

Review

What Is Affecting the Popularity of New Energy Vehicles? A Systematic Review Based on the Public Perspective

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Abstract: The dependence of traditional fuel vehicles on petroleum energy has aggravated the energy crisis, while the harmful gas emissions generated during the use of traditional fuel vehicles have aggravated environmental pollution and climate warming. Therefore, it is urgent to alleviate energy consumption and environmental pollution in the transportation sector. The development and promotion of energy-saving and environmentally friendly new energy vehicles has become an important initiative in the world automotive industry. However, there is still a gap between the promotion of new energy vehicles and the public's purchase preference, and understanding and respecting the public's purchase preference can help promote the popularity of new energy vehicles. Based on the core database of the Web of Science, we extracted 1498 papers related to the public's purchase preference and the popularization of new energy vehicles in the past two decades. We adopted a systematic literature review framework to clarify the research trajectory and research hotspots from literature combing, with the aim to reveal the interaction between the popularity of new energy vehicles and the public's purchase preference. In addition, we further refined and summarized the existing major studies in order to provide solution ideas for achieving the transition to new energy vehicles in an effort to promote the green and sustainable development of energy.

Keywords: green development; new energy vehicles; purchase preference; visual analysis; sustainable energy



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1. Introduction

As an important non-renewable resource, petroleum, is a core raw material for modern industry and plays an important role in the operation of socioeconomic systems [1,2]. As the third largest energy consuming sector, petroleum remains the most dependent power source for the automotive industry. On the one hand, the dependence of conventional fuel cars on petroleum energy has intensified the contradiction between energy production and energy consumption, as well as exacerbated the energy crisis. On the other hand, the harmful emissions produced during the use of conventional fuel vehicles aggravate environmental pollution and climate warming, thereby threatening human health. In this context, the high energy consumption and pollution of traditional fuel vehicles can no longer fully meet the needs of the current green development of the economy and society, and it is urgent to alleviate the energy consumption and greenhouse gas emissions in the transportation sector. With the continuous breakthroughs in science and technology, energy saving and environmental protection have become the new trend of change in the transportation field around the world, and new energy vehicles are playing an increasingly important role.

De Rubens et al. pointed out that the use of electric vehicles can reduce CO₂ emissions [3], where hybrid vehicles combine internal combustion engines and electric motors and are more economical and efficient compared to conventional fuel vehicles [4]. Environmentally friendly vehicles can help reduce the public's dependence on conventional

vehicles [5]. As a positive response to energy saving and clean production, several countries and regions have set requirements for vehicle carbon emissions; China has set the strategic goals of carbon peaking and carbon neutrality, and it has issued and implemented a series of documents, especially through strong government subsidies and incentives. This comes along with a series of initiatives, such as parking and license plates, to encourage the public to purchase new energy vehicles. It can be seen that new energy vehicles have become a key area of common concern for governments and automobile enterprises around the world, and the strategic significance of promoting and popularizing new energy vehicles is becoming increasingly prominent.

So, in the marketing of new energy vehicles, what are the public's preferences? What are the focus points to promote public adoption? In addition, how is it possible to effectively turn intention into behaviors? In order to answer these questions, we provide a relatively comprehensive and systematic econometric analysis of the scientific literature in the area of public purchase preference, which is important to answer these queries.

This paper focuses on a systematic review and summary of the literature related to the promotion of new energy vehicles. The purpose of this work is as follows.

- (1) To capture research trends in the subject area using selected bibliometric data;
- (2) To clarify public preferences and analyze the factors influencing the promotion of new energy vehicles, etc.;
- (3) To summarize the main substantive findings of the existing literature;
- (4) To identify future research directions;
- (5) To provide a scientific basis for enterprises and governments to formulate policies for the promotion of new energy vehicles.

By exploring these questions, this study contributes both practically and academically. In terms of theory, against the backdrop of existing academic research and fragmented knowledge, the main current findings are explored in a multiangle and systematic way. On the one hand, it supports previous theoretical statements, and, on the other hand, it enriches existing research perspectives. With the help of bibliometric tools, individual public attributes, product attributes, and incentives are placed in an integrated scenario to explore the possible interactions and to explore key challenges for future research. This provides future researchers with a systematic overview of the relevance of the topic and directions for further research. In practice, by combing the existing relevant mainstream literature, this study identifies the main factors that influence the public's behavior in purchasing new energy vehicles. It helps to further understand the interactions between purchase intention and behavior. Moreover, this would help the government, enterprises, and others to formulate more scientific promotion policies and marketing strategies for the promotion of new energy vehicles. It can also provide guidance to engineers' decisions regarding incorporating consumer preference into EV engineering design.

Through the study, the contributions are as follows: analysis of the research background, the understanding of public purchase preference, and mastering the research on the promotion of new energy vehicles; further contributions include a summary of the results of related studies; support of the theoretical statements of previous studies; and the formulation of future research directions.

2. Concept Definition and Research Questions

2.1. Concept Definition

Influenced by the driving method, electric vehicles are also called new energy vehicles, including pure electric vehicles, plug-in hybrid vehicles, fuel cell vehicles, etc. In this paper, they are uniformly expressed as new energy vehicles [6]. Generally speaking, the public's purchase preference of new energy vehicles refers to a decision-making behavior for members of the public to decide to buy and use new energy vehicles.

2.2. Research Questions

To effectively promote the popularization of new energy vehicles and help achieve the dual carbon goal, this process is inseparable from the scientific and precise decision making of government departments and enterprises, and it is necessary to accurately grasp the relevant influencing factors in the decision-making process, so the systematic research on the current promotion of new energy vehicles is particularly important.

The main objective of this paper is to explore the research findings related to the promotion of new energy vehicles over the past twelve years in order to further clarify public preferences and the main influencing factors affecting the promotion of new energy vehicles. Therefore, we seek answers to the following specific research questions.

Q1: What is the research trend in the literature related to the public's purchase preference of new energy vehicles?

Q2: What information does this research trend reveal?

Q3: What are the main features of existing research on the topic?

Q4: What will be the future research frontiers in this research area?

Q5: What are the main points of force for the promotion of new energy vehicles?

3. Bibliometric Analysis

3.1. Data Source

We aim to review the current series of studies in the area of the public's purchase preference of new energy vehicles while considering the availability of the data. Thus, we selected the literature related to the purchase intention of new energy vehicles in the Web of Science Core Collection as the data source, and the search was limited to articles and reviews, excluding conference papers, conference abstracts, etc. Meanwhile, the time frame was defined as 2010 to 2023 (as of 15 March 2023) due to the fact that we conducted data collection on 15 March 2023.

To accommodate the multidisciplinary nature of the research topic, we used keywords rather than the restricted indexing range of journals. The English search formulas were (((TS = (electric vehicle? OR new energy vehicle? OR electric automobile? OR alternative fuel vehicle?)) AND TS = (purchase intention? OR adoption OR preference? adoption OR preference? OR willingness OR acceptance OR choice))) AND DT = (Article OR Review)) AND LA = (English). In particular, TS was the topic of study, which comprised the Title, Abstract, Keywords, and Keywords Plus. DT was the document type. LA was the language of the document. It can ensure that only credible, high quality academic literature was included.

The database of 3492 articles was initially obtained by specifying the keywords, document type, language, and time above. The literature was further screened to prevent outliers from undermining the validity of the results and to improve the precision and fit of the search results. After removing documents with inconsistent themes, no keywords and incomplete author information, we finally obtained 1498 valid English literature results and 73 highly cited literature results from the literature database. The specific composition is shown in Figure 1. The dataset was collected on 15 March 2023.

3.2. Methods and Tools

Bibliometrics uses econometric analysis to study the literature and bibliometric features, thus aiming to explore the current state and future trends of science and technology. Through the bibliometric analysis of pertinent disciplines, we develop visual knowledge maps and reveal potential insights within the research area. In this way, we systematically analyze the development trajectory of the discipline and future trends.

The Vosviewer software (version 1.6.19, Copyright © 2009-2023 Nees Jan van Eck and Ludo Waltman, supported by the Centre for Science and Technology Studies of Leiden University) was used to construct a scientific map that visualized the evolution of hot spots, frontier developments, and future trends in the study of the public's purchase preference of new energy vehicles.

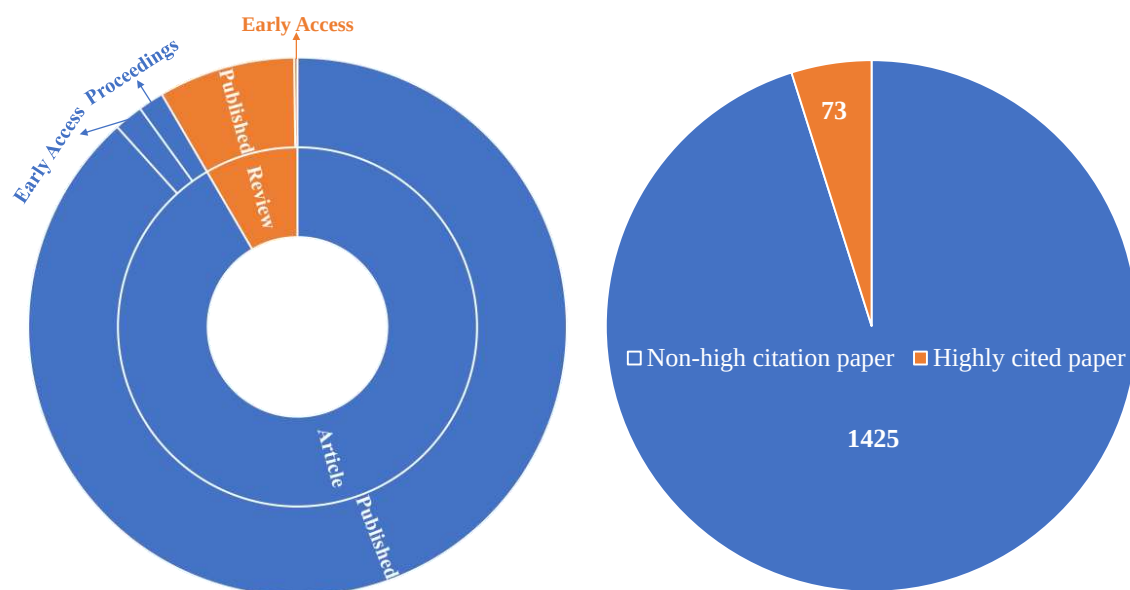


Figure 1. Composition of the literature database. Source: Collected and summarized by the authors.

