

Knowledge Structure of E-Commerce Research in China: An Analysis Based on Bibliometrics

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Abstract

In this study, CiteSpace visualization software and bibliometric methods were used to conduct in-depth research on the field of emergency e-commerce research in China from 2003 to 2023. The literature data included in CNKI were used as a sample set to construct a scientific knowledge map. The study integrates the atlas with the data results and comprehensively analyzes and discusses the research chronology, research subjects, research hotspots, and research frontiers from various perspectives. The results of the study show that emergency e-commerce research is an interdisciplinary field characterized by a low level of researcher activity, a limited number of small and dispersed research teams, and a lack of inter-team cooperation. Research institutions mainly consist of universities and research institutes with limited inter-university cooperation, which hinders the overall integrity of academic research in the field. Emergency e-commerce management is the cornerstone of research in this field. Together with epidemic e-commerce, e-commerce food safety, and e-commerce response to public events, it forms the research focus of this field. The development strategies of fresh food e-commerce and cross-border e-commerce are still in focus, especially in terms of responding to public events and enhancing the entire e-commerce emergency management system. This area is expected to be a key frontier for future research.

Keywords

Electronic Commerce, Emergency, CiteSpace, Visual Analysis, Knowledge Graph

1. Introduction

With the ongoing social and economic advancements in China, the e-commerce sector is progressively maturing and broadening within the country, establishing a comprehensive and varied system and industry chain. Concurrently, the fre-

quency of emergencies is on the rise, encompassing a growing array of scenarios. E-commerce plays a pivotal role in bolstering and advancing the emergency management framework, directly influencing the security of emergency resources, the effectiveness of disaster alerts, the speed of information dissemination, and overall emergency response procedures. Consequently, conducting research in this domain holds significant importance in refining the emergency management structure and augmenting the emergency response capabilities of both the nation and businesses, a facet that warrants considerable attention.

As of April 14, 2023, there has not been a widespread comprehensive examination and integration of both domestic and international literature pertaining to emergency e-commerce. By expanding the search parameters, it is possible to uncover scholarly analyses conducted by both domestic and international researchers within the domains of e-commerce and emergency preparedness. The predominant nature of these analyses is quantitative, as illustrated in **Table 1**.

Table 1. Statistics of literature in the field of emergency e-commerce research review (9 articles).

| The author | Time Slicing | Article | Data sources |
|------------------------------|--------------|--|--------------|
| Zhou Zoushan, Wei Shuqi | 2016-2023 | Visualization Analysis on Hot Spots and Trends of Agricultural Products Live-streaming E-commerce Based on CiteSpace | CNKI |
| Liu Huijing, Hu Bingchuan | 2003-2022 | Analysis of Research Focus and Fronts on E-commerce of Fresh Agricultural Products at Home and Abroad Based on CiteSpace | CNKI |
| Lin Mengxi | 2013-2023 | Energy Distribution, Hot Spots and Trends of Research in the E-Commerce Field of RCEP in China—A Bibliometric Analysis Based on Citespace | CNKI |
| Diao Yufan, Shen Yujiao | 2014-2020 | Visualization Analysis of Domestic Cross-border E-commerce Research | CNKI |
| Wu Yong, Qu Zhengshu | 2003-2023 | Progress and Trends in Smart Emergency Research in China—A Visual Analysis Based on CiteSpace | CNKI |
| Bai Yinchuan | 2000-2023 | Hot Spots and Trends in Emergency Management Strategy Research—CiteSpace-based Visualisation Analysis | CNKI |
| Xiao Yi, Yao Ying | 1999-2021 | Visualization and Analysis of China's Cross-border E-commerce Research Grounded in the Post-Epidemic Era | CNKI |
| Nan, R; Zhu, WJ; Xiao, YJ | 2000-2021 | Knowledge Graph Analysis of Digital Emergency Management Research Based on CiteSpace Visualisation: Comparative Analysis of WOS and CNKI Databases | WOS |
| Wen C, Liu W, He Z, Liu C | 2004-2022 | Research on emergency management of global public health emergencies driven by digital technology: A bibliometric analysis. | WOS |

Research in the field of emergency e-commerce, both domestically and internationally, is marked by cyclical growth in hotspots. Domestic research primarily focuses on major public events, following a clear trend of periodical development. Foreign research, on the other hand, emphasizes payment security and emergency management in business-to-business and business-to-consumer transactions. The literature above covers various time periods, analyzing and discuss-

ing different aspects of emergency e-commerce research, including emergency management, laws, and regulations, from various sectors and disciplinary perspectives. This establishes a strong foundation for the field and offers valuable references for future research in this area (Wen et al., 2023; Nan et al., 2022).

2. Data Sources and Research Methods

2.1. Data Sources

The study utilized literature and related data sourced from the China National Knowledge Infrastructure (CNKI). Research on emergency e-commerce typically adopts a multidisciplinary approach. To ensure a comprehensive search and maximize coverage of relevant literature in this field, a specific search formula was devised: (TI = e-commerce OR TI = B2C OR TI = B2B OR TI = O2O OR TI = C2C) AND (TI = Breakout OR TI% = Emergency OR TI% = Public Incident OR TI = Epidemic OR TI = New Crown OR TI = COVID-19 OR TI = Disaster OR TI = Fire OR TI = Earthquake OR TI = Quarantine OR TI% = Accident OR TI = Food Safety OR TI = Monitoring and Warning OR TI = Vehicle Dispatch) The search spanned from January 1, 2003, to December 31, 2023, resulting in the retrieval of 461 documents meeting the search criteria from CNKI. These documents were exported in RefWorks format and processed in Citespace, leading to the creation of a dataset comprising data from 461 documents.

2.2. Research Methods

This research investigates the body of literature pertaining to emergency e-commerce research in China spanning the period from 2003 to 2023 as a representative dataset. Employing bibliometric analysis and the visualization tool Citespace 6.1.6, it conducts a comprehensive examination of the current state and emerging trends within China's emergency e-commerce research domain. This examination encompasses various aspects, including temporal progression, research focal points, core themes, and prevalent research areas. The primary objective of this study is to provide robust insights that can guide future investigations in this field, facilitating the identification of novel research avenues and concepts.

