# Analysis of China's Intelligent Logistics Policies based on Text Mining

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## ABSTRACT

Based on text mining technology, this paper provides a comprehensive analysis of China's intelligent logistics policies. Through the descriptive statistical analysis of the annual release volume, types and subjects of policy texts, the dynamic trends, dominant forms and major sectors of policy releases are revealed. Using the TF-IDF algorithm to extract keywords and combining with the LDA thematic model analysis, it is found that the key areas of the policies include: improving the service capacity of enterprises, cold chain logistics construction, supply chain synergy, green standardisation, etc., and the main paths of implementation are: deepening the reform, increasing the investment, optimising the layout, etc. to improve the quality, improving the coordinating mechanism, promoting the synergy through the innovative model, building the green assessment system, promoting new energy transportation, unifying the standard process, etc. to promote the low-carbon transport. The main implementation paths are to deepen reform, increase investment and optimise layout to improve quality, improve coordination mechanisms and innovate models to promote synergy, build a green assessment system, promote new energy transport and unify standard processes to promote low-carbon transformation. The policy will mobilise the participation of enterprises, the state and industry organisations, of which enterprises are the main innovators and applicators, the state provides strategic support and regulatory guidance, and industry organisations promote the implementation of the policy. At the same time, it focuses on international integration, encourages "going out", guides the participation of foreign capital, deepens cooperation and cultivates international competitiveness. Finally, it puts forward suggestions on top-level policy design, sectoral coordination, tool innovation, enterprise main body, social participation, policy evaluation and continuous investment.

## KEYWORDS

Smart Logistics; Text Mining; LDA Topic Model.

## 1. INTRODUCTION

In the past few years, many domestic and foreign scholars have conducted in-depth research on smart logistics and its application in various scenarios, and proposed a variety of theoretical frameworks and practical strategies, which have jointly promoted the progress and development of this field. Domestic scholars focus more on exploring the development path of smart logistics, technological innovation and supply chain impact from the practical level; while foreign scholars focus more on the role of smart logistics in the construction of smart cities, the construction of theoretical frameworks, and the assessment of the impact on urban sustainability. In 2014, Katarzyna Nowicka [1] analysed the application of cloud computing in the construction of smart cities and explored the implementation path from three key dimensions: social, environmental and economic.Yassine Issaoui [2] conducted an in-depth research on the field of smart logistics, systematically sorted out and

integrated a variety of logistics methods, and put forward an comprehensive and coherent framework concept, which not only summarises the key technologies and applications of smart logistics, but also provides an exhaustive review of recently emerged smart logistics innovations.Zhang N[3] proposed an innovative distribution path optimisation scheme by integrating and applying the Internet of Things (IoT) and cloud platform technologies to the field of smart logistics and distribution. Hu Wanda [4] proposed the development path of "Internet+" efficient logistics in Chongqing based on the laws of the logistics industry and actual needs, including optimising the development environment, constructing an integrated logistics system, improving the urban and rural distribution network, and emphasising the synergistic growth of the regional economy and logistics.Cao Yuliang [5] analysed the key influencing factors for the construction of green city and smart logistics construction key influencing factors, and combined with the needs of urban environmental protection, selected indicators for assessing urban smart logistics construction, and through the use of fuzzy mathematical analysis methods, evaluated the green smart logistics in urban environmental protection.

As early as 1998, a foreign scholar David Heckerman [6] earlier applied Bayesian classifiers to the field of spam filtering, demonstrating the excellent performance of this simple and efficient probabilistic model in text classification tasks. It also promoted the subsequent wide application of Bayesian methods in spam detection, email classification, etc. David M. Blei [7] and other scholars proposed the LDA (Latent Dirichlet Distribution) topic modelling algorithm, which is simple, efficient and interpretable, and is widely used in the fields of text mining and natural language processing. After that, Qing Cao [8] explored the factors affecting the "helpfulness" voting of online user reviews by using text mining methods. The results of the study pointed out that the semantic features had a significant impact on the number of helpful votes received by the reviews. In addition, it was found that comments with extreme views were more likely to win supportive votes than those with mixed or neutral views. Thus, the literature provides insights into semantic features and viewpoint extremity for understanding online user review voting behaviour.Subhasis Dasgupta [9] analysed smartphone consumer reviews through text mining to evaluate the application in the marketing domain. 4710 reviews of 22 smartphones were captured through web crawlers and it was found that there were variations in audio and video quality across phones. Overall, the study provides an in-depth understanding of smartphone consumer reviews, but its limitations need to be noted. In 2022 foreign scholar Zondervan Niels A [10] analysed 5,098 abstracts of logistics articles through text mining to reveal trends and innovations in the logistics industry before and after COVID-19, and found that supply chain resilience emerged as a key trend, and digitisation accelerated during the outbreak, particularly in relation to blockchain, IoT and other areas. Therefore, this paper will use text mining techniques to analyse and study China's smart logistics policies.

