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Electric Vehicle Charging Infrastructure: a Bibliometric Analysis of Technological Evolution, Research Hotspots and Emerging Research Frontiers

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ABSTRACT
Electric vehicles provide many benefits compared to internal combustion engine vehicles both in terms of environmental impact and technology; however, wide-scale application of EVs requires the development of accessible, reliable, and efficient charging infrastructure. Hence, the charging infrastructure is an important part of the electric vehicle system, linking transportation electrification to energy generation, distribution networks, energy storage, and digital technologies. Apart from conventional research topics, the intersection of EV charging with smart transportation, renewable energy, and advanced computing provides new opportunities for research, including AI-assisted charging, autonomous charging, wireless dynamic charging, V2H and V2B charging, distributed energy resources, digital twins, energy storage solutions, and more. The growing number of connected and autonomous vehicles may lead to new challenges and demands in the field of charging systems.
Keywords: Electric, Vehicle, Charging, Infrastructure, Technological, Evolution, Research Hotspots.

1. INTRODUCTION

With the quick shift to sustainable transport modes, there is increasing uptake of electric vehicles (EVs) across the world due to various issues including climate change, energy security, air pollution, and the need to lessen reliance on fossil fuel. There are many environmental and technological benefits associated with using EVs, but the large-scale utilization of such vehicles hinges largely on the development of the charging infrastructure. The charging infrastructure becomes one of the important elements of the EV system.(Ge Xianlong, 2019)

Evolution of Electric Vehicle Charging Technologies

The EV charging infrastructure technology has advanced greatly through time, evolving from simple slow charging into fast, ultra-fast, wireless, and intelligent charging methods. Charging technologies have been developed in response to differences in the time taken for charging, frequency of use of the vehicles, power requirements, and convenience for users. The advancement of AC and DC charging technologies has seen improvements in charging power, communication, battery management, and charging safety. Other technologies that have been developed include bidirectional charging, vehicle to grid, wireless charging, battery swapping, and automated charging. (Fan Houming, 2022)

Integration of Charging Infrastructure with Smart Energy Systems

Increasing use of EVs has brought about new interactions between transport systems and electricity supply systems. Massive charging of EVs may cause increased electricity demand as well as other issues relating to power quality, grid stability, peak demand, and capacity of the distribution network. Therefore, much of the research efforts have been on intelligent charging whereby the EV charging system is coordinated with the electricity demand, renewable energy production, electricity price, and grid operation. The inclusion of solar energy systems, battery energy storage, microgrids, and intelligent energy management has changed charging stations from electricity delivery stations to energy management stations. (Wang Yong, 2023)

Digitalization and Intelligent Charging Systems

Digital solutions have become more relevant in developing advanced EV charging infrastructure. Technologies such as Internet of Things (IoT), artificial intelligence (AI), machine learning, cloud computing, blockchain, and data analysis have been implemented to enhance charging management, demand forecasting, planning of the infrastructure, fault detection, authentication, and services to users. Intelligent charging systems can help optimize charging processes based on users' needs and conditions of the grid operation in a cost-effective way. These trends have also stimulated interest in studying issues of cybersecurity, interoperability, communication protocols, data handling, and intelligent transport-energy integration. (Almouhanna A, 2020)

Research Hotspots in Electric Vehicle Charging Infrastructure

As the research domain has been growing, some prominent research topics have been identified. Among the research topics under discussion are optimal location and sizing of charging stations, prediction of the demand for charging services, rapid charging methods, smart charging systems, V2G technology, renewable power-based charging, battery storage systems, network optimization, and energy management (Bektaş T, 2011). Also, scholars have focused on economic feasibility, user behavior, accessibility of charging services, infrastructure

usage, and environmental consequences of EV charging networks. It is important to identify these research foci and their development over time to understand the dynamics of academic research domain.

Emerging Research Frontiers

Besides the current research areas, emerging research topics that lie at the crossroads of EV charging, smart transportations, renewable energy sources, and advanced computation techniques are also gaining prominence. (Xiao Xianglong, 2018). Some examples of such areas are intelligent charging using AI algorithms, autonomous charging, wireless dynamic charging, applications like V2H and V2B technology, distributed energy resources, digital twins, and advanced energy storage systems. Connected and autonomous vehicles will also lead to some novel needs for charging systems. Such emerging research topics highlight the evolution of charging infrastructure from traditional charging systems towards more intelligent and adaptive ones. (Zhu Zhiyong, 2011)

2.OBJECTIVES OF THE STUDY

To study on Integration of Charging Infrastructure with Smart Energy Systems

To study on Evolution of Electric Vehicle Charging Technologies

3.RESEARCH METHOD

To make sure that the collected sample literature possesses sufficient validity and reliability, the two main databases applied in this research are CNKI and Web of Science (WoS). In the WoS database, the chosen time span is 2008-2023, and the search has been performed in the Web of Science Core collection. Applying the keywords “Vehicle Routing Optimization”, “Logistics Vehicle Routing Optimum”, “Vehicle Routing Problems” etc., fuzzy search was carried out, after which by manual screening the redundant literature and publications unrelated to the study field were removed. As a result, 4,497 publications were obtained. In the CNKI database, the search pattern was set to: subject” Vehicle path optimization” OR” vehicle path planning” OR” Vehicle path problem”. It provided 852 publications. In total, 5,349 publications were found. Search Date: December 10, 2023. (Wu Qianyun, 2020)

This article applies the bibliometric method with the aid of the scientific knowledge map and utilizes CiteSpace 6.1R6 software to import data of selected domestic literature and foreign literature into the software. With the aid of the analysis of literature format transformation and the combination of keyword co-occurrence and clustering knowledge graph, the research hotspots and trends of vehicle routing optimization both domestically and internationally are explored. (Xu Ling, 2024)