The main methodology's phases in the review are shown in Figure 2.

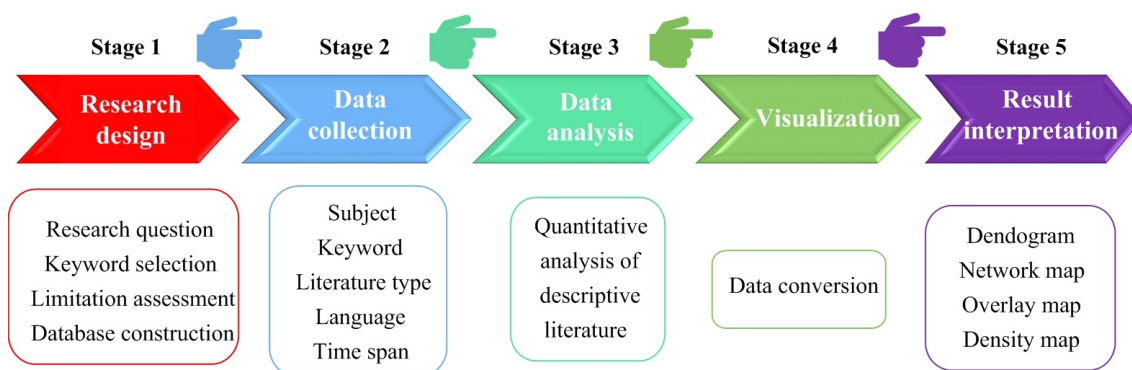


Figure 2. Main methodology's phases in the review. Source: Collected and summarized by the authors.

3.3. Descriptive Bibliometric Analysis

Data from 1498 literature results were exported to a TXT file, encompassing essential details such as title, author, journal, article type, language, keywords, abstract, publication year, issue number, volume information, and relevant references. In general, there are often situations in the literature that affect the accuracy of data analysis, such as singular and plural noun phrases and confusion between upper and lower case letters. Therefore, the first step was to clean the literature database of synonyms, spelling differences, etc.

The knowledge graph is a typical weighted bibliometric network. Therefore, it demonstrates the association between a node, such as a journal, keywords, country, etc. and another node. By utilizing the knowledge graph, researchers can employ citation and cocitation analysis to evaluate the advancement of their research. The scholarship states that, while literature coupling analysis can identify similarities between the two, it is not the central focus of this paper. Whereas direct citation is not as accurate, cocitation analysis is more likely to highlight the frontiers of the research under the thematic consistency of the literature. Hence, we used cocitation analysis to measure the public's purchase preference of new energy vehicles. Furthermore, the frontiers of the current research were identified based on their citation characteristics and structure.

Table 1 shows the main information extracted from the Web of Science for 1498 publications between 2010 and 15 March 2023. Of these, the number of author keywords is 3902, while the number of keywords PLUS is 2036. As observed, the overall quantity of keywords

employed is roughly 3.662 times greater than the number of literature results. The period of the literature analysis covers the last 12 years of scientific papers, while in 2017 a significant growth trend started; see Figure 3. Around 70% of all papers published within the last five years followed in this period after 2017. It is clear that advancing the popularity of new energy vehicles is of growing significance, and the importance of exploration in this subject area is increasingly being realized.

Table 1. Main information on the articles included in the review. Source: Collected and summarized by the authors.

Main Information	Information Interpretation	Literature Number
Literature	Total	1498
Literature source	Journal	197
Author keywords	Total word	3902
Keywords PLUS	Word count	2036
Authors	Total number	4318
All keywords	Total word	5428

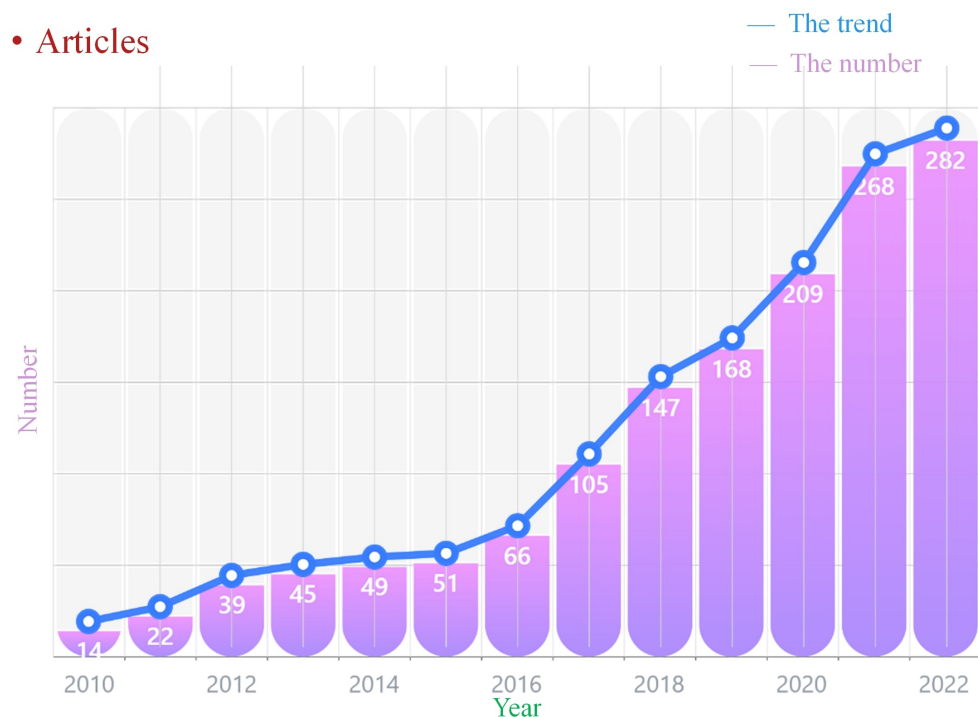


Figure 3. The number of articles included in the review by the year of publication. Source: Collected and summarized by the authors.

Through further analysis of the 1498 research literature results obtained, it is found that the distribution of articles showed a scattered character with a concentration. The 20 journals with the highest number of published articles are listed in Table 2. The number of articles published in the Top 10 journals reached 895, especially in Transportation Research Part D, Sustainability, Energy Policy, Energies, Transportation Research Part A, Journal of Cleaner Production, Energy, Applied Energy, etc. This accounts for roughly 60% of all published articles. It encompasses various areas, such as transportation engineering, environmental sciences, computer science, transportation design, sustainability, transportation policies and practices, energy, emerging technologies, etc. It is also stating the fact that sustainable energy and green transportation are known in many disciplinary journals. Decision-making groups other than the public are also working to explore the factors and preferences for new energy vehicle purchases to promote clean energy and low carbon transportation. At the same time, it also reflects the phenomenon of interdisciplinary

research between this theme and other disciplines, which provides a broader research perspective and ideas for subsequent related studies.

Table 2. Most influential journals in the research area under study. Source: Collected and summarized by the authors.

Journal	Number of Articles
Transportation Research Part D—Transport and Environment	162
Sustainability	142
Energy Policy	127
Energies	105
Transportation Research Part A—Policy and Practice	101
Journal of Cleaner Production	77
Energy	52
Applied Energy	48
Renewable & Sustainable Energy Reviews	48
Transportation Research Record	33
Transportation Research Part C—Emerging Technologies	26
Environmental Science and Pollution Research	20
Transportation	19
IEEE Access	17
International Journal of Hydrogen Energy	17
IEEE Transactions on Intelligent Transportation Systems	14
Journal of Power Sources	14
Sustainable Production and Consumption	13
Environmental Research Letters	12
Nature Energy	12

4. Discussion of the Results of the Econometric Analysis

4.1. Keywords Cluster Analysis

Keywords are both a highly condensed version of the literature content and the most visual representation of the main idea of the study. The high-frequency keywords in the research area of the public's purchase preference of new energy vehicles is the direct reflection of the attention and importance of this subdivision. It reflects the research trend in this research area.

We used Vosviewer to analyze the literature database for high-frequency keyword co-occurrences. Based on experience, the threshold parameter was set to 5, a total of 87 keywords were sorted out, and the keyword co-occurrence knowledge map is shown in Figure 4. Among them, electric vehicles and shopping preference had the highest hotness. EVs, Preference, Phev, Nevs, Charging Infrastructure, Energy Management, Charging, Battery, and Environmental Concern were the buzzwords in the research literature. Among them, Charging Infrastructure, Energy Management, Charging, and Battery were all related to the battery and charging of new energy vehicles, which also reflect the public's attention to the range of new energy vehicles and their concern about the charging support facilities. The frequency of keywords such as Environmental Concern, Emissions, costs, policies, ranges, subsidies, and incentives was also relatively high. This reflects that the public is concerned about the cost, policies, subsidies, incentives, and environmental protection of new energy vehicles, in addition to the range and charging facilities. These were also the hot topics of the current research on the popularization of new energy vehicles. Table 3 shows the top 20 keywords with frequencies greater than five, which represent the research hotspots in the last twelve years and together constitute the network map of the research area.



Table 3. Top 20 of the authors' identified keywords. Source: Collected and summarized by the authors.

Number	Author Keywords	Occurrences
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Highly cited literature is defined as the top 1% of all papers published in the same ESI discipline in the same year, which are ranked in descending order of citations. We analyzed

Highly cited literature is defined as the top 1% of all papers published in the same ESI discipline in the same year, which are ranked in descending order of citations. We analyzed

73 highly cited ESI literature results extracted from the literature database and obtained a keyword knowledge graph as shown in Figure 5.