## 2. DESCRIPTIVE STATISTICAL ANALYSIS OF POLICIES

### 2.1. Policy Data Collection and Screening

In order to ensure that the data collection process can obtain accurate, detailed and comprehensive intelligent logistics industry policy text, this study through in-depth analysis and comparison of the academic results of many experts and scholars in this field, and ultimately decided to use the "Beida Fabulous" as an authoritative database as the main tool to collect relevant policy documents, and the State Council, The State Council, the Ministry of Commerce and other official government websites are also used as supplementary sources.

At the stage of filtering search terms, it was considered that searching only with the keyword "intelligent logistics" would result in a small text content, and it is likely that relevant policies would be omitted. Therefore, in order to ensure the comprehensiveness and relevance of the policy texts used in the study, this paper chooses "logistics" and "smart logistics" as search terms. First of all, using NLM, we entered "logistics", "intelligent logistics", "transport", "express delivery", etc., which

are related to logistics and intelligent logistics, into the search box. Firstly, the search box was used to input the keywords "logistics", "smart logistics", "transport", "express" and other keywords closely related to the logistics and smart logistics industry, and in order to ensure the adaptability and foresight of the research results, the time span was positioned from 2014 to 2022. Eventually, a total of 415 logistics industry policy texts were downloaded within the search timeframe. Secondly, the downloaded policy texts are carefully screened, firstly, the invalid policy texts are eliminated, then the documents issued by the government with plans, outlines, notices, opinions, etc. that can directly reflect its authority are retained, and the letters, public notices, etc. are deleted. Finally, 46 central policy texts specialising in the smart logistics industry and 57 industrial policies highly relevant to the smart logistics industry were retained, totalling 103 policy samples for the study of this paper, and some of the policies are shown in Table 1.

**Table 1.** Economic Data Statistics

| number | Name of policy | Age of issuance |
|---|---|---|
| 1 | Implementation Opinions of the Ministry of Commerce on Promoting the Development of Trade and Logistics | 2014 |
| 2 | Guiding Opinions of the National Development and Reform Commission, the Ministry of Transport and the Ministry of Commerce on the Construction of a Credit System for the Logistics Industry in China | 2014 |
| …… | | …… |
| 3 | Circular of the General Office of the National Development and Reform Commission and the Office of the National Bureau of Statistics on Strengthening the Monitoring of Logistics Statistics | 2023 |
| 4 | Implementation Opinions of the State Post Bureau on Promoting Green and Low-carbon Development of the Postal Express Industry | 2023 |

## 2.2. Analysis of the Chronology of Policy Issuance

Policy issuance can be used to assess the frequency and scale of policy documents issued by a government or organisation [11]. The assessment is usually based on the number and characteristics of policy documents, which can help researchers, policy makers and managers to better understand the dynamics and trends of the policy development process, as well as the effectiveness of the policy implementation.This paper is about the characteristics of the time sequence of policy issuance of smart logistics as shown in Figure 1.
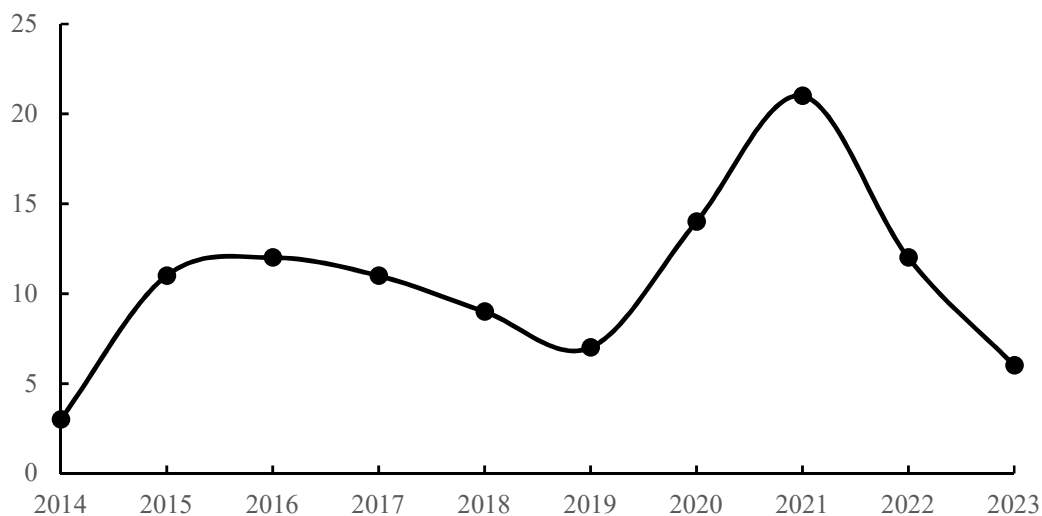