4.RESULT AND DISCUSSION

Network Analysis of Cooperation Between Chinese and Foreign Authors

In general, the author cooperation network graph can depict the connection relationship among various authors in this field with node size showing the number of publications and lines showing the collaboration relationship. From the domestic author cooperation network graph in Figure 1, we can see that there are some significant differences in the node size and few connections among the clusters. (Li Manman, 2018) There were two scholars in the lead who studied urban distribution and vehicle routing under the mixed time windows. The scholars are Ge Xianlong and Fan Houming respectively. The application of Price's law is adopted for evaluating whether the authors in the research field form a core group of authors. The core authors will apply the formula according to Price's law, as depicted in formula 1:

$$M = 0.749 \times \sqrt{N_{MAX}}$$

where N_MAX is the maximal number of publications of authors, and M is the critical value that identifies the publications of core authors. According to the literature on domestic samples, N_MAX = 21, M ≈ 3.43, and authors who have published more than 3 publications are referred to as core authors. It follows from statistics that the percentage of core authors in domestic literature totals 26.2%, while the percentage of core authors totals 12.6%, which shows that there are no core author groups among the authors. (Ou Jiangxia, 2014)

The greatest number of papers have been written by Wang Y among all foreign samples. The recent research trend is largely concentrated on multi-center collaboration vehicle routing. In the article with the largest citations, the researcher developed a model of multi-stage solution approach using clustering, dynamic programming, and heuristic methods for minimizing total cost in collaborative multi-center vehicle routing problem (CMCVRP), and the improved Shapley value model was applied for building the profit-sharing plan. (Aljohani K, 2016)

The runner-up is Juan A. This researcher’s team considered the location routing problem for electric vehicles with distance constraints (LRPCD) and applied a fast multistring heuristic algorithm along with a meta-heuristic algorithm to solve the problem. (Pan S,2021)

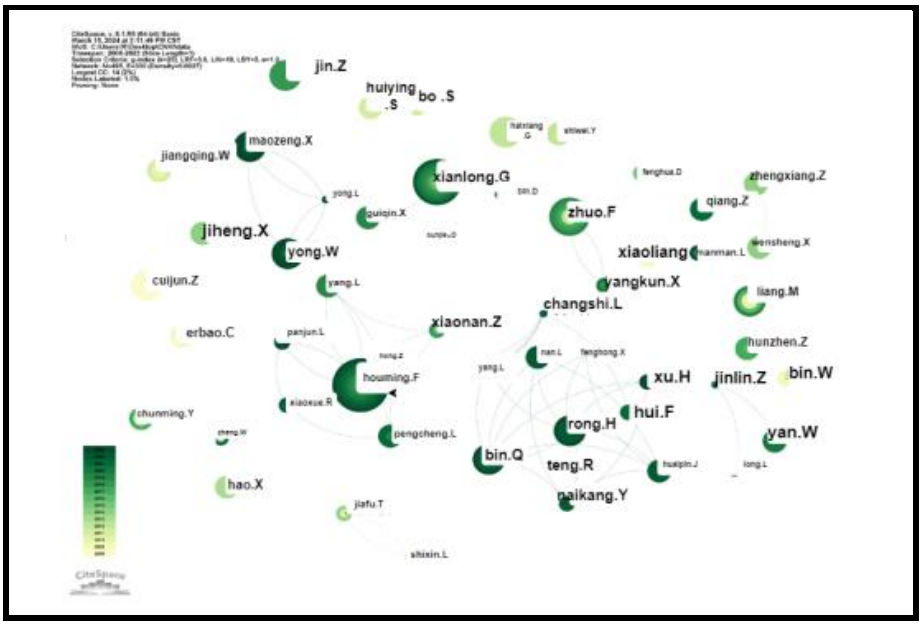


Figure 1: Analysis of Chinese authors' cooperation

It is evident from Figure 1 below that two significant cooperative groups whose core hubs are Wang Y and Laporte G have been formed, together with many other small cooperative groups. Unlike the researchers in the domestic context, the researchers in the international perspective have established many more research groups. (Anand N, 2014)

Research Hotspots, Perspectives and Context Analysis of Vehicle Routing Optimization at Home and Abroad

1. Analysis of domestic and foreign hot spots based on co-word analysis

As mentioned by Xiao Xianglong, keywords in a paper are a reflection of researchers' opinions, and an important measure for bibliometric studies. Analysis of co-word for keywords shows how close the topics under discussion are related to each other; thereby helping to identify the frontiers of research in this field. (Kleinberg J, 2002) The concept of co-word analysis is based on measuring the correlation degree among a set of words through frequency of co-occurrence within a set of papers. Words which occur together very often within the literature are more correlated with each other and may even have some semantic connections with each other. Steps involved in co-word analysis are represented in Figure 2. (Detlefsen L, 2018) Here M1 is the representation of reference 1, and Z1 is the representation of keyword 1. The same keyword is represented by the same set of letters and numbers. (Altman M, 2009) An "Document-keyword" matrix is formed which is a 0-1 matrix whose significance decides the existence of the membership relationship between the particular keyword and particular document. With this step, 0-1 "keyword-document" membership matrix is formed which helps in measuring the similarity of documents. Further, multiplication of the 0-1 matrix gives us the co-occurrence matrix of the keywords. (Cai Yanguang, 2015)