3. Research Results and Analysis

3.1. Analysis of Annual Print Volume of Emergency E-Commerce

The quantity of publications denotes the yearly tally of documents released on CNKI within a specific field, while the cumulative quantity of publications signifies the overall count of documents on CNKI within the same field up to that particular year. These two metrics can, to a certain extent, indicate the trajectory of research interest within a field over a given timeframe. As illustrated in **Figure 1**, the research conducted in the realm of emergency e-commerce in China can be broadly categorized into two distinct time periods. From 2003 to 2019, there was a marginal fluctuation in the annual publication count, leading to an

overall stabilization. However, between 2019 and 2022, there was a remarkable surge in the number of publications, surpassing the total count of the preceding period. This occurrence can be attributed to the notable surge in research on “CKP” both in China and globally since the start of the year. Concurrently, there has been a substantial transformation in the e-commerce landscape in China as a result of this public event, resulting in noteworthy research advancements across different subdomains.

The overarching pattern delineates three phases: gradual growth (2003-2019), explosive expansion (2019-2021), and decelerating growth (2021-2023). Drawing from this pattern, there remain numerous unresolved issues necessitating further exploration and resolution within this domain. The potential of cross-border e-commerce is on the rise, with an increased emphasis on emergency management in this context. Consequently, this investigation anticipates a progressive rise in the volume of scholarly articles.

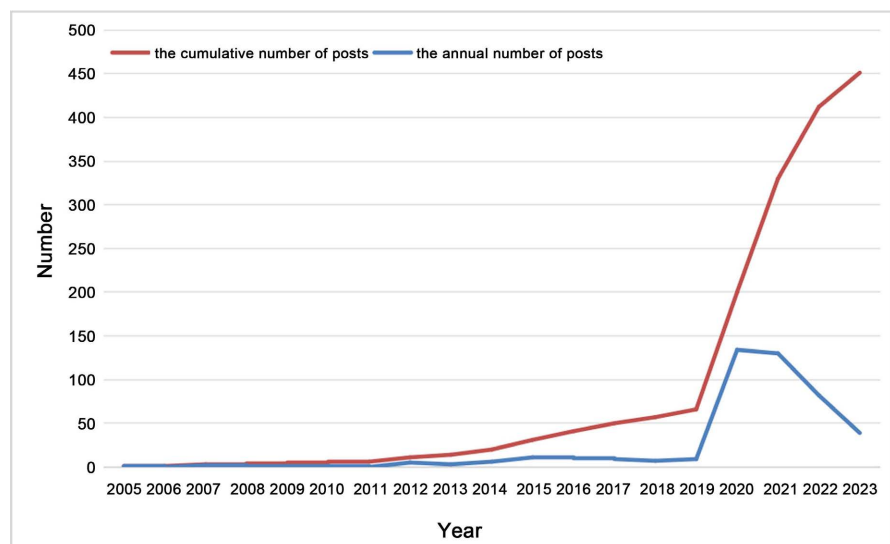


Figure 1. Trend chart of annual and cumulative number of emergency e-commerce posts.

3.2. Subject Analysis of Emergency E-Commerce Research

Co-Occurrence Analysis of Core Research Organization

Re-run CiteSpace with the Node Types set to Institution, while maintaining the other settings consistent with the original configuration to conduct knowledge mapping of core institution co-occurrence. The outcomes are depicted in **Figure 2**. Simultaneously, utilizing the processed data arranged by the statistical value of the institution’s publication volume, the top 10 research institutions with the highest publication volume are identified. These findings are detailed in **Table 2**.

The combination of the distribution depicted in **Figure 2** and the data provided in **Table 2** reveals that the prominent institutions in the field of emergency e-commerce are Yiwu Institute of Commerce and Industry with 6 articles, Beijing Materials Institute with 4 articles, and the School of Economics of Northeast University of Finance and Economics with 3 articles. The remaining institutions

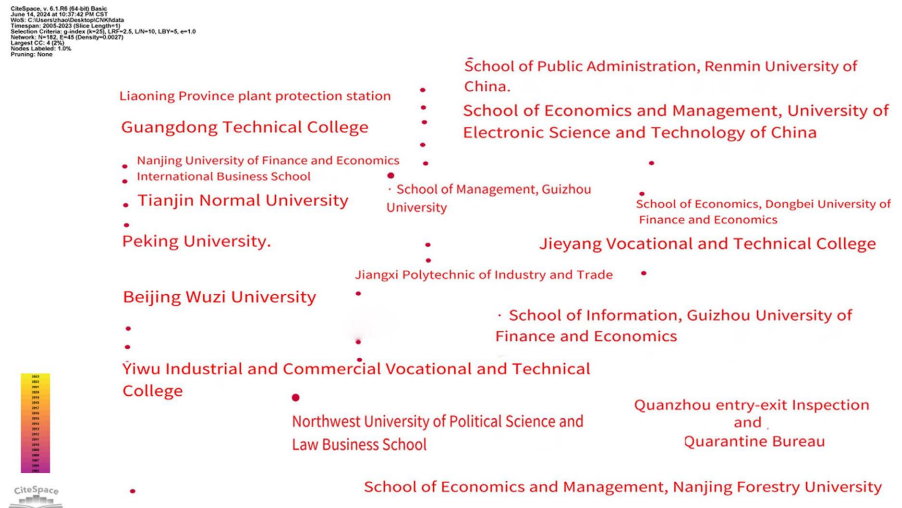


Figure 2. Translated co-occurrence knowledge graph of core institutions.

