Bean	Indonesia

Studies	Model type	Objective Functions				UCT	Multi-Product	Type of Products	Real case
		Social purposes	E-Impact	Cost/Profit	Others				
Mohammadi *et al.,* (2023)	MINLP	√	√	√			√	Meat (Sausage, Kielbasa, and Hamburger)	Iran
Saffari *et al.,* (2023)	MILP				√		√	N/A	Iran
Daneshvar *et al.,* (2023)	MINLP			√		√	√	N/A	Iran
Li & Zhao, (2023)	MILP			√	√	√	√	N/A	China
Rajabi-Kafshgar *et al.,* (2023)	MILP		√	√				Cashew	Iran
Mohammadi & Nikzad, (2023)	MIP	√	√	√		√		N/A	China
Miao & Ni (2023)	SIM				√		√	Vegetables and Chicken	China
Ahmadi-Javid *et al.,* (2023)	MILP			√				Milk	China, Germany, France
Fahmy *et al.,* (2023)	MILP			√		√	√	N/A	Egypt
Antonio Violi *et al.,* (2024)	MILP			√		√	√	Fruits and Flowers	Italy
Aghajani *et al.,* (2024)	MILP	√	√	√		√		Stevia	Iran
Ahvan *et al.,* (2024)	MILP	√	√	√		√	√	Fruit	Iran
Gholian-Jouybari *et al.,* (2024)	MILP	√	√	√				Coconut	Philippines
Bryan Urra-Calfuñir *et al.,* (2024)	MILP			√				Olive oil	Chile
Khazaeli *et al.,* (2024)	MILP			√			√	Vegetables	Iran
Lei *et al.,* (2024)	MILP			√				N/A	China
Jin, (2024)	SIM				√		√	Vegetables and Chicken	China
Liao & Chen, (2024)	NMIP			√		√		N/A	China
Pakdel *et al.,* (2024)	MONP		√	√		√		N/A	Iran
Shi, (2024)	GPR			√	√	√	√	N/A	China
Pan & Shan, (2024)	MILP	√	√	√		√	√	Milk, Fruit, Vegetables	China
Li & Shi, (2024)	MILP			√	√	√	√	N/A	China
Rashvand Falari *et al.,* (2024)	MINLP			√	√	√		N/A	Iran
Biza *et al.,* (2024)	MILP			√	√	√		Tomato	Ethiopia
Malashin *et al.,* (2024)	GA			√		√		N/A	Russia
Shafiee Motlaq-Kashani *et al.,* (2025)	MILP	√		√				N/A	Iran

Notes: UCT: Uncertainty; GMS: Greater Mekong Subregion; MIP: mixed integer programming; SIM: Simulation; MILP: Mixed-Integer Linear Programming; MINP: mixed integer nonlinear programming; MINLP: mixed-integer nonlinear programming model; NMIP: nonlinear mixed integer programming; RFSO: robust fuzzy stochastic optimization; HMCGP-UFGA: Heuristic Multi-Choice Goal Programming and Utility Function Genetics Algorithm; DLAP (Distribution Site Location-Allocation Problem); VRPD (Vehicle Routing Problem with Drones); MOPSO: Multi-Objective Particle Swarm Optimization. FCCP: fuzzy chance-constrained programming method; TILRP: transportation inventory location routing problem; NDEA: Network Data Envelopment Analysis. TraNSIT: Transport Network Strategic Investment Tool; MCDM: Multi-Criteria Decision Making; GP and SM: Goal Programming and Surplus Model; IRP: Inventory Routing Problem; MOLP: Multi-Objective Linear Programming; MONP: Multi-Objective Nonlinear Programming; GPR: Gaussian Process Regression; LRP: Location-Routing Problem; LP: linear programming model; PO: path optimization model; PI: Physical Internet; IP: Integer Programming; DMPC: Distributed Model Predictive Control; GA: Genetic Algorithm; SPE: Spatial Price Equilibrium; STP: stochastic tactical planning model; DE: Differential Evolution Algorithm; VaNSAS: Variable Neighborhood Strategies Adaptive Search
.

Tran Trung Chuyen is a lecturer at the Faculty of Business Administration - Marketing, Nam Can Tho University. His teaching focuses on economics, business administration, logistics, and supply chain management. He is currently a PhD candidate in the field of Transportation and Logistics at the Malaysia University of Science and Technology (MUST).

Professor Dr. Premkumar Rajagopal is currently the President of the Malaysia University of Science and Technology (MUST). He is an international expert in the fields of Supply Chain Management (SCM) and logistics. Professor Premkumar has published numerous research papers in international journals, scientific conferences, and book chapters, focusing on topics such as supply chain management, sustainable supply chain technologies, and the application of artificial intelligence in SCM.