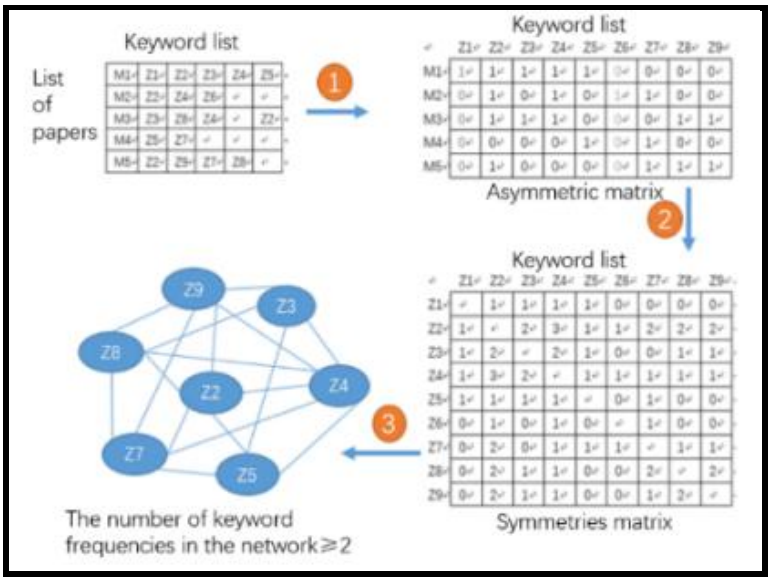


Figure 2: The basic process of co-word analysis

The knowledge network method is adopted after getting the co-occurrence matrix. In this paper, CiteSpace software is used for analyzing the keywords of international and domestic literature. The greater the frequency, the easier it will become to become the research hotspot of the future, while the centrality means the correlation among the keywords of the network. From Table 1, it can be seen that the international literature keyword "Algorithm" has the biggest node and the greatest centrality. (Sainathuni B, 2014) The keyword co-occurrence graph of the sample literature in this paper is shown in Fig. 3. Based on the literature survey and the opinion of relevant experts, these hot keywords are classified into three groups:

Evolutionary Algorithms: These categories include Genetic Algorithm, Tabu Search, Ant Colony Algorithm, and Genetic Algorithm. All of these belong to meta-heuristic algorithms. These algorithms are a combination of stochastic and local search techniques. By making use of natural phenomenon, experience, and heuristics, these algorithms conduct search for an optimal solution

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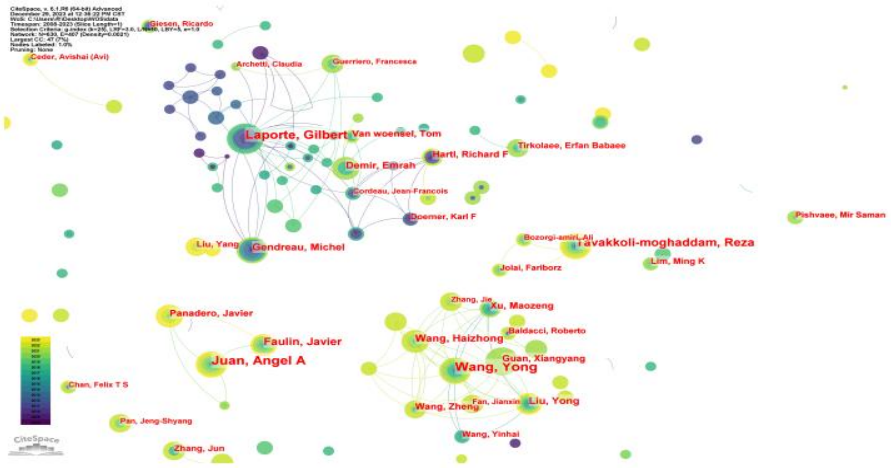


Figure 3: Cooperation analysis diagram of foreign authors

Table 1: Foreign high-frequency keyword statistics

No.	Frequency	Centrality	Keyword
1	962	0.05	Algorithm
2	736	0.01	Model
3	456	0.02	Genetic Algorithm
4	447	0.01	Time Window
5	378	0.01	System
6	288	0.02	Design
7	248	0.04	Tabu Search
8	243	0.01	Search
9	237	0.04	Delivery
10	218	0.02	Traveling Salesman-Problem

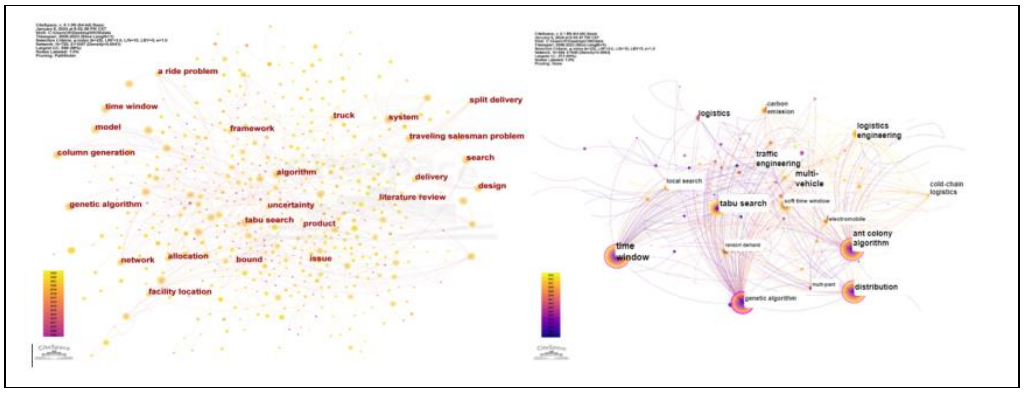


Figure 4: Co-occurrence of keywords in vehicle routing optimization research

Time Window: This class deals with problems associated with the execution of activities or tasks in a particular time interval, which will practically serve the purpose of setting time constraints. Some of the ideas covered in this class include time window, soft time window, and Time Window. (Carlo H J, et al., 2012)

Logistics Service: This group comprises logistics distribution, systems, and logistics engineering. It deals with the effective organization and management of logistics activities. In the profitable service sector of delivery services, delivery service time is very significant. 9 Erdoğan S, et al., 2012)