**Figure 1.** Timeline diagram of the issuance of smart logistics policies

From Figure 1, it can be seen that China's annual issuance of intelligent logistics industry policies from 2014 to 2023 shows a trend of growth followed by a decline.From 2014 to 2021, the overall number of policy issuances increased year by year, reaching a peak of 21 in 2021. And from 2022 onwards, there is a downward trend in the number of issuances.

The year 2021 is the peak of policy issuance, with 21 issuances, which may be related to the government's vigorous promotion of intelligent upgrading of the logistics industry in that year. And the 3 issuances in 2014 is the lowest point in the whole time period. In addition to the peak value in 2021, 2020 and 2016-2017 are also relatively concentrated years for policy issuance, with the volume of issuance ranging from 11 to 14, indicating that the government paid more attention to the smart logistics industry in these years. Although the number of issuances declined in 2022 and 2023, the six issuances in 2023 were still at a high level, indicating that the smart logistics industry is still one of the key areas of government attention.

In summary, by analysing the annual policy issuance volume, it can be seen that the smart logistics industry has received increasing attention from the government over the past decade, especially during 2016-2021, but the issuance volume has declined in the past two years, and the policy orientation may be adjusted in the future.

## 2.3. Analysis of Types of Policy Issuances

Policy issuance is an important and binding measure formulated by the national authority in accordance with the actual needs of social development, and is a key means of promoting the efficient, standardised and correct development of the country's political, economic and other fields. The formulation of policies requires the Government and relevant departments to take into account the problems and market demands they face, make scientific decisions, and formulate targeted, reasonable and feasible policy measures. At the same time, the issuance of policies must provide clear norms and operational guidelines for all aspects involved to ensure the smooth implementation of the policies, give full play to the effectiveness of the government's administrative management, and give impetus to the healthy development of the economy. This study classifies and counts 103 policy documents related to rural industrial revitalisation. These policy documents are categorised into six subdivided types: notices, opinions, letters, planning, replies and announcements [12]. The number and proportion of each type of policy documents are shown in Table 2 below.

**Table 2.** Statistical table of smart logistics policy types

| Policy Type | Number | Percentage |
| --- | --- | --- |
| Notification | 56 | 54.37% |
| Opinion | 40 | 38.83% |
| Letter | 4 | 3.88% |
| Planning | 1 | 0.97% |
| Reply | 1 | 0.97% |
| Notices | 1 | 0.97% |

According to the data in Table 2, the statistics on the types of smart logistics policies are analysed as follows: the statistics on the distribution of policy types involve a total of six types of smart logistics-related policies, mainly including notices, opinions, letters, plans, replies and announcements. Among them, notice and opinion are the two types that account for the largest proportion, with a combined proportion of 93.2%. The notification type of policy accounts for the highest proportion of policies The notification type of policy documents is the most numerous, with a total of 56 documents, accounting for 54.37 per cent, more than half of the total. As a form of policy that directly conveys the intentions of decision-making authorities, notification plays an important role in the field of intelligent logistics. The number of opinion-based policies is considerable The number of opinion-

based policy documents is 40, accounting for 38.83%, which is the second largest policy type after notification. Opinion type policies generally contain guiding opinions and recommendations on related matters.

Other types of policies are fewer in number Apart from circulars and opinions, other types of policy documents, such as letters, plans, replies and announcements, are fewer in number, accounting for less than 4 per cent of the total. Among them, there is only one each of planning, reply and announcement. Dominated by operational policies In terms of percentage, notifications and opinions, two types of operational and guidance policies, are absolutely dominant, reflecting the fact that policies in the field of smart logistics are more focused on the deployment arrangements for existing work.