Table 2. Core Institutions in the field of emergency logistics research.

| | | |
|----|--|---|
| 1 | Yiwu Industrial & Commercial College | 6 |
| 2 | Beijing Wuzi University | 4 |
| 3 | School of Economics of Dongbei University of Finance and Economics | 3 |
| 4 | Jieyang Polytechnic | 2 |
| 5 | School of Information of Guizhou University of Finance and Economics | 2 |
| 6 | School of Economics and Management of University of Electronic Science and Technology of China | 2 |
| 7 | School of management of Guizhou University | 2 |
| 8 | Tianjin Normal University | 2 |
| 9 | Liaoning Provincial Plant Protection Station | 2 |
| 10 | Guangdong Province Technician College | 2 |

listed in the table each have 2 articles. This observation indicates that, akin to the core authors, there is no distinct dominant institution in this field. Furthermore, the relatively equal distribution of publications among institutions, as illustrated in **Figure 2**, leads to several conclusions. Firstly, universities and related industries, such as quarantine institutes, serve as the primary research entities driving advancements in emergency e-commerce. These institutions play a pivotal role in research output and field development. Secondly, there is a noted lack of collaboration among institutions, primarily limited to intra-province university and departmental partnerships, which have minimal impact on cooperative efforts. The absence of broader inter-institutional collaborations, spanning across provinces, hinders the establishment of more comprehensive and advanced forms of academic cooperation in the realm of emergency e-commerce. These factors collectively impede the progression of the discipline within this domain.

3.3. Analysis of Hot Spots of Emergency E-Commerce Research

3.3.1. Co-Occurrence Analysis of Keywords in Emergency E-Commerce Research

In CiteSpace, the node type should be adjusted to “Keyword” while maintaining the other settings. Following the initial rendering by the software, it is recommended to manually adjust the node distribution to enhance clarity and visibility of the outcomes. Subsequently, generate the keyword co-occurrence knowledge graph, as depicted in **Figure 3**. Since the dataset’s keyword meanings remain consistent post initial processing, data consolidation is necessary. For instance, instances of “e-commerce” and “e-commerce” should be consolidated into a single entity, “e-commerce,” to facilitate the calculation of keyword frequency and relevance. The outcomes of this consolidation process are presented in **Table 3** and **Table 4**. The top 10 keywords based on frequency and intermediary centrality are then identified.

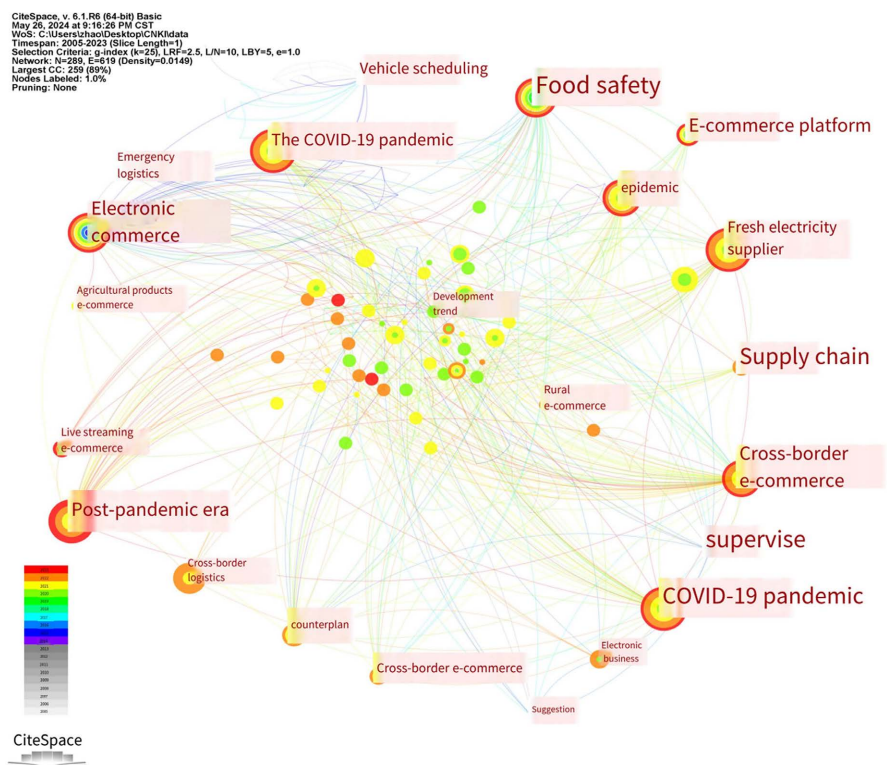


Figure 3. Translated co-occurrence knowledge graph of keyword.

Table 3. High-frequency keywords of emergency e-commerce.

| Ranking | Keywords | Frequency | Ranking | Keywords | Frequency |
|---------|-------------------------|-----------|---------|------------------------|-----------|
| 1 | Cross-border e-commerce | 92 | 11 | Cross-border Logistics | 9 |
| 2 | New Crown Epidemic | 82 | 12 | Agricultural Products | 8 |
| 3 | E-commerce | 64 | 13 | Rural E-commerce | 8 |

Continued

| | | | | | |
|----|-------------------------|----|----|---------------------------------|---|
| 4 | Post-Epidemic Era | 41 | 14 | Logistics | 8 |
| 5 | Fresh Food E-commerce | 37 | 15 | Agricultural E-commerce | 7 |
| 6 | Food Safety | 30 | 16 | Live E-commerce | 7 |
| 7 | Epidemic | 27 | 17 | Regulation | 6 |
| 8 | Counter measures | 19 | 18 | Epidemic prevention and control | 5 |
| 9 | Cross-border E-commerce | 12 | 19 | Live E-Commerce | 5 |
| 10 | Supply Chain | 11 | 20 | Vehicle Scheduling | 5 |

Table 4. High centrality keywords of emergency e-commerce.

| Ranking | Keywords | Frequency | Ranking | Keywords | Frequency |
|---------|-------------------------|-----------|---------|----------------------------------|-----------|
| 1 | E-commerce | 0.67 | 10 | E-commerce Platform | 0.05 |
| 2 | Cross-border e-commerce | 0.51 | 11 | Cross-border Logistics | 0.02 |
| 3 | New Crown Epidemic | 0.34 | 12 | Agricultural Products | 0.03 |
| 4 | Post-Epidemic Era | 0.24 | 13 | Rural E-commerce | 0.08 |
| 5 | Fresh Food E-commerce | 0.14 | 14 | Logistics | 0.01 |
| 6 | Food Safety | 0.27 | 15 | E-commerce | 0.02 |
| 7 | Epidemic | 0.12 | 16 | Agricultural Products E-commerce | 0.02 |
| 8 | Countermeasures | 0.12 | 17 | Live streaming e-commerce | 0.02 |
| 9 | Supply Chain | 0.09 | 18 | Regulation | 0.07 |

Table 3 illustrates the prevalent keywords and their frequencies within the emergency e-commerce domain. The data reveals that “cross-border e-commerce” holds the highest frequency at 92 occurrences, indicating its prominence in this field. Following this, “new crown epidemic” and “e-commerce” are mentioned 82 and 64 times respectively, showcasing the impact of the epidemic on e-commerce and emphasizing the significance of e-commerce in scholarly investigations. Furthermore, the table includes keywords like “post-epidemic era,” “fresh

food e-commerce,” and “food safety,” which are focal points within the contemporary e-commerce industry.