Perspective analysis of vehicle routing optimization research

Perspective Analysis of Vehicle Routing Optimization Research in China. In order to get a good understanding of different research perspectives at home and abroad, the CiteSpace software was utilized to carry out a keyword clustering for literature samples. Keyword clustering maps were generated based on LLR (maximum likelihood estimation) algorithm. First of all, cluster analysis was done on the sample literature at home. Generally speaking, Mean Silhouette stands for the mean value of the silhouette of the cluster. It is believed that Q>0.3 means there is a clear clustering pattern and S>0.7 means the clustering effect is satisfactory. This clustering has an S value of 0.9702 and a Q value of 0.8874. This suggests good clustering. From Figure 5, it can be seen that there are 15 clusters in this cluster map. Through the analysis of the cluster map and cluster table for the vehicle route optimization keyword co-occurrence network, this paper, through the connections and homogeneity between clusters, concluded that the major domestic research angles are as follows: (Bektaş T, et al. 2011)

1. Algorithm Optimization Research in Vehicle Route Optimization: These are cluster #0, #3, #9, and #13. The researches concerning the optimization of algorithms for vehicle route optimization in this area have been carried out for many years. Initially, researchers mostly tried to reduce costs or maximize efficiency. However, with the development of studies in this area, more and more scientists started suggesting various algorithm optimization under different conditions. The concept of Tabu search, suggested by American professor Fred G in 1986, could be described as a technique of search, which imitates the human's memory and experience and applies the method of selection of neighborhood in order to move from a locally optimal solution. As for the studies on genetic algorithms, Zhu Zhiyong proposed a new crossover operation for improvement of the genetic algorithm. (Małek, A, et al.2023)

2. Research on Actual Logistics Applications in Vehicle Route Optimization: It comprises cluster #0, #6, #5, and #8. Logistics environment can come across complicated issues, for example, time-varying demand and multi-distribution requirements. (Hurtado-Torres NE et al., 2017) The time window requirement is often included in the logistics transportation schedule. Wu Qianyun included time window and optimal loading considerations to establish a vehicle route configuration model in order to ensure time and cost consideration. In the context of rural e-commerce logistics and distribution, scholars like Xu Ling include cost minimization and establish a mixed integer programming model of drones and vehicles. The validity of the model is tested using numerical example analysis, and it can be used as a reference for rural e-commerce logistics and distribution. (Jayabal R ,2024)

3. Research on Road Network Traffic Dynamics in Vehicle Route Optimization: It consists of cluster #1, #10, and #11. Research on vehicle routing optimization involves studying the traffic condition of the road network in the actual setting. Researchers have started working on dynamic vehicle routing problem influenced by various factors like bad weather or any other disturbance. Li Manman updated the delivery routes for vehicles using 2-Opt and Insertion techniques according to the driving time and congestion time due to traffic in real-time, resulting in reduced time costs. (Kumar M et al., 2023) The algorithm is validated by Ou Jiangxia through simulation of real-time traffic information using chaotic optimization technique. (Un-Noor F, et al. 2017)

Perspective Analysis of Foreign Vehicle Routing Optimization Studies.

Clustering was done through keyword clustering analysis on foreign literature from WoS, which produced 13 clustering modules, as presented in Figure 5. On the basis of the criterion of homogeneity, 12 clustering modules have been obtained, giving rise to the conclusion that foreign research perspectives focus on the following: (Lipman T and Yuan J, 2025)

1. Research perspective based on optimization algorithms: These are sub-clusters #0, #4, #5, #7, and #9. Such a foreign research perspective is in line with the one of China. In such a perspective, the scholars mostly concern themselves with continuous optimization of various algorithms. In complex and changing real-world situations, combining of multiple goals and various constraints and formulation of rules of the adaptive algorithms become crucial. (Qadir SA, et al. 2024)

2. Research based on the perspective of environmental protection and environmental sustainability: It involves sub-cluster #1, #2 and #3. In this regard, foreign researchers generally emphasize the effect of path optimization on environmental protection. The development of sustainable development requires that many emerging topics, such as reverse logistics and green logistics, will slowly come into being, because both environmental protection and resources become important in path optimization. Aljohani K. discussed the urban environment impact issue from the view point of logistics facility locations and made a detailed classification of the impact issues. Pan S. analyzed sustainable urban logistics in smart cities by means of bibliometric research and put forward new concepts and perspectives of sustainable urban freight logistics. (Kumar G, et al. 2024)

3. Research based on the perspective of path planning and management: These are sub-cluster numbers #3, #6, #8, #10, and #11. This theory is concerned with the use of route optimization in areas such as supply chain and urban logistics, which is important in increasing the efficiency of logistics processes and improving logistics service. Theories by scholars such as Anand N. were focused on the urban logistics modeling research trend in terms of the

relationship between urban logistics modeling research and urban logistics, stating that in an urban setting, proper path planning and management have direct influence on logistics and supply chains and hence improve the quality of life of people. (Kashem MA, et al. 2024)

Context analysis of domestic and foreign vehicle routing optimization research

In order to make a comparison of the development of vehicle routing problem research both domestically and internationally in terms of the development of this area between 2008 and 2023, in this article, keyword emergence has been adopted to demonstrate the development of this research. As early as 2002, Kleinberg J put forward the concept of mutation algorithm, referring to the sudden rise in citation frequency of keywords within a very short period of time. (Tan S, et al., 2023) Through the analysis of the burst keywords' knowledge map, we can know about the research focus on vehicle routing problem among domestic and international researchers. (Ahmed I, et al., 2024)