Figure 5. Author keywords co-occurrence density in highly cited literature. Source: Authors' elaboration using Vosviewer.

Among them, there was the most discussion on electric vehicles, hybrid vehicles, and purchasing preferences, which were the main focus of the keywords. Keywords such as sustainable, perceived risk, and subsidies were presented in 2019–2020. As can be seen, the scientific research results and current events in this topic area are up-to-date, thereby reflecting the background environment around 2020 accompanied by the occurrence of COVID-19 and the subsidy withdrawal in China. This same feature can also be seen in the literature database keywords analysis, as shown in Figure 6. It also supports the fact that the public is becoming more and more aware of environmental protection and is gradually leaning towards green and sustainable energy in their personal travel choices.

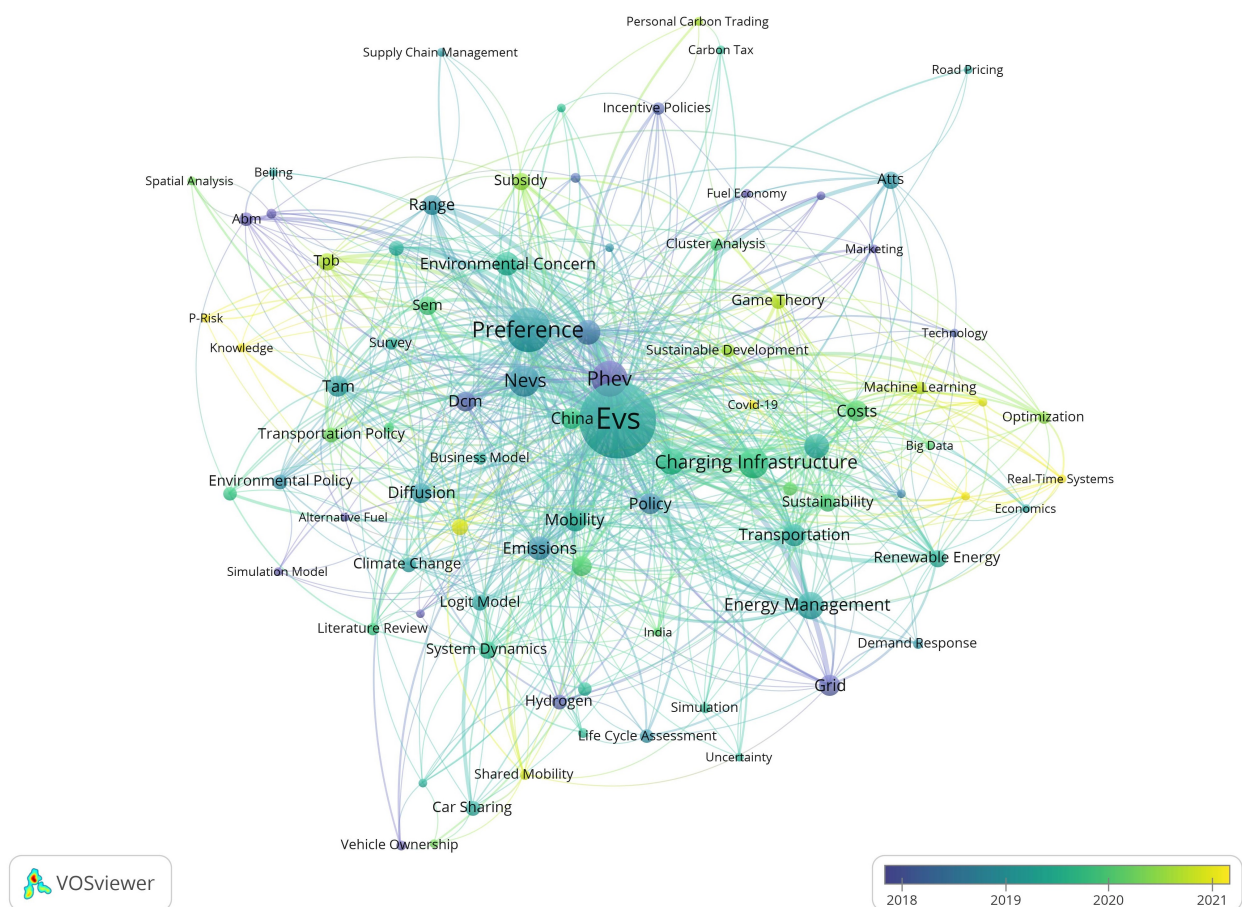


Figure 6. Author keywords co-occurrence overlay. Source: Authors' elaboration using Vosviewer.

4.3. Literature Cocitation Analysis

Cocitation reflects the association between two different literatures, thus referring to two different cited literature works being cited by the same citation. The cocitation of the literature reflects the condensation of the main research results.

Firstly, we used Vosviewer to conduct a literature cocitation analysis on the literature database. Based on the experience of the threshold parameters and the number of literature works, the threshold was set to 26. A total of 224 literature works were sorted out, as shown in Figure 7, and the top 20 are shown in Table 4. It can be seen that, within the statistical period span, the two papers published by scholars Rezvani Z and Egbue O had the highest citation frequency in this research area. Swedish researcher Rezvani Z defined the research object as plug-in electric vehicles in the literature review “Advances in consumer electric vehicle adoption research: A review and research agenda”, and the author proposed that the main research direction is that plug-in battery electric vehicles would gradually replace plug-in hybrid electric vehicles and extended range battery electric vehicles. The highly cited literature work “Barriers to widespread adoption of electric vehicles: An analysis of consumer attitudes and perceptions” published by American scholar Egbe O in 2012 conducted a more in-depth study on the mediating role. In addition, other scholars further explored the mediating effect of consumer attitudes and the moderating role of public norms and environmental awareness through the trial data of electric vehicles, and they achieved certain research results.

To further analyze the source journals of the citations, we used Vosviewer to conduct a cocitation analysis of the literature database. Based on the experience of the threshold parameters and the number of literature works, the threshold was set to 26, and a total of 298 journals were sorted out. The knowledge graph is shown in Figure 8. It can be seen that Energy Policy, Transportation Research Part D, Transportation Research Part A, Journal

of Cleaner Production, and Applied Energy were the top 20 cited sources of research results in this research area, as shown in Table 5. When combined with the impact factors and H index of the aforementioned journals, it can be said that the transportation science and energy journals achieved high quality in this research area. In contrast, there were relatively few publications on the market diffusion and marketing strategy.

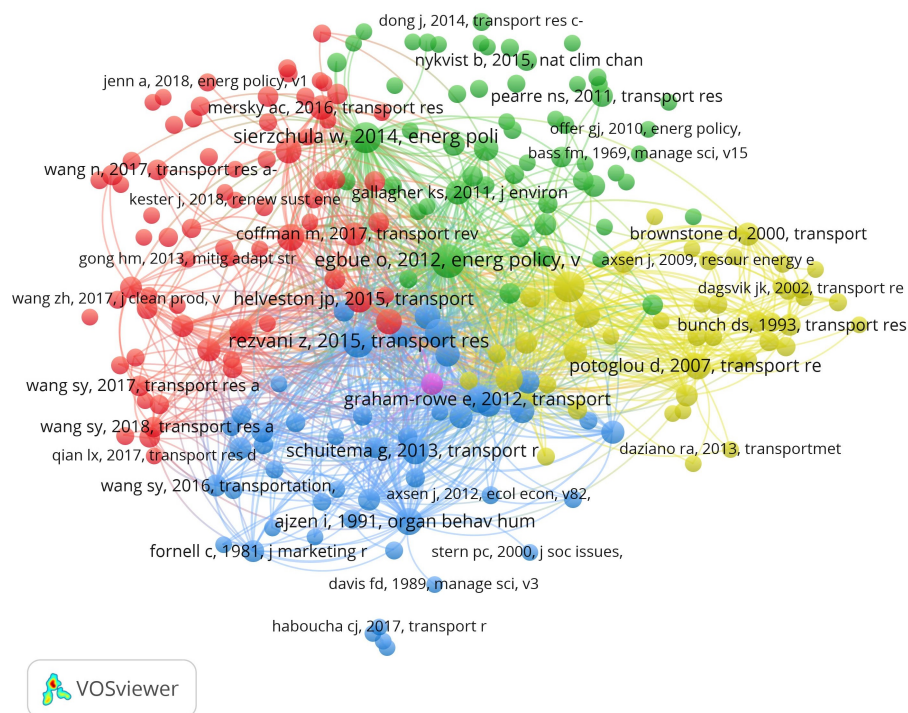


Figure 7. References co-citations density. Source: Authors' elaboration using Vosviewer.

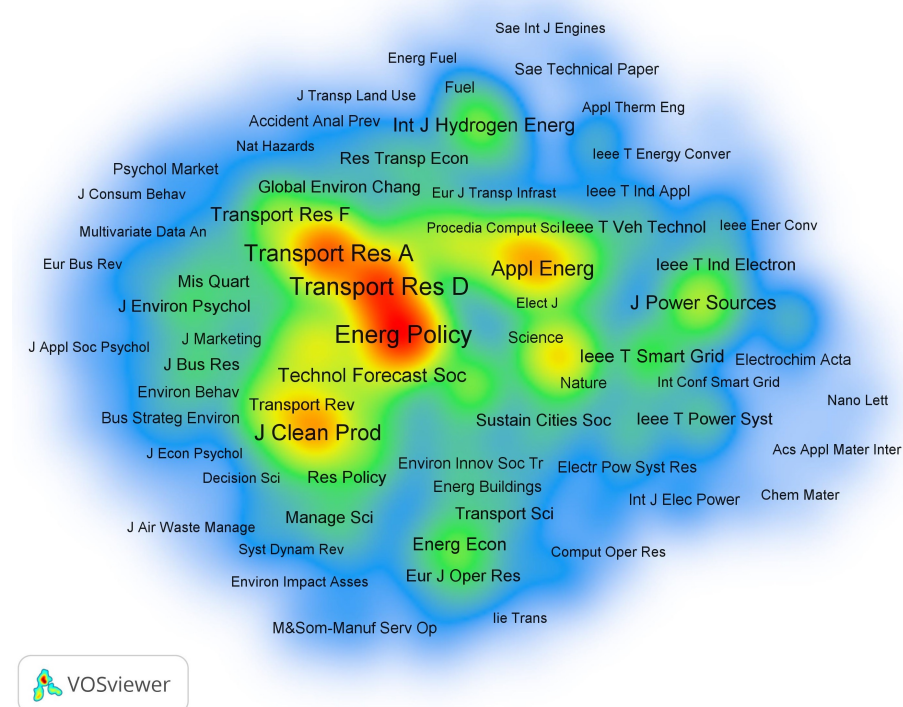


Figure 8. Journal cocitation densities. Source: Authors' elaboration using Vosviewer.