In contrast, **Table 4** shifts the focus towards the centrality of keywords, evaluating their importance and interconnectedness within the e-commerce knowledge network. “E-commerce” emerges as the most central keyword with a score of 0.67, signifying its critical role in the domain. Similarly, “cross-border e-commerce” and “COVID-19 pandemic” exhibit high centrality scores of 0.51 and 0.34 respectively. Additionally, keywords such as “post-epidemic era,” “fresh food e-commerce,” and “food safety” also demonstrate notable centrality, indicating their significant positions in e-commerce research and discourse.

Upon analyzing these tables, several conclusions can be drawn:

- 1) Emergency e-commerce is a priority area encompassing key topics such as cross-border e-commerce, epidemic response, and food safety.
- 2) Epidemics have had a substantial impact on the e-commerce sector, evident from the high frequency and centrality scores of “New Crown Epidemic” and “Post-Epidemic Era.”
- 3) The foundational and central role of e-commerce is underscored by the high and moderate centrality scores associated with the keyword “e-commerce.”
- 4) The critical importance of food safety within e-commerce is highlighted across both tables.

3.3.2. Cluster Analysis of Keywords in Emergency E-Commerce Research

Following the acquisition of the knowledge graph depicting keyword co-occurrence, this research proceeded to conduct keyword clustering. The LLR algorithm was employed within the Citespace software for this purpose. Subsequently, the software generated a knowledge graph illustrating the keyword clustering, as depicted in **Figure 4**. The clustering process yielded a total of 26 class clusters, with a Q-value of 0.6271 and an S-value of 0.8761. The Q-value, denoting the clustering module value, serves as an indicator of the significance of the cluster structure. A Q value exceeding 0.3 is generally acknowledged as indicative of a significant clustering structure. Meanwhile, the S-value, representing the clustered mean contour value, is utilized to evaluate the efficacy of clustering by measuring the similarity of data points within the same cluster. Clustering results are deemed convincing if the S-value surpasses 0.7. The findings suggest that the keyword clustering structure pertaining to emergency e-commerce research is indeed significant, with a convincing clustering effect. Following an examination of the core literature, analysis of the clustering outcomes, and consolidation of similar clusters, the identified clusters can be categorized into five overarching themes:

1) Development Dilemma and Countermeasures of Cross-border E-commerce Emergency Management

This theme centers on the difficulties faced by cross-border e-commerce within the emergency management system, encompassing the areas of quarantine and inspection supervision, food safety, as well as bonded imports and the associated risks of smuggling.

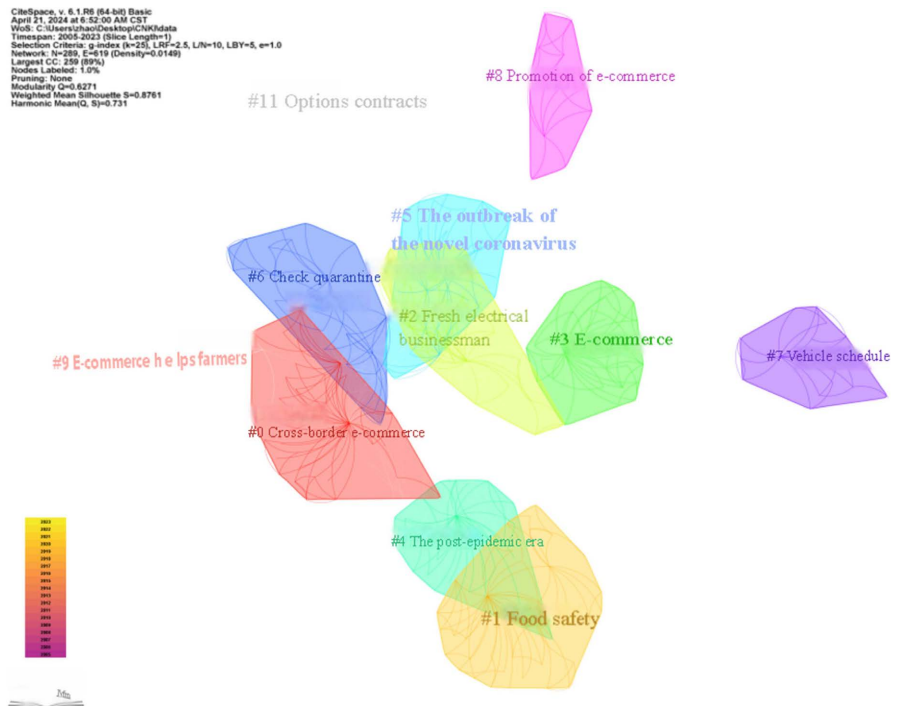


Figure 4. Keyword clustering knowledge graph.