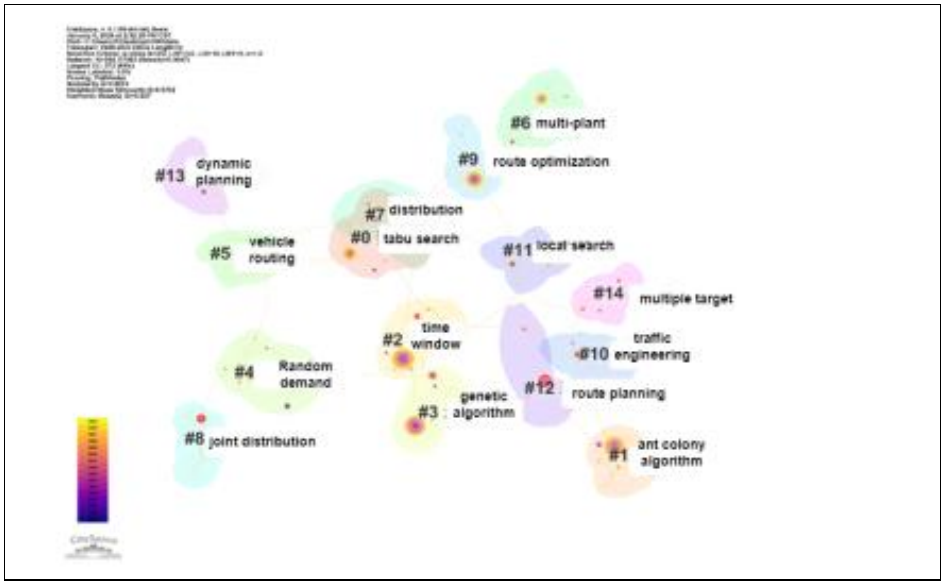


Figure 5: Domestic keyword clustering view

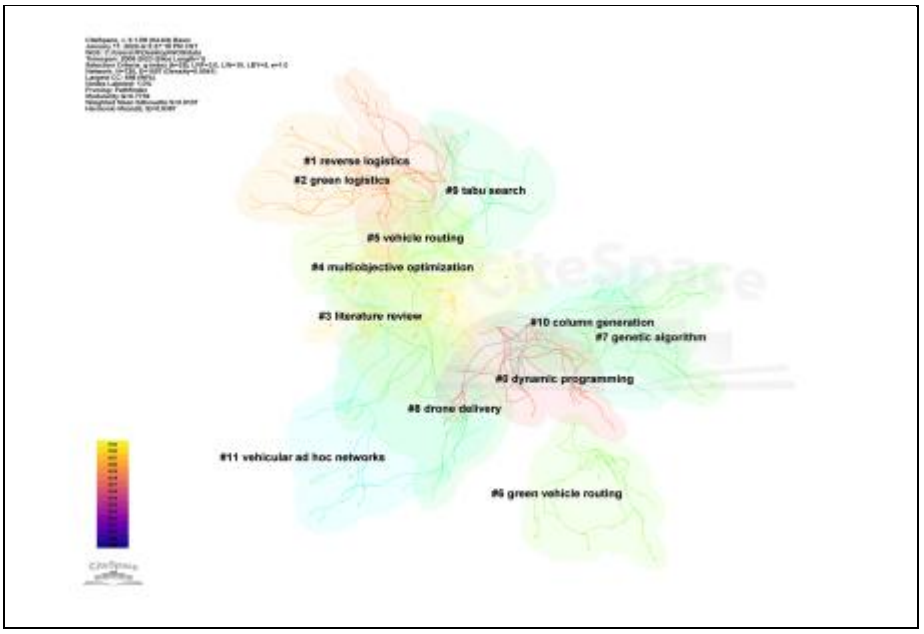


Figure 6: Foreign keyword clustering view

Context Analysis of Domestic Vehicle Routing Optimization Research. In the figure above, 'Begin' indicates the beginning of the mutation while 'End' indicates the end of the mutation. It can be observed from Figure 7 that combinatorial optimization, mathematical model, optimization, and ant colony algorithm emerged as keywords in the study of vehicle route optimization in China during the period between 2008 and 2012 as shown in Figure 7. In addition, keywords like cold chain logistics, urban transportation, time-varying road networks, mixed fleets, and dynamic demand emerged much earlier in the literature but still continue to remain popular among Chinese scholars. (Han Kulak B, 2024) These are the possible factors that may have led to the

development of these keywords over the past few years:
Firstly, there is vigorous emphasis on the revitalization of industries in rural areas with special reference to cold chain logistics transportation of agricultural products and quality development requirements for the cold chain logistics of agricultural products. Secondly, urban low carbon transportation forms an important aspect of modern transportation development and dual carbon goals of China. These goals are an important strategy laid down by the Party Central Committee of China. (Kumar YA, et al., 2024)
With the development of sustainable development and the introduction of policies and laws in this aspect, more researchers are turning their attention from vehicle route optimization problems to green transport system research. Thirdly, it is acknowledged by researchers that traffic conditions vary with time, hence making it necessary to take time as a variable in route planning and traffic optimization. (Page MJ et al. 2021) For instance, Cai Yanguang discussed how fuel consumption and loading affect actual roads and developed an adaptive ant colony algorithm for solving the vehicle routing problem on varying road network. Researchers are closing the theoretical-practical gap in this regard by making a shift from theoretical research to practical application research. (Rajaeifar MA, et al. 2022)

Context Analysis of Foreign Vehicle Routing Optimization Research. The keyword mutation analysis was carried out for foreign studies about the vehicle routing problem optimization. In this case, Tabu Search had the greatest mutation intensity and mutation period, as illustrated in Figure 8. This implies that, between 2008 and 2016, Tabu Search was the center of extensive research among foreign researchers. (Yue QL, et al. 2021) These keyword concepts and their causes of emergence in recent times are explained in the following way: To begin with, there is a strong push from the government to rejuvenate the rural industrial sector, which will tackle the issue of cold chain logistics transportation of agricultural products and will have a requirement for the high-quality development of agricultural product cold chain logistics. Furthermore, low-carbon transportation in cities is a crucial part of modern transportation development in China and the dual-carbon targets. These goals form an integral part of a major strategic deployment by the Party Central Committee. (Yang Z, et al. 2022)
Because of the advent of sustainable development and the formulation of related policies and regulations, more scholars have turned to the study of green transportation systems rather than vehicle route optimization. (Bakhmat N et al., 2022) Third, researchers have realized that the situation of traffic congestion varies in terms of time, thus requiring the inclusion of time elements into the analysis of route planning and traffic optimization. For instance, Cai Yanguang takes into account the effects of fuel consumption and load carrying capability on real roads and uses adaptive ant colony algorithm to solve the vehicle routing problem under dynamic road networks. There is a growing trend among researchers to make theoretical designs applicable in practice.