Table 4. Top 20 of reference cocitations. Source: Collected and summarized by the authors.

Author	Title	Year	Citations	Type
Egbue O [7]	Barriers to widespread adoption of electric vehicles: An analysis of consumer attitudes and perceptions	2012	279	article
Rezvani Z [8]	Advances in consumer electric vehicle adoption research: A review and research agenda	2015	225	review
Hidrué MK [9]	Willingness to pay for electric vehicles and their attributes	2011	215	article
Sierzechula W [10]	The influence of financial incentives and other socio-economic factors on electric vehicle adoption	2014	200	article
Carley S [11]	Intent to purchase a plug-in electric vehicle: A survey of early impressions in large US cities	2013	145	review
Ajzen i [12]	The Theory of Planned Behavior	1991	141	article
Bjerkkan Ky [13]	Incentives for promoting Battery Electric Vehicle (BEV) adoption in Norway	2016	138	article
Graham-Rowe E [14]	Mainstream consumers driving plug-in battery-electric and plug-in hybrid electric cars: A qualitative analysis of responses and evaluations	2012	134	article
Jensen Af [15]	On the stability of preferences and attitudes before and after experiencing an electric vehicle	2013	131	article
Schuitema G [16]	The role of instrumental, hedonic and symbolic attributes in the intention to adopt electric vehicles	2013	127	article
Hackbarth A [17]	Consumer preferences for alternative fuel vehicles: A discrete choice analysis	2013	122	article
Helveston Jp [18]	Will subsidies drive electric vehicle adoption? Measuring consumer preferences in the U.S. and China	2015	120	article
Potoglou D [19]	Household demand and willingness to pay for clean vehicles	2007	119	article
Liao F [20]	Consumer preferences for electric vehicles: a literature review	2017	118	review
Plotz P [21]	Who will buy electric vehicles? Identifying early adopters in Germany	2014	111	article
Langbroek Jhm [22]	The effect of policy incentives on electric vehicle adoption	2016	108	article
Gallagher Ks [23]	Giving green to get green? Incentives and consumer adoption of hybrid vehicle technology	2011	106	article
Ben L [24]	The adoption of cleaner vehicles in the UK: exploring the consumer attitude action gap	2007	105	article
Mersky Ac [25]	Effectiveness of incentives on electric vehicle adoption in Norway	2016	101	article
Diamond D [26]	The impact of government incentives for hybrid-electric vehicles: Evidence from US states	2009	96	article

Table 5. Top 20 of source journals cocited in the literature. Source: Collected and summarized by the authors.

Num	Journal	Country	Citations	Impact Factor	H Index
1	Energy Policy	UK	5202	7.576	234
2	Transportation Research Part D—Transport and Environment	UK	4131	7.041	113
3	Transportation Research, Part A—Policy and Practice	UK	3550	6.615	142
4	Journal of Cleaner Production	UK	2228	11.072	232
5	Renewable and Sustainable Energy Reviews	UK	1845	16.799	337
6	Applied Energy	UK	1747	11.446	235
7	Energy Conversion and Management	UK	1348	11.533	210
8	Journal of Power Sources	The Netherlands	1125	9.794	320
9	Sustainability	Switzerland	1108	3.889	109
10	Transportation Research Part C—Emerging Technologies	UK	1082	9.022	147
11	Transport Policy	UK	946	6.173	103
12	International Journal of Hydrogen Energy	UK	846	7.139	231
13	Technological Forecasting and Social Change	USA	774	10.884	134
14	Transportation Research Part F—Traffic Psychology and Behaviour	UK	763	4.349	100
15	Transportation Research Part B—Methodological	UK	741	7.632	148
16	Energies	Switzerland	699	3.252	111
17	Transportation Research Record	USA	645	2.019	131
18	IEEE Transactions on Smart Grid	USA	632	10.275	189
19	Energy Economics	The Netherlands	535	9.252	168
20	Transportation	The Netherlands	491	4.814	98

4.4. Research Strength Analysis

Regarding the research strength analysis, it mainly included the number of publications, citations, major research institutions, and national coupling analysis by country or region.

Analysis of the number of publications: The development of the same discipline often has a certain regional character, frequent exchanges between scholars in the same country or region, and the flow of information can further drive the development of this discipline in this country or region. Generally speaking, a country or region with a large number of scholars or publications in a research area has a stronger research strength in that area. Therefore, we summarized the publication volume of each country as a display window for the country's scientific research strength in the subject area. Based on experience, setting the threshold to 5 resulted in the top 20 publication volume, as shown in Table 6. As is shown in Figure 9, China, the United States, the United Kingdom, Germany, and Canada ranked among the top 5 in the study of the public's purchase preference of new energy vehicles. Interestingly, in terms of the literature citation, the United States remained the first, and the United Kingdom remained the third. China, Germany, and Canada were in second, fifth, and seventh place, respectively, while Italy, The Netherlands, Sweden, and Denmark jumped to the fourth, sixth, eighth, and ninth places, respectively, as shown in Table 6. This indicates that although China's research on the public's purchase preference of new energy vehicles currently ranks among the top in the world in terms of publication volume, its citation volume is slightly lower, and its academic influence still lags behind that of developed countries, especially those with larger publication volumes, such as Italy, The Netherlands, Sweden, and Denmark. However, their research results have received widespread attention and ranked relatively high in citations, thus indicating their academic influence.

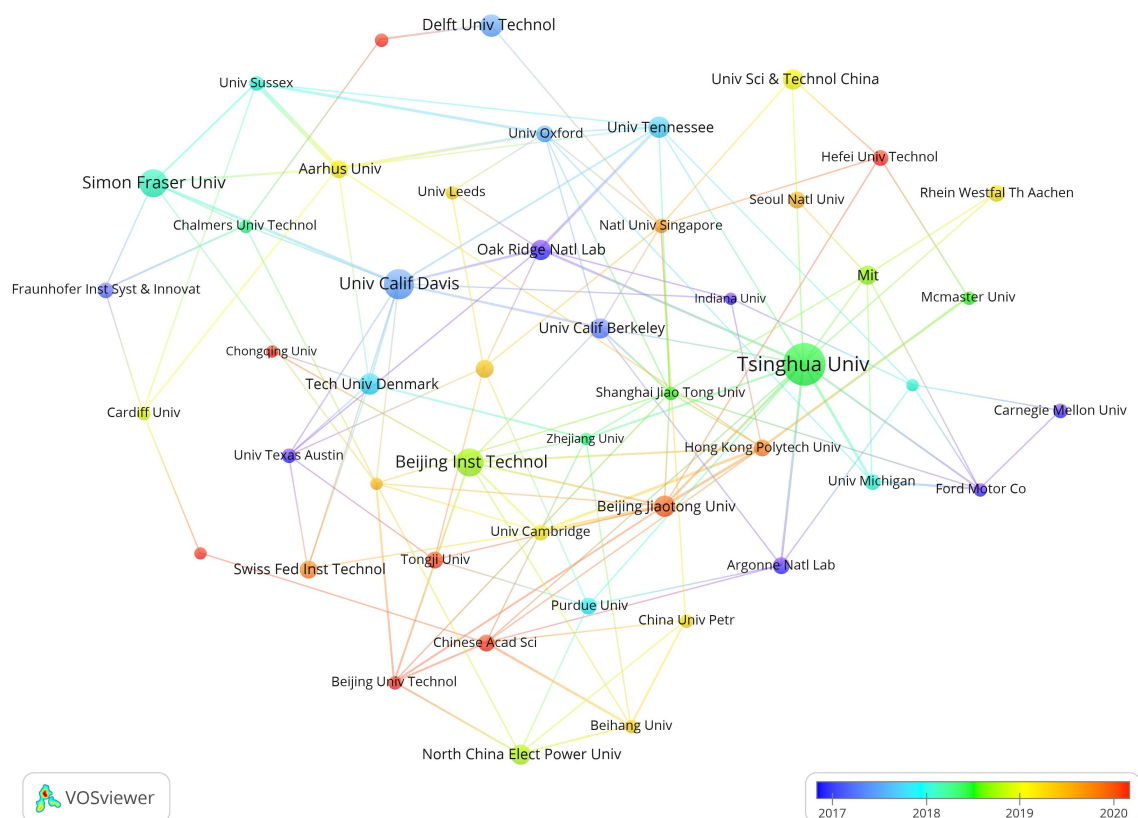


Figure 9. Country or region of top reference density. Source: Authors' elaboration using Vosviewer.

Table 6. Top 20 countries or regions with the number of highest publications. Source: Collected and summarized by the authors.

Num	Country	Literature Numbers	Ranking	Citations Number	Ranking
1	China	470	1	13,218	2
2	USA	362	2	18,161	1
3	UK	147	3	7834	3
4	Germany	110	4	3900	5
5	Canada	80	5	3510	7
6	Italy	59	6	5431	4
8	The Netherlands	58	7	3719	6
7	Australia	58	8	1604	11
9	South Korea	58	9	1235	14
10	India	55	10	1231	15
11	Denmark	39	11	1825	9
12	Japan	39	12	1207	16
13	Sweden	37	13	2686	8
14	France	35	14	1186	17
15	Spain	34	15	789	21
16	Switzerland	33	16	1277	13
17	Malaysia	28	17	1818	10
18	Poland	27	18	244	29
19	Norway	26	19	914	20
20	Portugal	25	20	645	22

Analysis of the major research institutions: With the development of disciplines and the dynamics in knowledge, mutual cooperation has become an important method of scientific research. The analysis makes it possible to clearly locate the relevant scientific institutions. According to Figure 9, Chinese and American scholars have contributed the most to this research area, and the scientific map of the main research institutions involved is shown in Figure 10.