i) Quarantine Inspection and Supervision

In the domain of cross-border e-commerce, specifically within the framework of direct mail and general trade online shopping operating in the bonded trade model under the oversight of inspection and quarantine for imported goods, divergent viewpoints have long existed. One school of thought asserts that ensuring product safety requires inspection and quarantine oversight to guarantee product quality and safety with manageable risks. Conversely, an alternative perspective advocates for a more permissive policy environment to nurture the growth of emerging industries. This stance is rooted in the unavailability of many products from cross-border e-commerce within the domestic market, coupled with challenges in obtaining the requisite product business licenses and specifications. To address this challenge, Wu Maon has proposed the implementation of a system for filing and managing cross-border e-commerce enterprises, the introduction of a pre-declaration mechanism for incoming goods, and the establishment of a standardized information system for supervising and managing cross-border e-commerce, encompassing inspection and quarantine protocols. Lin Wenjian has suggested the establishment of a credit supervision framework for inspection and quarantine in cross-border e-commerce. Conducting credit oversight of cross-border e-commerce transactions and implementing differentiated management of cross-border e-commerce enterprises based on their credit standing represent a feasible path for inspection and quarantine authorities to achieve effective supervision, thereby facilitating trade through functional transformation. Quality traceability stands as a crucial element in the management of inspection and quarantine in cross-border e-commerce. The proposal to create a

traceability system for the quality and safety of import and export commodities aims to bolster overall quality and safety management and risk mitigation. Hu Wenhai has put forth a set of strategies in this regard, including the continual enhancement of pertinent cross-border e-commerce practices and the implementation of diverse measures. Within this framework, a series of countermeasures, such as bolstering relevant legislation on cross-border e-commerce, leveraging quality traceability data as a cornerstone, and utilizing the “Internet+” approach to establish a comprehensive quality supervision model, among other tactics.

ii) Food safety

Effective regulation of cross-border e-commerce imported food safety is related to the safety of people’s lives and is an important issue in the “Healthy China Strategy.” The cross-border e-commerce imported food market is increasingly prosperous, but the corresponding food safety issues continue to be highlighted. The heterogeneous nature of cross-border e-commerce and imported food transaction modes has posed challenges to traditional food safety supervision. Research on this subject also focuses more on regulatory innovation and countermeasures. Fei (2019) summarizes and analyzes the realistic dilemma of cross-border e-commerce import food safety supervision and puts forward targeted recommendations (Yang et al., 2012). Zhang Xusheng, on the other hand, analyzes the dilemma of cross-border e-commerce food safety dispute relief and puts forward suggestions for improvement based on the differences in the perception of cross-border e-commerce food safety risks by different social subjects (Hu et al., 2016). Similarly, Yao Wentong’s study on the application of punitive damages in cross-border e-commerce food disputes focuses more on the legal aspect, which reflects the interdisciplinary nature of the topic. With regulatory innovation wanting to correspond to the governance mode of research, the scientific construction of a food safety social co-governance system is an effective way to deal with food safety problems in the cross-border e-commerce environment. Some of them, like Wang Xue’s study, emphasize the study of mechanisms and systems and put forward the suggestions of macro means, such as “establishing the online food safety risk control system mainly based on cross-border e-commerce platforms” and “enhancing the governance capacity of food safety nongovernmental organizations.” Others, like Zhang Bei’s study, focus on the study of cross-border e-commerce platforms and put forward the suggestions of macro means. There is also a systematic analysis of cross-border e-commerce food safety risk characterization and a collaborative governance countermeasures approach, as in Zhang Bei’s study (Zhang et al., 2021). These studies show that China’s cross-border e-commerce food safety regulatory system is still facing many challenges in terms of the improvement of the rule system along with the changes in domestic economic development and the international trade system (Zhang & Peng, 2020).

iii) Bonded models and smuggling risks

In the realm of cross-border e-commerce, online bonded mode involves en-

terprises engaging in initial bulk purchases of foreign goods, which are then imported into designated customs supervision areas or bonded logistics centers in China for storage in bonded warehouses. Through cross-border e-commerce platforms, consumers can directly purchase goods from these bonded warehouses, streamlining the process by eliminating the need for consumers to manage customs clearance, taxes, and related procedures. This section of the research focuses on examining the current state of development and suggesting strategies to mitigate and manage risks associated with smuggling. For instance, Wang (2021)'s research underscores the constraints of bonded import operations, such as limited variety and insufficient inspection efforts. The study recommends the adoption of novel customs clearance protocols, establishment of an information repository, deployment of risk prediction systems, and other interventions to address smuggling risks.

2) Emergency management for fresh food e-commerce

Upon examination of the primary literature, it is apparent that domestic scholars and experts have predominantly concentrated their research efforts on two specific areas within this subject matter: the advancement of cold chain logistics in fresh food e-commerce applications, and the integration of fresh food e-commerce within the framework of unforeseen public events. Utilizing the ISM method, Zhu (2017) has identified, analyzed, and assessed the risk factors associated with O2O fresh e-commerce agricultural products. Subsequently, he has proposed strategic measures for managing risks in the cold chain logistics system of O2O fresh e-commerce agricultural products. Li (2024) has utilized the Dingdong grocery shopping fresh food e-commerce platform as a case study to pinpoint supply chain risk factors. Employing the AHP-fuzzy comprehensive evaluation method, she has evaluated the supply chain risk of Dingdong grocery shopping fresh food e-commerce to enhance the precision of demand prediction in fresh food e-commerce supply chains and to formulate strategies for risk prevention and control (Qin & Sun, 2022). The O2O model, which merges online and offline resources through technology, incorporating features such as local deployment, social networking, and mobility, has proven advantageous for fresh food e-commerce by facilitating advancements in the cold chain logistics system. This model has emerged as a prominent keyword in research within this field. In the context of public emergencies, various scholars and experts have divergent perspectives. For instance, Wang & Gu (2021)'s study aims to analyze the challenges faced by fresh e-commerce terminal distribution during epidemics and offers optimization suggestions. Zhu (2023) has introduced an infectious disease epidemic diffusion model that considers isolation status, analyzing the demand characteristics of fresh food e-commerce for different demographic groups and establishing a predictive function for fresh food e-commerce demand during public health emergencies.

3) Contingency management for e-commerce in the face of pent-up demand

The research in this area is primarily focused on emergency commodities and

the emergency supply chain, with scholars and experts dedicating their attention to this subject. For instance, Cui & Chen (2012), Cui et al. (2013) has developed a two-stage commodity distribution model within the context of self-built logistics to manage the increased demand during e-commerce promotions. This model comprises a time-responsive commodity distribution model and a time-delayed commodity distribution model, with Cui validating the effectiveness and feasibility of this distribution scheme. Furthermore, Cui's research delves into emergency logistics and distribution, exploring scenarios such as logistics and distribution with and without transportation capacity constraints, as well as multi-objective planning. The models and algorithms proposed in Cui's work have been rigorously tested for accuracy and practicality, establishing her study as a significant guiding influence in this field. In a related study, Ren et al. (2022) expands on these considerations by integrating elements such as prioritizing customer service and reducing carbon emissions. Tianyu's research employs algorithms like the ant colony algorithm, forbidden search, and simulated annealing algorithm to optimize the model's algorithm design. Ultimately, Tianyu's study introduces novel theoretical approaches for e-commerce enterprises to enhance distribution efficiency and strategically plan distribution routes.