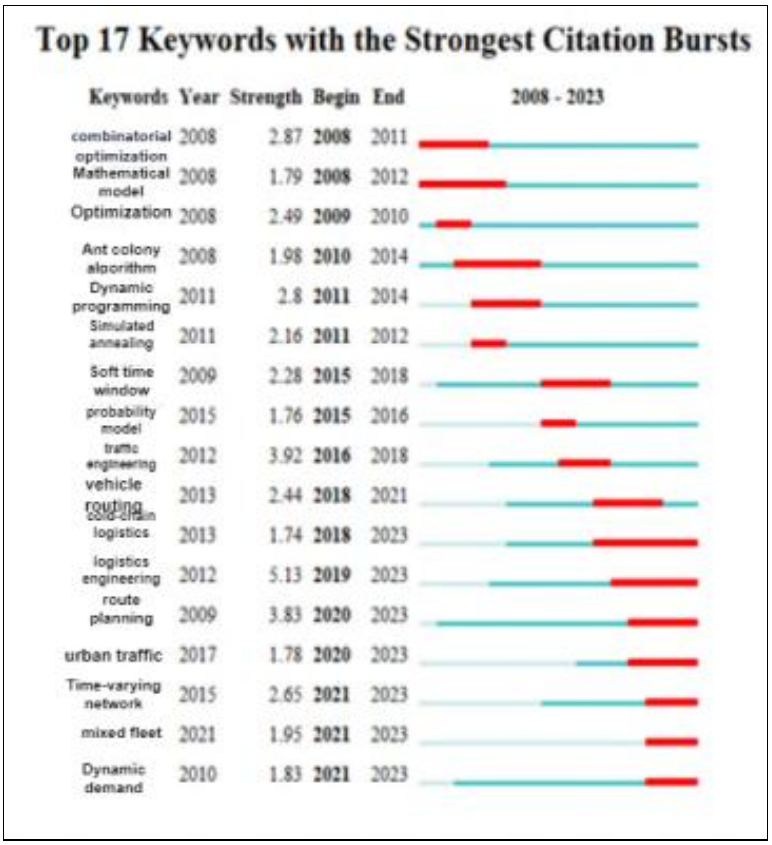


Figure 7: Domestic keyword emergence chart

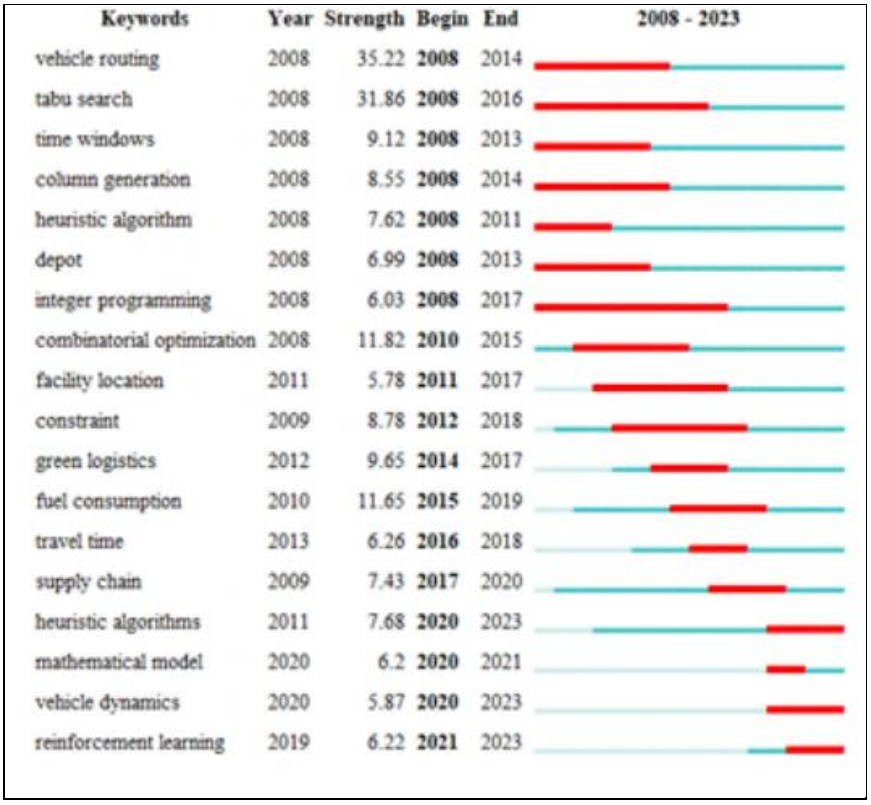


Figure 8: Foreign keyword emergence chart

Context Analysis of Foreign Vehicle Routing Optimization Research. The foreign vehicle routing optimization researches were analyzed in terms of keyword mutations. Out of all, Tabu Search possessed the highest mutation intensity and the longest mutation period, as illustrated in Figure 8 below. This suggests that during the years 2008-2016, Tabu Search received significant attention from foreign researchers. (Sooryamoorthy R , 2020) ,

From 2008 to 2014, the scope of studies from abroad was mainly related to the issues of Tabu Search, Time Windows, Column Generation, Depot, Combinatorial Optimization, and Integer Programming. At this stage, foreign scientists paid their attention to such study areas as logistics planning, warehousing issues, and combination optimization. For example, Sainathuni B. discussed the issue of warehouse-inventory transportation problem (WITP), which was solved by using the nonlinear integer programming model of WITP via a local search heuristic method in order to reduce the cost of distribution. Besides, Carlo H. J. applied the approach of synchronous work and rearrangement (RWW). (Hossain Lipu MS, et al. 2022)