**Figure 10.** Major research institutions overlay. Source: Authors' elaboration using Vosviewer.

Among them, academic institutions in China, the United States, Canada, and The Netherlands, such as Tsinghua Univ, Univ Calif Davis, Beijing Inst Technol, Simon Fraser Univ, and Delft Univ Technol, rank among the top 5 in terms of publication volume. Meanwhile, research institutions such as Oak Ridge Natl Lab, Univ Calif Davis, Ford Motor Co, Carnegie Mellon Univ, and Indiana Univ started relatively early, while academic institutions in Chinese universities started relatively late, but they also have a certain influence. According to the top 20 academic institutions obtained by setting the threshold to 10 in Table 7, China's research influence in this topic research area is currently high, but there are relatively few foundational literature works. However, research in this area in China still shows a strong momentum, with major research teams including Tsinghua University, Beijing University of Technology, as well as China University of Mining and Technology, Beijing Jiaotong University, North China Electric Power University, University of Chinese Academy of Sciences, etc. In addition, the research teams should further deepen communication and cooperation with strong research teams such as the United States, The Netherlands, Germany, and the United Kingdom, as well as broaden research ideas, deepen research depth, focus on the transformation of scientific research results, and enhance scientific research strength and international influence.

Analysis of countries bibliographic coupling: Based on the experience of setting the threshold to 5, the obtained countries' bibliographic coupling diagram is shown in Figure 11. Among them, the countries or regions such as the United States, China, Germany, and The Netherlands have higher couplings of research results. Countries or regions such as Australia, India, UK, Canada and South Korea are also prominent. Combined with Figure 12, around 2018, some countries and regions, mainly the United States, showed a leading trend in research in this field. During 2019–2020, some countries and regions, mainly China, were fruitful. Countries and regions such as India, on the other hand, showed breakthroughs around 2021. The number of publications by country and region also reflected this feature. In addition, the possible international academic discourse among countries and regions such as the United States, China, The Netherlands, Germany, Canada, and so on, also deserves our reflection and attention.

Table 7. Top 20 research institutions. Source: Collected and summarized by the authors.

Num	Organization	Literature Works	Citations
1	Tsinghua University (Beijing, China)	45	2097
2	University of California (Davis, CA, USA)	30	1472
3	Beijing Institute of Technology (Beijing, China)	27	903
4	Simon Fraser University (Bennaby, Canada)	27	1348
5	Delft University Technology (Delft, The Netherlands)	20	1804
6	Beijing Jiaotong University (Beijing, China)	19	314
7	Technical University of Denmark (Copenhagen, Denmark)	19	1015
8	University of Tennessee (Knoxville, TN, USA)	19	792
9	North China Electric Power University (Beijing, China)	18	455
10	Oak Ridge National Laboratory (Oak Ridge, TN, USA)	18	1259
11	University of California (Berkeley, CA, USA)	18	1156
12	University of Science and Technology of China (Hefei, China)	18	1175
13	Massachusetts Institute of Technology (Cambridge, MA, USA)	17	452
14	Aarhus University (Aarhus, Denmark)	16	791
15	Southeastern University (Nanjing, China)	16	375
16	Swiss Federal Institute of Technology Zurich ETH (Zurich, Switzerland)	16	442
17	Argonne National Laboratory (Lemont, IL, USA)	15	996
18	Seoul National University (Seoul, Republic of Korea)	15	393
19	Chinese Academy of Sciences (Beijing, China)	14	577
20	Hong Kong Polytechnic University (Hong Kong, China)	14	664

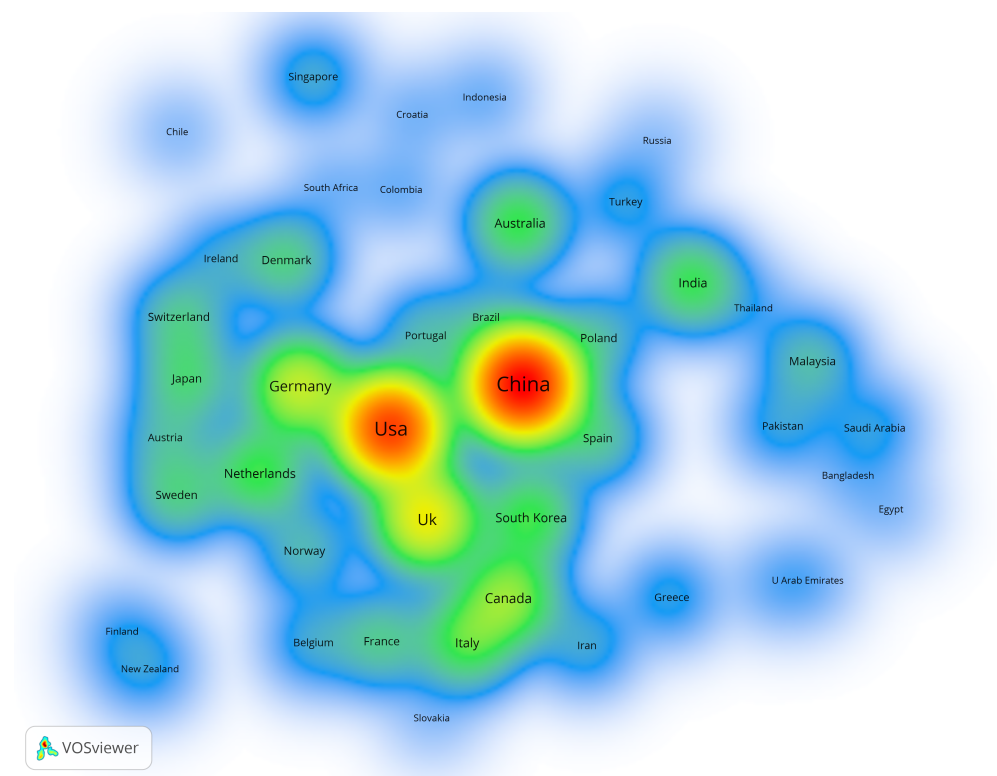


Figure 11. Countries' bibliographic coupling density. Source: Authors' elaboration using Vosviewer.

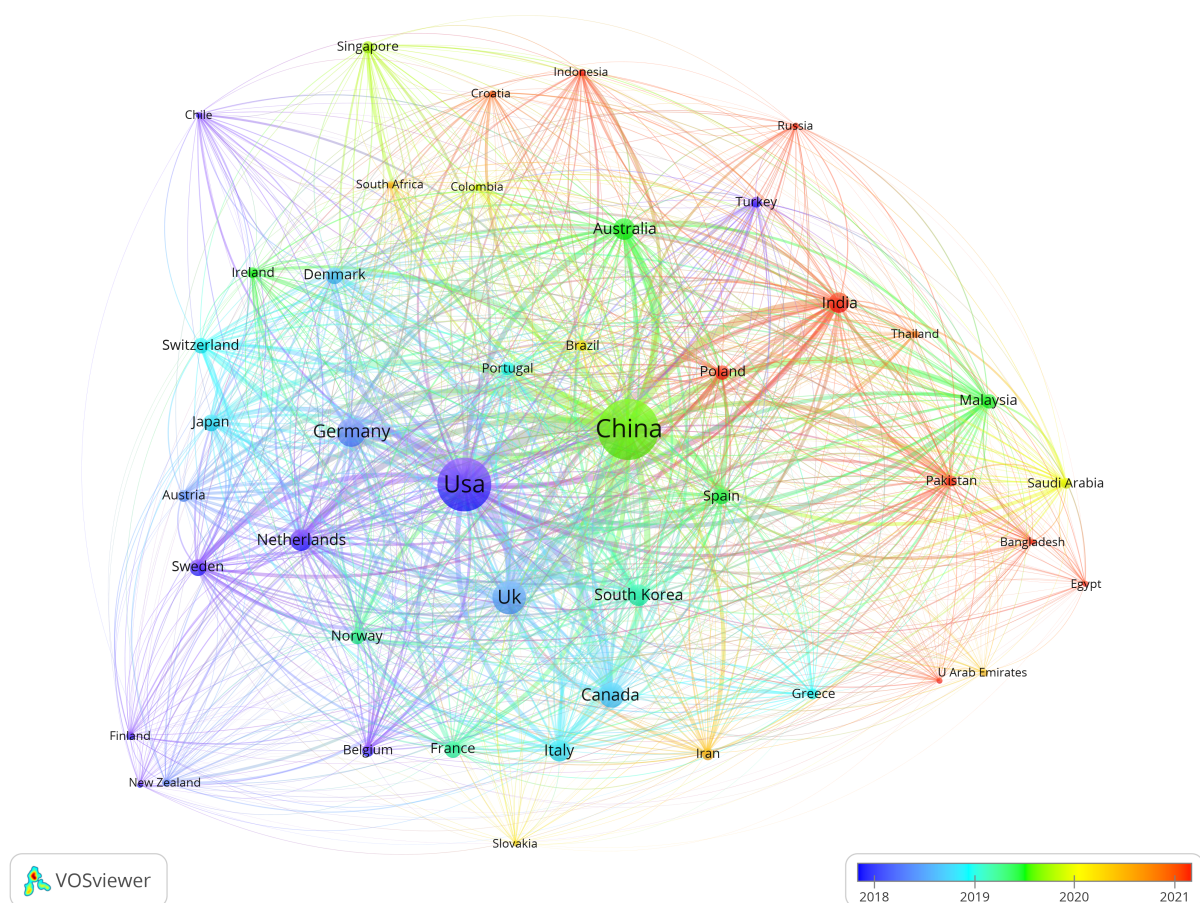


Figure 12. Countries' bibliographic coupling overlay. Source: Authors' elaboration using Vosviewer.