4) Vehicle scheduling in an e-commerce environment

In the realm of e-commerce, the logistics and distribution system is a critical component that significantly influences the viability of B2C e-commerce operations. An essential technology within this system is vehicle scheduling optimization, which has been highlighted as a key factor. Duan & Fu (2009) introduced a specialized search algorithm to tackle the Capacitated Vehicle Routing Problem (CVRP), demonstrating improved efficiency and effectiveness compared to traditional genetic algorithms. Vehicle scheduling in the context of B2C e-commerce has garnered significant attention from researchers and industry experts. For instance, Meng & Song (2021)'s work focuses on optimizing order splitting in multi-category B2C e-commerce to develop a more efficient vehicle scheduling scheme that reduces order splitting rates and associated costs.

5) Emergency management of e-commerce for agriculture in the context of the epidemic

The Implementing Opinions on Promoting the High-Quality Development of Rural E-commerce delineates the strategic direction for the significant advancement of rural e-commerce over the next five years, aiming to propel its digital transformation and enhancement. Considered a burgeoning focal point within the realm of e-commerce, scholars often prefer to scrutinize and delve into this subject within the context of unforeseen public occurrences. For instance, Xue (2021)'s research delves into the utilization of e-commerce to support farmers through various survey methodologies grounded in pattern induction, offering optimized strategies for path improvement. Conversely, Wu & Zhu (2021)'s study centers on Pinduoduo as the primary focal point, examining the platform's endeavors in aiding farmers during the epidemic and providing valuable insights

for the progression of rural e-commerce in the post-epidemic era.

Table 5. Main clusters of emergency e-commerce research.

| Cluster ID | Cluster labels | The main keywords contained |
|------------|------------------------------|---|
| #0 | Cross-border e-commerce | Cross-border e-commerce, imported food safety, transaction model, regulatory innovation, Belt and Road cross-border logistics, new coronavirus, rcep empowerment, development environment, standardized development, inspection and quarantine, customs clearance and supervision, bonded stockpiling model, development countermeasures, outbreak of new coronavirus infection, development opportunities, opportunities and challenges, food safety |
| #1 | Food Safety | o2o model, control mechanisms, food regulators, food delivery e-commerce platforms, “masks are hard to find”, new crown pneumonia, food safety, e-commerce economy |
| #2 | Fresh food e-commerce | Cold chain logistics, development model, rural poverty alleviation, live streaming with goods, new crown epidemics, emergency emergencies, e-commerce enterprises, post epidemic period, sports training industry |
| #5 | New Crown Pneumonia Outbreak | cross-border e-commerce, economic stimulus policy, ASEAN countries, change of transaction system, agricultural e-commerce, psr model, innovation and entrepreneurship environment, fresh food e-commerce, change of transaction system, convention and exhibition marketing, digital economy, o2o2o business model, rural industry chain, cross-border e-commerce, China-ASEAN, helping farmers image, residents’ perception of consumption, consumption market |
| #7 | Vehicle Scheduling | Vehicle Scheduling, Greedy Algorithm, M-Commerce, Use Case Modeling, Petri Nets |
| #8 | Spurt in Demand | E-commerce promotions, optimal distribution solution, emergency supply chain, distribution model, emergency logistics, emergency supply chain, blowout demand, optimal distribution solution |
| #9 | E-commerce for agriculture | Consumption help, fair trade, ethical consumption, rural e-commerce, rural e-commerce, hierarchical analysis, rural development, consumption help, rural revitalization |

The groupings presented in **Table 5** delineate the primary areas and topics necessitating immediate attention in e-commerce research, which have emerged in direct correlation with contemporary socio-economic circumstances, technological progress, shifts in consumer conduct, and patterns in global interconnectedness. These groupings underscore the principal issues and obstacles within the realm of e-commerce and the preoccupations of scholars and professionals as they seek resolutions. As the e-commerce sector continues to progress and introduce novel concepts, these groupings may undergo transformations, giving rise to fresh research topics and trajectories. For example, in the investigation of agri-commerce, [Wei et al. \(2024\)](#) introduced an inventive C2B2C2B2C e-commerce framework, “Qbnb”, designed to provide consumers with a more tailored and effective service encounter by amalgamating demand and resources. This framework is especially well-suited for the agricultural e-commerce domain as it can better address the need for personalized services in rural regions, while bolstering the efficiency and market penetration of agricultural goods. Through the implementation of the “Qbnb” model, agricultural enterprises can more adeptly respond to market fluctuations and furnish mutually advantageous solutions for both farmers and consumers.

3.3.3. Frontier Analysis of Emergency E-Commerce Research

Upon examination of **Table 6**, it is evident that the mutated terms display varying degrees of mutation intensity and durations. Notably, the term “food safety” demonstrates the highest mutation intensity, while “vehicle scheduling” and “procurement” exhibit the longest durations among the identified keywords. In 2005, the emergence of e-commerce in China coincided with the nascent stage of emergency management research within the country. Consequently, emergency e-commerce, as an interdisciplinary domain bridging these two areas, was inherently at a rudimentary phase. Subsequently, starting from 2008 and amidst a series of natural disasters such as snowstorms and earthquakes, the integration of e-commerce into the emergency management framework progressed from enhancing the supply chain system to establishing a comprehensive information-based emergency response, disaster prevention, and recovery management system. Keywords such as emergency logistics, phytosanitary measures, sudden demand surges, and other unforeseen developments gained prominence during this period. The unexpected outbreak of the novel coronavirus (COVID-19) at the end of 2019 significantly impacted China, presenting substantial challenges to the country’s e-commerce sector, particularly concerning risks associated with overseas warehouse management and disruptions in cross-border e-commerce supply chains. Concurrently, the surge in interest surrounding live e-commerce due to its relevance to epidemic prevention and control further intensified research efforts. As the post-epidemic era unfolds with the gradual relaxation of policies and the resurgence of societal activities, agricultural e-commerce and live e-commerce, both promising fields, have emerged as new focal points among scholars and experts, evolving into key research topics. Additionally,

discussions on development strategies and talent cultivation have gained traction in the current academic landscape. Looking ahead, the formulation of development strategies for emergency e-commerce is poised to remain a primary focus of research within this domain (Wei et al., 2016; 2022; Xie et al., 2016; Li et al., 2012; Xie et al., 2019; Hong et al., 2019; Hong et al., 2022; Huang et al., 2021; Xie et al., 2023; Li et al., 2014).