The studies from 2015 to 2019 mostly focused on Facility Location, Constraint, Green Logistics, Fuel Consumption, Travel Time, and Supply Chain. This trend demonstrates that the scholars from abroad have started to pay more attention to interdisciplinarity research and horizontal expansion in the field. It means that they utilize the methods of operations research, management and other sciences to study the path planning issue in detail and take into account the influence of fuel consumption on the environment. (Pranckutė R , et al. 2021) The green vehicle routing problem (G-VRP) was introduced by Erdoğan S in 2012. With growing interest in sustainable development, the reduction of energy consumption and carbon emissions became an inevitable part of vehicle routing optimization. Tolga Bektaş T and other researchers took into consideration the fuel consumption and carbon dioxide emissions when modeling vehicle route planning methods. Using case study approach, they investigated the relationship between the cost of fuel consumption, cost of carbon emissions, and cost of others. The cost of fuel consumption is directly proportional to the operational cost of logistics operation. (Ivancheva L., 2008)

The foreign research studies during the years 2020 to 2023 include Heuristic Algorithms, Mathematical Models, Vehicle Dynamics, and Reinforcement Learning. The researchers in the years 2020 to 2023 started analyzing the effect of computer science, mechanical engineering, artificial intelligence, and others on the optimization of the vehicle routing problem. The research in this field will provide innovative tools for solving the vehicle routing problem. With the emergence of new technology, the integration of artificial intelligence and big data into the vehicle routing optimization problem will become the future research focus.

5.CONCLUSION

Analysis based on the research hotspots and perspectives: There are similarities and differences in research focus between domestic research and international research. Similarity lies in the fact that the design and optimization of different algorithms will be the research interest of both domestic and international scholars in the future for a long time to come. Scholars still pay great attention to the combination of different algorithms in order to reach

complementation so that great progress can be made in the resolution of large-scale VRP problems. Domestic scholars concentrate more on theoretical basis and modeling, whereas international scholars focus more on the combination of theory and practice. Under the guidance of cross-border collaboration, their research efforts are based on practical problems and the use of mathematics models and linear programming, graph theory, among others to solve vehicle routing problems. Furthermore, inspired by the regulations made by the government in China, cold chain logistics and green logistics have slowly attracted the attention of Chinese scholars. The Chinese scholars have gradually started to pay attention to the low carbon models and design new logistics systems.

REFERENCES

1. Ge Xianlong, Zhu Ziqiang.2019.Electric vehicle route optimization problem with soft time window. J. Industrial Engineering and Management. 24, 4 (August 2019), 96-104+112.
2. Fan Houming, Sun Xiuna, Zhang Yueguang, Ren Xiaoxue, Tian Panjun. 2022.Vehicle routing problem with mixed time window under time-varying road network. J. Computer Engineering and Applications. 58, 16 (August 2022), 292-302.
3. Wang Yong, Li Huixing, Luo Siyu, Zhou Jingxin, Xu Maozeng. 2023 Multi-center joint distribution electric vehicle route optimization problem under resource sharing mode. J. Journal of System Management. 32, 6 (December 2023), 1119- 1141
4. Almouhanna A, Quintero-Araujo C L, Panadero J, Angel A Juan, Banafsheh Khosravi, Djamila Ouelhadj. 2020. The Location Routing Problem Using Electric Vehicles with Constrained Distance. J. Computers & Operations Research. 115, March 2020, 104864.
5. Bektaş T, Laporte G. 2011. The Pollution-Routing Problem. J. Transportation Research Part B: Methodological. 45, 8 (September 2011), 1232-1250.
6. Xiao Xianglong, Li Xin, Gao Han, Cheng Qikai. 2018. Discovery of research gaps in subject areas based on keyword co-occurrence. J. Information Engineering. 4, 6 (December 2018), 37-50.
7. Zhu Zhiyong, Diao Hongxiang, "Research on vehicle routing problem based on improved genetic algorithm," Journal of Natural Sciences of Xiangtan University. vol. 33, pp. 115-118, June 2011.
8. Wu Qianyun, Xie Naiming, Shao Yuting. 2020.Assembly line integrated logistics scheduling considering time windows and loading constraints. J. Computer Integrated Manufacturing Systems. 26, 3 (March 2020), 806-814.
9. Xu Ling, Yang Linchao, Zhu Wenxing, Zhong Shaojun. Research on collaborative delivery path optimization of drones and vehicles under rural e-commerce logistics. J. Computer Engineering and Applications. 60, 1 (January 2024), 310-318.
10. Li Manman, Lu Jian, Guo Wenqian. 2018. Dynamic vehicle routing problem where the duration of occasional congestion can be known. J. Traffic Information and Safety. 36, 2 (April 2018), 85-92.
11. Ou Jiangxia, Li Mingfeng. 2014. Research on dynamic programming of vehicle routing problem based on Beidou. J. Highway. 59, 6 (June 2014), 182-186.
12. Aljohani K, Thompson R G. 2016. Impacts of Logistics Sprawl on the Urban Environment and
13. Logistics: Taxonomy and Review of Literature. J. Journal of Transport Geography. 57, 12 (December 2016), 255-263.
14. Pan S, Zhou W, Piramuthu S, Gianikas V, Chen C. 2021.Smart City for Sustainable Urban Freight Logistics. J. International Journal of Production Research. 59, 7 (March 2021), 2079-2089.
15. Anand N, Van duin R, Tavasszy L. 2014. Ontology-Based Multi-Agent System for Urban Freight Transportation. J. International Journal of Urban Sciences. 18, 2 (Jul 2014), 133-153.
16. Kleinberg J. 2002. Bursty and Hierarchical Structure in Streams[C]// Proceedings of the Eighth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining. July 2002. pp. 91-101
17. Cai Yanguang, Tang Yalian, Cai Hao. 2015. Adaptive ant colony algorithm for vehicle routing problem under time-varying road network conditions. J. Computer Application Research. 32, 8 (August 2015), 2309-2312+2346.
18. Sainathuni B, Parikh P J, Zhang X, Kong N. 2014. The Warehouse-InventoryTransportation Problem for Supply Chains. J. European Journal of Operational Research. 237, 2 (September 2014), 690-700.
19. Carlo H J, Giraldo G E. 2012. Toward Perpetually Organized Unit-Load Warehouse s. J. Computers & Industrial Engineering. 63, 4 (December 2012), 1003-1012
20. Erdoğan S, Miller-Hooks E. 2012. A Green Vehicle Routing Problem. J. Transportation Research Part E: Logistics and Transportation Review. 48, 1 (January 2012), 100-114.
21. Bektaş T, Laporte G. 2011. The Pollution-Routing Problem. J. Transportation Research Part B: Methodological. 45, 8 (September 2011), 1232-1250.
22. Małek, A., & Marciniak, A. (2023). Selection of the photovoltaic system power for the electric vehicle. Archiwum Motoryzacji, 100(2).
23. Jayabal R (2024) Towards a carbon-free society: innovations in green energy for a sustainable future. Results in Engineering, 103121.
24. Un-Noor F, Padmanaban S, Mihet-Popa L, Mollah MN, Hossain E. A comprehensive study of key electric vehicle (EV) components, technologies, challenges, impacts, and future direction of development. Energies. 2017;10(8):1217.
25. Lipman T and Yuan J (2025) Electric Vehicle Charge Management Strategies to Benefit the California Electricity Grid.
26. Qadir SA, Ahmad F, Al-Wahedi AMA, Iqbal A, Ali A. Navigating the complex realities of electric vehicle adoption: a comprehensive study of government strategies, policies, and incentives. Energ Strat Rev. 2024;53:101379.