5. Highlights of Existing Research

Egbue et al. found that new energy vehicles must overcome problems related to technology and consumer behavior [7]. A related study reported that the current factors affecting the public adoption of new energy vehicles are complex, which mainly include infrastructure such as charging stations, upfront costs, public perceptions, group pressure, and the new crown epidemic, along with some technical limitations [27]. Swedish scholars Rezvani et al. systematically summarized that technology, environment, cost, personal factors, and social factors are the main influencing factors of new energy vehicle purchase intention [8]. Similarly, other scholars have also conducted similar studies [20,28,29]. Based on the integration of previous research results and the topic of this study, we mainly focused on the influencing factors of new energy vehicle promotion based on the perspective of individual public views, product attributes, and incentive policies, as shown in Figure 13.

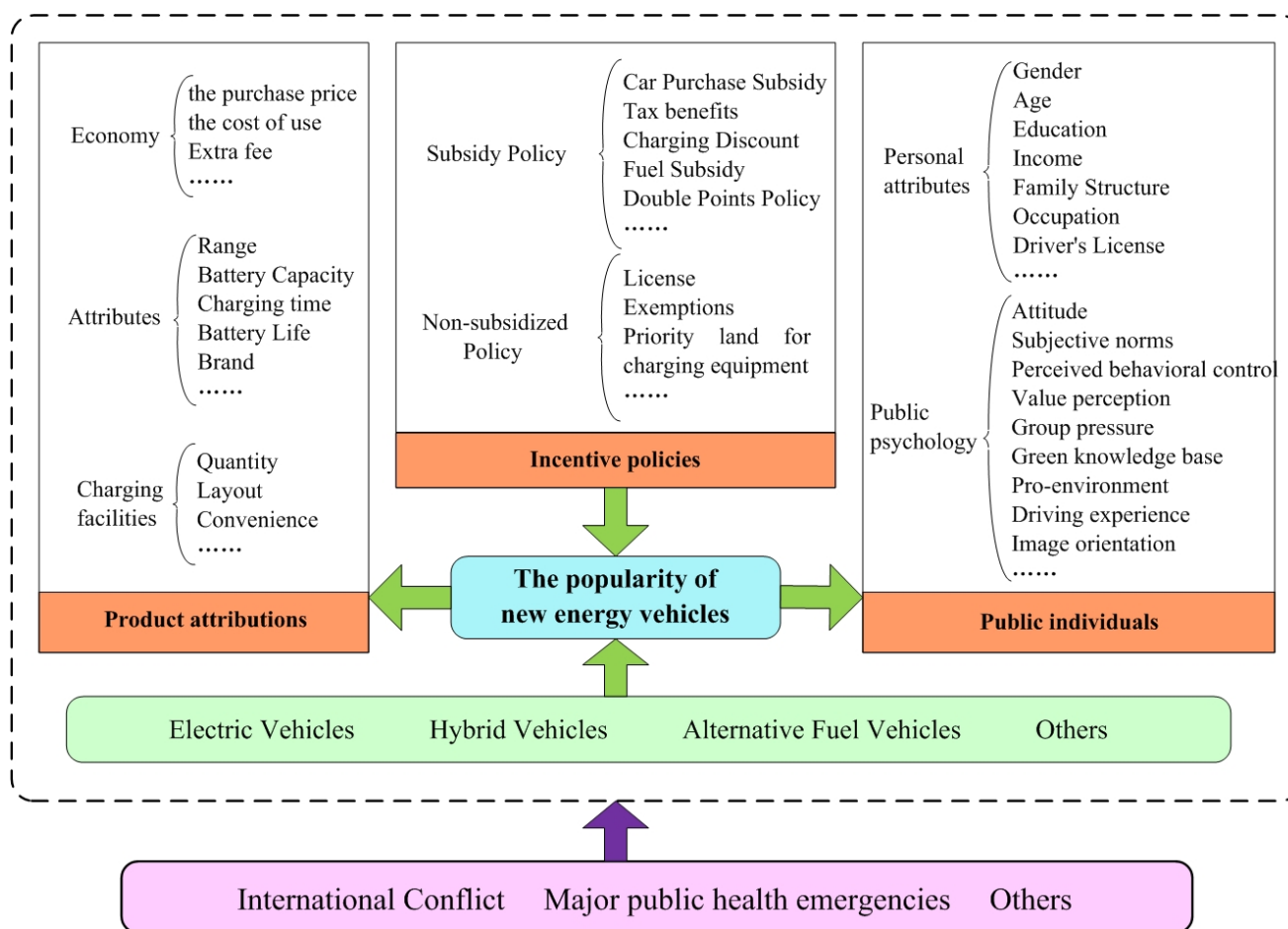


Figure 13. The main influencing factors of new energy vehicle promotion. Source: Authors' elaboration based on the existing literatures.

5.1. Public Individual-Based Analysis

The public can be attributed to influence the development of transportation, especially in green mobility and low-carbon transportation. Similarly, new energy vehicles, as a new mode of transportation, provide more choices for people's green travel. A large number of scholars have focused on the relationship between individual public factors and the promotion of new energy vehicles to help the development of the new energy vehicle industry and to promote the development of green transportation.

Table 8 provides information from the existing literature on the impact of public characteristics on their purchase intention.

Table 8. The impact of public characteristics. Source: Collected and summarized by the authors.

Public Individuals	Points	Main Conclusions
Personal attributes	Gender	Gender differences in new energy vehicle enthusiasts in different countries [30–32].
	Age	There was no unanimous conclusion, but the main focus was on the middle-aged group [30,33,34].
	Education	Some scholars have argued that income affects the purchase intention [32].
	Family	Married groups are more likely to buy [35]. The number of family members and the number of family members with a driver's license influence purchasing decisions [36].
	Others	Daily travel distance affects the public's willingness to buy [33]. A public in large cities more likely to buy [34]. Policies could have greater effects in cities with higher population densities [37]. The number of vehicles owned may also influence the public's purchasing decisions [38,39].
Public psychology	Attitude	Attitudes have the greatest impact on public shopping behavior [40].
	Subjective norms	Subjective norms influence the public's willingness to buy [41,42].
	Perceived Behavioral Control	Perceived behavioral control has a less profound effect than attitude [43].
	Group pressure	Influence on the public's willingness to buy [42,44].
	Green Knowledge reserve	Significant influence on the use of new energy vehicles [45].
	Environmental Awareness	Does not determine the public's willingness to buy [46].
	Driving experience	Significantly and positively influences the public's willingness to buy [47,48].
	Others	Public awareness of innovation influences purchase intention [49]. There is a gap between the public's environmental concern, perceived environmental benefits, and the actual environmental behavior [33].

5.1.1. Personal Attributes

In reviewing the literature works, it can be seen that the existing results on the individual factors of the public include two major parts: personal attributes and public psychology. Specifically, public individual attributes mainly refer to the public's gender, age, education, income, marital status, family background, and occupation, while psychological factors mainly refer to the public's attitude, willingness, subjective norms, and value feelings. Based on panel data of new energy vehicle sales in 20 Chinese provinces, Li et al. elucidated the effect of regional population density differences on new energy vehicle promotion policies by constructing a multiple regression model analysis. It was eventually determined that policies such as government procurement, the construction of charging facilities, and restrictions on driving and purchasing could have a greater effect in cities with higher population densities [37]. Meanwhile, some scholars have shown that the number of household members and the number of household members with driving licenses have a significant impact on the public's decision to purchase new energy vehicles, which together affect their acceptable purchase price [36]. The number of vehicles owned by a household also affects the public's purchase decision [38].

5.1.2. Public Psychology

Research on public psychology aspects has been conducted mainly in the framework of some classical theories focusing on consumer and environmental psychology perspectives. These classical theories are mainly included in the Theory of Planned Behavior [12,50–55], the Theory of Rational Behavior [50,56], the Random Utility Theory [57], the Diffusion of Innovation Theory [58], the Perceived Value Theory [59], and the Norm Activation Model [60]. As one of the classical theories, a large body of literature has used the theory of planned behavior to study the public's purchase of new energy vehicles. A large number of existing research results from different countries or regions show that the more positive the

public's attitude, perceived behavioral control, and subjective norms are, the stronger the public's purchase intention [61–63]. Moons and De Pelsmacker found that public attitudes have a significant impact on purchase intentions by measuring the general attitude of the Belgian public toward new energy vehicles and their product attributes, all while assessing that subjective norms and perceived behavioral control have a positive impact on the public's behavior in purchasing new energy vehicles, but their effects were not as profound as those of attitudes [43]. Attitudes are the most powerful influence on public purchasing behavior [40]. When the public feels some pressure from others or groups, it also affects their purchase intention [42]. Some scholars analyzed the growth drivers of plug-in electric vehicles in California and showed that community effects and workplace peer effects have a significant impact on the popularity of new energy vehicles [44].

In addition, since new energy vehicles contribute to energy conservation and emission reduction to a certain extent, existing studies often regard the public's purchase of new energy vehicles as a kind of pro-environmental behavior, and mostly use the norm activation model and value–belief–norm theory to conduct research [8]. The Norm Activation Model argues that publics who have higher perceptions of the possible consequences of pro-environmental behaviors and attribute them primarily to themselves are more likely to engage in pro-environmental behaviors. The value–belief–norm theory, on the other hand, argues that pro-environmental behavior is a result of personal norms, a personal or moral obligation perceived by individuals involved in pro-environmental behavior, and is one of the important influences in explaining and predicting the public's purchase of new energy vehicles [8,57,61–64]. Sun et al. noted that the proportion of family and friends who have purchased new energy vehicles can significantly increase the public's purchase intention [65]. Chen et al. found that the knowledge reserve has a direct and significant effect on the use of new energy vehicles. This is because increasing the public's green knowledge base can generate strong beliefs about the possible positive outcomes of new energy products through the belief that they can improve environmental performance or alleviate environmental problems [45].