Table 6. Burst keywords in emergency e-commerce.

| Keywords | Year | Strength | Begin | End | 2005-2023 |
|-----------------------------------|------|----------|-------|------|-----------|
| Procurement | 2005 | 1.8 | 2005 | 2015 | |
| Vehicle Scheduling | 2007 | 2.73 | 2007 | 2017 | |
| E-commerce | 2005 | 3.95 | 2008 | 2016 | |
| Emergency Supplies | 2009 | 1.23 | 2009 | 2015 | |
| Emergency Logistics | 2012 | 3.13 | 2012 | 2015 | |
| Recommendations | 2012 | 1.69 | 2012 | 2017 | |
| Well demand | 2012 | 1.33 | 2012 | 2013 | |
| E-commerce Promotion | 2012 | 1.33 | 2012 | 2013 | |
| M-Commerce | 2012 | 1.12 | 2012 | 2017 | |
| Regulation | 2013 | 2.12 | 2013 | 2017 | |
| Plant Quarantine | 2013 | 1.23 | 2013 | 2016 | |
| Inspection and Quarantine | 2014 | 1.7 | 2014 | 2018 | |
| Food Safety | 2016 | 4.96 | 2016 | 2019 | |
| Takeaway | 2017 | 1.81 | 2017 | 2019 | |
| Cross-border e-commerce | 2017 | 0.66 | 2017 | 2018 | |
| New Crown Pneumonia | 2020 | 1.22 | 2020 | 2021 | |
| Live E-commerce | 2020 | 1.02 | 2020 | 2021 | |
| Impact | 2020 | 1.02 | 2020 | 2021 | |
| Cross-border e-commerce companies | 2020 | 1.02 | 2020 | 2021 | |
| Epidemic Prevention and Control | 2020 | 1.02 | 2020 | 2021 | |
| Epidemic Impact | 2020 | 0.81 | 2020 | 2021 | |
| Agricultural E-commerce | 2020 | 0.72 | 2020 | 2021 | |
| Talent Cultivation | 2020 | 0.61 | 2020 | 2021 | |
| Post-Epidemic Era | 2020 | 4.63 | 2021 | 2023 | |
| Development Countermeasures | 2021 | 0.56 | 2021 | 2023 | |

4. Conclusion and Future Work

In this study, CiteSpace visualization software and bibliometric methods were used to conduct in-depth research on the field of emergency e-commerce research in China from 2003 to 2023. The literature data included in CNKI were

used as a sample set to construct a scientific knowledge map. The study integrates mapping with the data results to conduct a comprehensive analysis and discussion from multiple perspectives, including research chronology, research subjects, research hotspots, and research frontiers. It summarizes the following conclusions:

1) In this area of study, active scholars, authorities, and research organizations are engaged in presenting research findings and offering references for potential collaboration in future scientific investigations. 2) From the perspective of time distribution, China's research on emergency e-commerce in annual publications is limited, with minimal changes. The cumulative volume of publications generally follows a pattern of "gradual increase-sudden growth-slowdown in growth." 3) Five key research areas have been condensed and enhanced, including the challenges and solutions related to emergency management in cross-border e-commerce, emergency management strategies for fresh food e-commerce, handling emergency situations in e-commerce during periods of high demand, optimizing vehicle scheduling within the e-commerce sector, and emergency management practices for agricultural e-commerce during epidemic outbreaks.

Nevertheless, the CiteSpace tool faces technical constraints that prevent it from concurrently handling literature data from both CNKI and WOS databases. Consequently, our analysis was limited to literature data sourced from CNKI pertaining to Chinese emergency e-commerce research. Subsequent research endeavors will concentrate on exploring these specific areas.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- Cui, S. S., & Chen, H. (2012). The Research on Disruption Supply Chain Based on Blowout Demand of E-commerce Promotion. *Chinese Journal of Management Science*, *No. 11*, 25-39.
- Cui, S. S., Chen, H., & Xu, J. S. (2013). The Research on Disruption Commodity Distribution based on Explosive Demand of E-commerce Promotion. *Chinese Journal of Management Science*, *21*, 141-147.
- Duan, F. H., & Fu, Z. (2009). B2C E-commerce Logistic Distribution Routing Model and Algorithm. *Journal of Computer Applications*, *29*, 580-582, 589.
<https://doi.org/10.3724/sp.j.1087.2009.00580>
- Fei, W. (2019). Regulatory Response of Import Food Safety in China's Cross-Border E-Commerce. *Study and Practice*, *No. 12*, 66-74.
- Hong, Y., Kim, J. S., & Xiong, L. (2019). Media Exposure and Individuals' Emergency