27. Kumar G, Mikkili S. Advancements in EV international standards: Charging, safety and grid integration with challenges and impacts. Int J Green Energy. 2024;21(12):2672–98.
28. Kashem MA, Shamsuddoha M, Nasir T. Sustainable transportation solutions for intelligent mobility: a focus on renewable energy and technological advancements for electric vehicles (EVs) and flying cars. Future Transp. 2024;4(3):874–90.
29. Ahmed I, Basit A, Ahmad M, AlMuhaini M and Khalid M (2024) Electric mobility challenges and approaches for sustainable green power synergy in smart cities. Arabian Journal for Science and Engineering, 1–29.
30. Han Kulak B (2024) Investigating the environmental impact of tesla's electric vehicles compared to fossil fuel vehicles.
31. Kumar YA, Roy N, Ramachandran T, Assiri MA, Rao SS, Moniruzzaman M, Joo SW. Revolutionizing energy storage: exploring the nanoscale frontier of all-solid-state batteries. Dalton Trans. 2024;53(30):12410–33.
32. Rajaeifar MA, Ghadimi P, Raugei M, Wu Y, Heidrich O. Challenges and recent developments in supply and value chains of electric vehicle batteries: a sustainability perspective. Resour Conserv Recycl. 2022;180:106144.
33. Yue QL, He CX, Wu MC, Zhao TS. Advances in thermal management systems for next-generation power batteries. Int J Heat Mass Transf. 2021;181:121853.
34. Yang Z, Huang H, Lin F. Sustainable electric vehicle batteries for a sustainable world: perspectives on battery cathodes, environment, supply chain, manufacturing, life cycle, and policy. Adv Energy Mater. 2022;12(26):2200383.
35. Sooryamoorthy R (2020) Scientometrics for the humanities and social sciences. Routledge 88. Purnell PJ (2025) Bibliometrics in the Context of Research Evaluation and Research Policy (Doctoral dissertation, Leiden University).
36. Hossain Lipu MS, Miah MS, Ansari S, Meraj ST, Hasan K, Elavarasan RM, Hussain A. Power electronics converter technology integrated energy storage management in electric vehicles: emerging trends, analytical assessment and future research opportunities. Electronics. 2022;11(4):562.
37. Ivancheva L. Scientometrics today: a methodological overview. Collnet J Scientometr Inf Manag. 2008;2(2):47–56.
38. Pranckutė R. Web of Science (WoS) and scopus: the titans of bibliographic information in today's academic world. Publications. 2021;9(1):12.
39. Bakhmat N, Kolosova O, Demchenko O, Ivashchenko I, Strelchuk V. Application of international scientometric databases in the process of training competitive research and teaching staff: opportunities of Web of Science (WoS), Scopus, Google Scholar. J Theor Appl Inf Technol. 2022;100(13):4914–24.
40. Page MJ, Moher D, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD and McKenzie JE
41. (2021) PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. BMJ. 372.
42. Tan S, Bava M, Hu HX. A bibliometric analysis of english for specific purposes from 2011 to 2023 using Citespace: visualizing status, themes, evolution, and emerging trends. J Lang Educ. 2023;9:159–75.
43. Kumar M, George RJ, Anisha PS. Bibliometric analysis for medical research. Indian J Psychol Med. 2023;45(3):277–82.
44. Hurtado-Torres NE, Hurtado-Torres NE, Aragón-Correa JA, Ortiz-de-Mandojana N (2017) How does R&D internationalization in multinational firms affect their innovative performance? The moderating role of international collaboration in the energy industry. International Business Review, in press.
45. Detlefsen L (2018) Explaining Inequality in Economic Outcomes: An Empirical and Experimental Approach (Doctoral dissertation).
46. Altman M (2009) Employment scenarios to 2014 & 2024 in the context of a global economic slowdown. Pretoria: Human Sciences Research Council