From the perspective of innovation diffusion theory, the purchase of new energy vehicles is also considered as an adoption behavior of innovative products, and public innovativeness is mainly reflected in the propensity decision to purchase and use new products [66]. Studies have shown that public innovativeness has a positive impact on the purchase intention, i.e., early purchasers show higher innovativeness than later purchasers [46,66]. Heidenreich et al. explored the interaction between public innovativeness and the public's purchase preference of new energy vehicle from different dimensions [67].

Beyond the classical theoretical research framework, other aspects of the influence of psychological factors on the public's purchase preference have been explored. Li et al. found that the public's personal experience with the vehicle, customer satisfaction, and perceived value had a positive and significant direct effect on the public's purchase preference [68]. On the one hand, Adnan et al. showed that the public's concern for the environment was mediated by the influences related to the theory of planned behavior to affect plug-in hybrid vehicles rather than directly [63]. Zhang et al. suggested that positive perceptions of environmental benefits influence the public's propensity to purchase new energy vehicles [62]. However, some scholars have pointed out that there is a gap between the public's environmental concerns and the perceived environmental benefits and actual pro-environmental behavior, i.e., the public's environmental concerns and perceived environmental benefits do not necessarily produce pro-environmental behavior [69,70], possibly because other aspects of the public's concerns are more important than environmental protection [71]. On the other hand, some scholars have explored the symbolic value of new energy vehicles or the image positioning of car companies and the public's self-identity for analysis [8,16]. By studying the relationship between consumers' self-interest value, altruistic value, and the purchase demand of new energy vehicles, Zuming et al. pointed out that green-perceived value has a driving role, including green value and social value [72]. The more the product image of the new energy vehicles matches the public's self-image,

the stronger the public's purchase intention and the more favorable it is to transform into actual purchase behavior [8].

5.2. Product-Attributes-Based Analysis

Regarding the attributes of new energy vehicles themselves, existing studies have focused on factors such as purchase price, cost of use, range [73,74], charging time [18], charging convenience, brand [75], battery life [15,76], and safety [77,78]. Potoglou and Kanaroglou pointed out that reducing the price and improving the performance of new energy vehicles can effectively promote consumers to purchase new energy vehicles [19]. Through a survey of Chinese and American consumers, Helveston et al. found that consumers in both countries preferred new energy vehicles with a lower price, lower cost of subsequent use, shorter acceleration time, and faster charging process [18].

Combined with previous experience, the factors of the product attributes are briefly described as follows. The purchase price and usage cost are referred to as economic factors; range, charging time, battery life and brand are mainly related to the performance of new energy vehicles, which are important factors for the public to measure the reliability of new energy vehicles when purchasing, which are referred to as performance aspects; the number and layout of charging stations and other power replenishment are collectively referred to as charging facilities aspects. The following is mainly from the aspect of economic factors, product attributes, and charging facilities.

Table 9 provides information from the existing literature on the impact of product attributes on their purchase intentions.

Table 9. The impact of product attributes. Source: Collected and summarized by the authors.

Product Attributes	Points	Main Conclusions
Economy	Purchase Price	Price affects willingness to buy [79,80].
	Cost of Use	Cost factors also have an important influence [18,48].
	Range	Positively influences the public's willingness to buy [81].
Performance	Battery Life	Some scholars believe there is an effect [15,76].
	Charge Time	Affects public purchase intention [18].
	Brand	Affects public purchase intention [75].
	Quantity	More quantity can alleviate mileage anxiety [15,20]. Density of charging and switching station layout, etc. [82].
Charging facilities	Layout	Inadequate charging facilities are a major barrier to the popularization of electric vehicles [83].
	Convenience	Increasing the maximum driving distance, shortening the charging time, and improving the convenience of charging are conducive to stimulating consumers' purchase intention [84].
Others		Marketing and service levels have a positive impact on purchase intention [80].

5.2.1. Economy

Public preference for the purchase price of new energy vehicles varies from person to person; most studies have considered the purchase price and cost of use and found a negative impact on the public's utility of purchasing new energy vehicles [57], while public preference heterogeneity has been found to be relatively higher when the price of new energy vehicles is much higher than the price of conventional fuel vehicles [85]. However, it has also been noted that, while members of the public with higher incomes can afford to purchase new energy vehicles, they are concerned about the cost savings of new energy vehicles compared to traditional fuel vehicles [20]. When the public has to pay extra for battery leasing, this affects the public's purchase preference [86]. The price and cost to use new energy vehicles largely affect consumers' utility, and further reducing the price and

cost of use of new energy vehicles is an effective way to stimulate the demand for new energy vehicles [87].

5.2.2. Attributes

In general, the public's prefers new energy vehicles with better performance, and range is one of the most important factors influencing public purchases [82]. The vast majority of studies have concluded that range is related to public attitudes toward new energy vehicles and that longer range can alleviate the public's mileage anxiety and ultimately increase the likelihood of converting it into actual purchase behavior [20]. It is possible that the preference for range is related to the layout of the charging posts and the charging time [88]. It has also been found that the high cost and capacity issues of batteries affect the public adoption of new energy vehicles [89], while the imperfection of charging facilities increases the difficulty of promotion. In addition, the public has shown a preference for certain national and regional brands when purchasing new energy vehicles, and there is variability between countries and regions. When faced with a wider variety of new energy vehicles, the public has more choices, which may also enhance the public's purchase preference [30,84].

5.2.3. Charging Facilities

Except for some use of clean fuels, fossil fuels, etc., the mainstream source of power for new energy vehicles is currently electrical energy, so the main reference here is to the charging facilities used to replenish power. In general, charging facilities have a significant positive effect on the public's purchase of new energy vehicles, because more charging facilities can save more time costs on the one hand and alleviate the public's mileage anxiety on the other [20]. Previous studies have usually used the density of charging stations relative to gas stations to measure this value, and these studies now also include [85,90–92]. For example, there are such measurements as the distance from households to charging stations [85], the layout density of charging and switching stations, etc. [15,82]. Globisch et al. considered public charging facilities mainly from the public's economic and psychological perspective, thereby showing that insufficient charging facilities are a major barrier to EV penetration [83], while increasing the maximum driving distance, reducing charging time, and improving charging convenience are conducive to stimulating the public's purchase preference [84].

Some scholars analyzed the factors influencing the acceptance of pure electric vehicles in Ireland and pointed out that the government should play a role in improving the charging infrastructure while allowing the commercialization of the infrastructure to unlock the potential of the new energy vehicle market [93]. Faced with the future trend of rebates, Wang et al. used multiple linear regression to analyze the effect of incentive policies in 41 pilot cities from 2013–2014, thereby pointing out that the charging density, license fee exemption, unlimited traffic, and priority of land for charging infrastructure construction were the four most important factors, and they suggested strengthening the corresponding supporting policy system [94].

5.3. Incentive-Policies-Based Analysis

The popularity of new energy vehicles contributes to energy security and environmental protection, and many countries around the world have reached a consensus to accelerate the promotion of new energy vehicles [95–97], which have successively introduced relevant support policies. The incentive policies to promote the development of new energy vehicles are broadly divided into demand-focused policies and supply-focused policies. Demand-focused policies focus more directly on the public, such as vehicle purchase subsidies, tax incentives, fuel subsidies, and nonfinancial subsidy incentives. Supply-focused policies target vehicle companies and fuel suppliers and include R&D subsidies and other regulations for low-emission regulation categories, and this is not the focus of this paper.

Demand-focused policies are popular in most regions, especially purchase subsidies, which directly increase the consumer interest in new energy vehicles.

Table 10 provides information from the existing literature on the impact of incentives on purchase intentions.

Table 10. The impact of incentives. Source: Collected and summarized by the authors.

Incentive Policies	Main Conclusions
Subsidized	Government support policies positively influence purchase intention [54,98]. Government subsidies can stimulate the public's willingness to purchase new energy vehicles to a certain extent [99]. Purchasing tax reduction policies can stimulate the public's purchase intention [100].
Non-subsidized	Neither direct monetary subsidy policies nor adequate charging infrastructures can guarantee the mass penetration of electric vehicles [10].
Others	Policy effectiveness affects public awareness of new energy vehicles [101]. Population density, education level, number of charging piles, proportion of renewable energy generation, and oil price have important effects on expanding consumer demand [102].

5.3.1. Subsidy Policy

Scholars have found that policies such as subsidies, environmental regulations, and right-of-way concessions for the purchase of new energy vehicles affect consumers' purchase intention. By analyzing different policy intervention contexts for promoting new energy vehicles in U.S. cities, Silvia et al. pointed out that mixed policies have been the most effective, and the effectiveness of policies directly affects consumers' awareness of new energy vehicles [101]. Zhang et al. analyzed the incentive policy system for the promotion of new energy vehicles in terms of taxation subsidies, financial subsidies, R&D investment, and pilot promotion [103]. Chen analyzed the policy evolution of the initial development stage of new energy vehicles in China from 2001 to 2011 and pointed out that financial subsidies were an important factor in achieving the market scale of new energy vehicles [104,105]. Ilani et al. found that fiscal policies effectively stimulated purchase incentives and that government subsidies could stimulate the public's purchase preference of new energy vehicles to some extent [106]. Larsson et al. found that purchase tax exemptions were an important policy tool to promote the development of the new energy vehicle industry and stimulate market sales [107]. Bigner et al. noted that vehicle purchase subsidies and infrastructure investments were the most commonly used policy tools to accelerate the development of new energy vehicles, while fuel price taxes have had a greater impact on alternative fuel vehicles than subsidies [108]. Lane et al. found that government environmental regulations, fuel price policies, and vehicle purchase subsidies have had a strong influence on the purchase preference of new energy vehicles [24], and direct subsidy policies had a significant effect on the sales of electric vehicles [99,109]. Wang et al. supported these findings by using a comparative analysis of the policies in several countries, where road priority was positively associated with the EV market, and free parking and open bus lanes were effective incentives for market breakthroughs. However, financial subsidies were no longer responsible for the large differences in the promotion of various EVs [100]. However, the strength and direction of the policies varied widely across countries, which means that policies for sociotechnical transformation have not evolved in the same way at the national level [110].