- Preparedness Behaviors for Coping with Natural and Human-Made Disasters. *Journal of Environmental Psychology*, 63, 82-91. <https://doi.org/10.1016/j.jenvp.2019.04.005>
- Hong, Y., Zhao, J., Yu, J., & Wang, H. (2022). Quality of Life and Emergency Preparedness of MHO Staff: Role of Psychological Capital and Perceived Organizational Support. *Journal of Health Organization and Management*, 36, 875-891. <https://doi.org/10.1108/JHOM-05-2022-0130>
- Hu, H. W., Liu, J. J., Zheng, L., Zi, & Wang, Y. L. (2016). Introduction to the Construction of Quality Traceability System for Cross-Border E-Commerce Imported Goods. *Money China*, No. 30, 87+89.
- Huang, H., Chen, W., Xie, T., Wei, Y., Feng, Z., & Wu, W. (2021). The Impact of Individual Behaviors and Governmental Guidance Measures on Pandemic-Triggered Public Sentiment Based on System Dynamics and Cross-Validation. *International Journal of Environmental Research and Public Health*, 18, Article 4245. <https://doi.org/10.3390/ijerph18084245>
- Li, C. D., Xie, T., & Tang, Y. L. (2014). GMVN Oriented S-BOX Knowledge Expression and Reasoning Framework. *Journal of Intelligent Manufacturing*, 25, 993-1011. <https://doi.org/10.1007/s10845-012-0722-x>
- Li, C. D., Xie, T., Li, J., & Hong, H. X. (2012). Knowledge Expression and Chained Evolution Reasoning of Emergencies Based on SWRL. *Journal of Intelligence*, 31, 55-61.
- Li, T. T. (2024). Risk Identification of Fresh Food E-Commerce Supply Chain Based on Order Farming Model and Its Prevention and Control: A Case Study of Dingdong Limited. *China Circulation Economy*, No. 4, 12-16.
- Meng, Y. Y., & Song, S. J. (2021). Optimization of Order Splitting and Vehicle Scheduling in B2C Multi-Category E-Commerce. *Light Industry Science and Technology*, 37, 125-126.
- Nan, R., Zhu, W., & Xiao, Y. (2022). [Retracted] Knowledge Graph Analysis of Digital Emergency Management Research Based on CiteSpace Visualisation: Comparative Analysis of WOS and CNKI Databases. *Discrete Dynamics in Nature and Society*, 2022, Article ID: 4604223.
- Qin, W., & Sun, L. (2022). AHP-Based Research on Optimization of E-Commerce Paths to Help Farmers in the Post Epidemic Era. *Modern Agriculture*, No. 4, 79-83.
- Ren, T., Luo, T. Y., Li, S. X., Xiang, S., Xiao, H. L., & Xing, L. N. (2022). Knowledge Based Ant Colony Algorithm for Cold Chain Logistics Distribution Path Optimization. *Control and Decision*, 37, 545-554.
- Wang, X. Y. (2021). Constraints on the Development of China's Cross-Border E-Commerce Online Bonded Import Business and Suggestions for Improvement. *Practice in Foreign Economic Relations and Trade*, No. 3, 63-66.
- Wang, X., & Gu, C. B. (2021). Food Safety Governance in Cross-Border E-Commerce. *The Food Industry*, 42, 340-346.
- Wei, Y., Xie, T., & Hong, Y. (2016). Study of Quantitative Model for Maslow's View of Humanity Happiness. *Open Journal of Social Sciences*, 4, 108-113. <https://doi.org/10.4236/jss.2016.44015>
- Wei, Y. Y., Chen, W. F., Xie, T., & Peng, J. J. (2022). Cross-Disciplinary Curriculum Integration Spaces for Emergency Management Engineering Talent Cultivation in Higher Education. *Computer Applications in Engineering Education*, 30, 1175-1189. <https://doi.org/10.1002/cae.22513>
- Wei, Y., Yao, C., Chen, W. F., Xie, T., & Yang, J. (2024). Qbnb: An Innovative C2B2C2B2C e-Commerce Mode for Integrated On-Demand Services. *PLOS ONE*, 19,

e0297593. <https://doi.org/10.1371/journal.pone.0297593>

- Wen, C., Liu, W., He, Z., & Liu, C. (2023). Research on Emergency Management of Global Public Health Emergencies Driven by Digital Technology: A Bibliometric Analysis. *Frontiers in Public Health, 10*, Article 1100401. <https://doi.org/10.3389/fpubh.2022.1100401>
- Wu, J., & Zhu, L. (2021). A Study on the Mode and Current Situation of E-Commerce to Help Farmers Fight against the Epidemic under the New Crown Pneumonia Epidemic: The Case of PinDuoDuo. *Shanxi Agricultural Economy, No. 14*, 120-121.
- Xie, T., Li, C. D., Wei, Y. Y., Jiang, J. J., & Xie, R. (2016). Cross-Domain Integrating and Reasoning Spaces for Offsite Nuclear Emergency Response. *Safety Science, 85*, 99-116. <https://doi.org/10.1016/j.ssci.2016.01.005>
- Xie, T., Ni, M., Zhang, Z., & Wei, Y. (2019). Parallel Simulation Decision-Making Method for a Response to Unconventional Public Health Emergencies Based on the Scenario-Response Paradigm and Discrete Event System Theory. *Disaster Medicine and Public Health Preparedness, 13*, 1017-1027. <https://doi.org/10.1017/dmp.2019.30>
- Xie, T., Wu, J., Chen, W. F., Wei, Y. Y., & Chen, K. (2023). Pandemic and Emergency Manufacturing Innovation: A Scientometric Analysis Using Cite Space. *Disaster Medicine and Public Health Preparedness, 17*, e502. <https://doi.org/10.1017/dmp.2023.162>
- Xue, Q. (2021). Current Situation and Optimization of Fresh E-Commerce Terminal Distribution Under Sudden Epidemic Situation. *Journal of Harbin University, 42*, 65-67.
- Yang, Y., Jiong, M., & Zhongyun, C. (2012). Extension of Rural Service Chain Based on E-commerce—With a Case Study of Sichuan's Earthquake Zones. *Jiangsu Commercial Forum, No. 1*, 52-55.
- Zhang, B., Ye, D. M., & Ma, R. Q. (2021). Cross-Border E-Commerce Food Safety Risk Characterization and Collaborative Governance. *The Journal of Humanities, No. 10*, 115-121.
- Zhang, X. S., & Peng, S. J. (2020). The Cognitive Differences and Dispute Relief Dilemma of Food Safety Risk in Cross-border Electronic Commerce. *Research on China Market Regulation, No. 11*, 49-53.
- Zhu, X. Q. (2017). Risk Management of O2O Fresh Farm Produce Cold Chain Logistics System: In the Case of Shanghai CYPC Co., Ltd. *Logistics Technology, 36*, 127-133.
- Zhu, Y. J. (2023). Demand Forecasting Study of Fresh Food E-commerce in the Context of Public Health Emergencies. *China Logistics & Purchasing, No. 11*, 106-107.