5.3.2. Nonsubsidized Policy

Ma et al. found that policies granting right-of-way privileges have had a significant positive impact on the adoption of new energy vehicles and are effective in promoting the public's purchase preference [111]. Sierzchula et al. found through multiple regression analysis that charging infrastructure was significantly associated with EV adoption,

but neither monetary direct subsidy policies nor adequate charging infrastructure could any longer guarantee the adoption of EVs at scale [10]. Wang et al. analyzed the impact of government promotional policies on purchase decision based on an extended theory of planned behavior. They found that when consumers were in a higher energy efficiency perception and policy perception environment, their level of subjective behavioral motivation was higher [112]. So, this means that when consumers are more sensitive to new energy vehicle policies, they are more likely to make a purchase decision.

Nevertheless, some other findings have been obtained by scholars. Li et al. used the panel data of 14 countries from 2010–2015 and analyzed the effects of population density, education level, the number of charging piles, the proportion of renewable energy generation, oil price, GDP per capita, and urbanization level on the consumption demand of new energy vehicles by building a multiple linear regression model [102]. It was found that the first four factors had a significant positive impact on expanding consumer demand, while the last three factors had no significant impact. In other words, in addition to the public's personal attributes, product attributes, and incentive policies, there are some other factors that have an impact on the public's purchase preference of new energy vehicles.

Taking oil prices as an example, in 2022, influenced by geopolitical conflicts and local wars, international oil hit the highest prices in recent years, such as the double breakthrough of historical prices for 92 and 95 gasoline. This was not only about the market share of new energy vehicles [113], but also affected the purchasing preferences of the public, including changing their demand behavior for more fuel-efficient vehicles or even abandoning their purchase plans [114,115]. With the continuous development of new energy vehicles in recent years, an increasing number of studies in Canada [19], the United States [116], Japan [117], South Korea [118], and Iceland [119] have analyzed the impact of oil price changes on the automobile market. Du et al. studied the impact of oil price changes on the public's willingness to purchase cars in China and found that only when oil prices rose to US\$10 or more did high-income consumers change their purchase intentions and choose low-emission vehicles. Eppstein et al. found that higher oil prices increased the market penetration efficiency of plug-in hybrid vehicles, thereby allowing them to capture a larger market share [120]. Sun et al. showed that new energy vehicle sales in China became more sensitive to oil prices after the implementation of refined oil pricing reform [121].

6. Discussions and Recommendations

6.1. Discussions

In this paper, we have combed through the relevant literature through literature statistics and knowledge graph visualization, and we obtained some interesting conclusions. These also happen to provide a reasonable response to the questions raised. The results of this study are specifically discussed below.

By reviewing the previous results, it can be found that scholars' research on the purchase of new energy vehicles is abundant, and the number of published articles has been growing in recent years, which shows obvious crossdisciplinary characteristics.

In terms of keyword cluster analysis, EVs, Preference, Phev, Nevs, Charging Infrastructure, Energy Management, Charging, Battery, and Environmental Concern are the main hot words. Environmental Concern, Emissions, Costs, Policies, Ranges, Subsidies, and Incentives also appeared with relatively high frequency. It can be inferred that, when the public is shopping for new energy vehicles, they not only focus on the range and charging support facilities, but also on the expenses, policies, incentives, and environmental friendliness of new energy vehicles. In the highly cited literature, there were the most discussions on electric vehicles, hybrid vehicles, and shopping preferences, which corroborate that the public is increasingly inclined to be green. Notably, in 2019–2020, keywords such as sustainable, perceived risk, and subsidy appeared. As we all know, the period was accompanied by COVID-19 and a background of reduced subsidies for new energy vehicles from the Chinese government. It can be seen that scholars' research on this topic was closely linked

to current events and hotspots, and the public's shopping behavior was affected by changes in the external health environment as well as the policy.

In terms of the literature cocitation analysis, two articles published by scholars Egbue, O. [7] and Rezvani, Z. [8] had the highest citation frequency within the subject area during the statistical period. Of these, Egbue, O. [7] was published in *Energy Policy* as an article with a citation frequency of 279. It provides an in-depth study of the preferences and perceptions of technology enthusiasts, while noting that the biggest defined concerns were range, followed by cost, with sustainability having a much lesser impact. Rezvani, Z. [8] published in *Transportation Research Part D* as a review with a citation frequency of 225. A group of excellent literature, represented by these two articles, lays the foundation for subsequent related research and constructs the knowledge framework of the field.

In terms of the cocitation analysis of the journals, the mainstream journals with the top 20 cocitations were mainly concentrated in the journals of transportation science and energy. There were relatively few publications in market diffusion and marketing strategy journals. Most of the highly cocited journals were from the UK, such as *Energy Policy*, *Transportation Research Part D*, *Transportation Research Part A*, the *Journal of Cleaner Production*, *Applied Energy*, *Transportation Research Part C*, and so on. Sustainability from Switzerland was also at the top of the list. Combined with the impact factor and H index of these journals, these top 20 co cited journals are basically mainstream journals that are well recognized by the academic community. The high-quality research in these journals provides ideas for research in the field, and the journals have outstanding impact.

In terms of research strength, the number of papers on the public's willingness to buy new energy vehicles was top 5 in China, the United States, the United Kingdom, Germany, and Canada. The top 5 in the number of literature citations were the United States, China, Britain, Italy, and Germany. That is to say, the number of publications and their citations have not maintained the same rank, and there is still room for progress in the academic influence from China. Italy, The Netherlands, Sweden and Denmark, whose research results have received widespread attention, especially show their academic influence. Regarding the literature coupling between countries, countries such as the United States, China, Germany, and India had a high degree of coupling, and there is a possibility of the homogenization of research results. However, their international academic discourse was still relatively high.

In terms of specific research objects, existing studies have covered a wide range of aspects, from individual public attributes to product attributes to incentive policies. In particular, the public's purchasing preference and behavioral decision of new energy vehicles are increasingly focused on environmental protection. The details can be found in Section 5 and will not be repeated here. It can be inferred that, in the context of the development of clean energy and low-carbon transportation, scholars and the industry are increasingly aware of the importance of this research area, and countries around the world are paying more attention to the environmental protection of travel. At the same time, scholars are focusing more on sustainable transportation, transportation policy, charging facilities, autonomous driving, and big data. This may become a new hot spot for future research.

6.2. Implications

New energy vehicles are an important driving force for energy conservation and emission reduction, and the market effect of their promotion is diversified. It can effectively reduce the exhaust emissions of traditional vehicles, promote the transition to clean energy, promote the formation of energy saving and emission reduction, promote a green travel atmosphere, and play a positive role in improving air pollution. At present, although the government and enterprises continue to accelerate technological innovation, improve vehicle performance and support, improve the policy stimulus, and improve the public willingness to buy a car, the public enthusiasm to buy a car is still limited. Promoting the popularization of new energy vehicles has a long way to go.

In the process of shifting the development of new energy vehicles from policy-driven to market-driven, national or regional differences exist objectively. The heterogeneity of different countries or regions in terms of economic construction, transportation, ecological environment, technology level, traffic pressure, and other social systems, as well as other usage scenarios and environments for the market promotion of new energy vehicles, deserve further exploration. Based on this paper, some suggestions have been put forward that focus on the government and enterprise levels with a view to providing a scientific basis for decision making.

6.2.1. Government

The policy factors as one of the important external factors largely influence the development direction of the new energy vehicle industry. The popularity of new energy vehicles, while focusing on public purchase, should also motivate their continued use. Firstly, the government should focus on the public's awareness of environmental protection and continue to implement the "combination" of subsidized and nonsubsidized incentives, focus on consistency and coherence in policy implementation, and adjust flexibly according to changes in the market to enhance targeting. Secondly, top-level design should guide and regulate the new energy vehicle market, as well as guide cooperation in energy technology innovation such as battery standardization. Thirdly, efforts should be made to do be effective in supporting infrastructure that is represented by high-voltage transmission grids and charging piles to establish a good market-oriented competitive environment.

6.2.2. Enterprise

In the process of gradually replacing traditional fuel cars with new energy vehicles, the problems of charging, range, and value retention that accompany the performance of new energy vehicles are important factors that the public will encounter and weigh in practice. Therefore, in the subsequent development, we should first work on the innovation and cooperation of energy technology, strengthen independent innovation, and continuously improve the comprehensive performance of new energy vehicles. Secondly, we should track the changes in public preferences, target the combination of market demand and cutting-edge technology, and understand the inner mechanism to effectively enhance public awareness and access. Thirdly, we should adjust the development strategy and optimize the product layout in a timely manner.

6.3. Limitation and Future Research

This study reviews the public's purchase intention of new energy vehicles using bibliometrics and provides constructive suggestions for major decision-making bodies. However, there are some limitations to this study.

- (1) To avoid duplication of the literature sample, only relevant literature from the Web of Science core database was used. This reduced the subjectivity of the sample, but the methodology used may have resulted in some important findings being overlooked. In the follow-up study, the databases could be expanded as much as possible to improve the understanding of the topic and related knowledge.
- (2) This study was based on a time snapshot analysis, and this visualization feature will also change along with the development of the new energy vehicle industry. Therefore, it is worth further tracking how it would change with industry development. A spatial and temporal comparison of different countries and regions can also be considered in conjunction with geographical differences.
- (3) The public's purchase decision is complex. Relevant studies have mainly analyzed one or two aspects, such as individual public attributes, product attributes, and incentive policies. In subsequent studies, a comprehensive scenario that integrates the three can be simulated. By exploring the possible interactions in a more realistic life scenario, the core factors related to the public's car buying behavior can be identified. Through this approach, we can analyze the trade-off characteristics in the

public's purchasing decisions and reveal the mechanism of different core factors from a holistic perspective.

It is hoped that this study would further reiterate the importance of this research in the current complex context. We hope that the scientific exchange on this topic would continue to be followed in an effort to contribute wisdom to energy conservation and sustainable transportation.

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