Overall, notifications and opinions are the two most widely used types of policies in the field of smart logistics, reflecting that policies in this field are more focused on implementation, while there are relatively few basic and global planning policies, perhaps related to the fact that smart logistics, as a new thing, is still in the stage of rapid advancement of practice.

## 2.4. Analysis of Policy Issuers

The importance of the main body of the policy issuance cannot be ignored, as an authoritative body, the policy document issued has legal effect, guides the social behaviour, and reflects the state's attention to a certain field [13].

**Table 3.** Statistics of the main body of smart logistics policy (top 5)

| Issuing body | Number of communications | percentage |
|---|---|---|
| Ministry of Commerce | 98 | 43.56% |
| Ministry of Finance | 95 | 42.22% |
| Ministry of Transport | 12 | 5.33% |
| State Postal Bureau | 11 | 4.89% |
| National Development and Reform Commission | 9 | 4.00% |

Table 3 shows that the Ministry of Commerce (MOFCOM) and the Ministry of Finance (MOF) are the main issuing bodies of smart logistics policies. MOFCOM and MOFCOM ranked in the top two with 98 and 95 documents respectively, accounting for 85.78% of the total, and are the leading issuing departments of smart logistics policies. As the logistics and transport authority, the Ministry of Transport ranked third with 12 documents, accounting for 5.33%, and also played a role in the development of smart logistics policies. The State Post Bureau (SPB) and the National Development and Reform Commission (NDRC) ranked fourth and fifth with 11 and 9 issuances, respectively, accounting for less than 5%, and the influence of SPB and NDRC is limited in the formulation of smart logistics policies.

In general, the Ministry of Commerce and the Ministry of Finance take the lead, and the Ministry of Transport, the Postal Bureau and the Development and Reform Commission follow up and cooperate, which is the current sectoral pattern of smart logistics policy making. In the future, it may be necessary to further strengthen cross-sectoral coordination and linkage to form policy synergies and create a better institutional environment for the development of smart logistics.

## 3. INTELLIGENT LOGISTICS POLICY THEME ANALYSIS

### 3.1. Pre-processing of Policy Texts

After the original data set has been collated and sifted, what is obtained is often unstructured textual data. This kind of data cannot be directly applied to analysis without proper processing. Therefore, it is necessary to pre-process the text, and this process mainly includes word segmentation and removal

of deactivated words. In addition, custom dictionaries can be added in order to improve the accuracy of the lexicon, especially for specific terms or proper nouns. By integrating custom dictionaries into the segmentation tool, it can be ensured that these specific terms are correctly identified and processed. In this way, after the application of word splitting, deactivation word removal and custom dictionaries, the raw unstructured text data is converted into a structured form, laying a solid foundation for subsequent data analysis and mining.

### 3.1.1. Text Segmentation Process

Semantic disambiguation techniques have become a leader in the field of text processing due to their superior accuracy. After a long period of research in international academia and industry, a series of mature and efficient tools for word segmentation have been developed. After an in-depth performance comparison and practical application testing of these tools, this study selected the jieba lexical library, which is widely adopted by the Python platform, as the preferred tool for processing Chinese text.

The role of custom word lists in text processing is crucial, which significantly improves the accuracy and adaptability of word separation by enhancing the ability of word separation tools to recognise domain-specific terms and proper nouns. In this paper, in order to improve the quality and results of the intelligent logistics policy text in the processing process, it is added that there is a custom word list about the intelligent logistics policy text, and the custom keyword part is displayed as shown in Table 4.

**Table 4.** Smart Logistics Policy Custom Glossary (Partial)

| Intelligent Logistics Policy Customised Glossary |
|---|
| Internet of Things, Big Data, Cloud Computing, Modern Supply Chain, |
| Blockchain, Artificial Intelligence, Visualisation, Modern Logistics, Industry...... |

### 3.1.2. Stop-word

In the process of text analysis, in order to reduce the burden of irrelevant content on computer processing and to improve the accuracy of retrieval, this paper screens and removes punctuation marks, intonation, and other elements in the text that are irrelevant to the topic of smart logistics. For the screening of deactivated words, this study adopted the dictionary of deactivated words provided by the Harbin Institute of Technology (HIT) as the basis, and customised it according to the specific needs of disability policy research. "work", "guidelines", etc. were included in the list of deactivated words and eliminated. In addition, adverbs such as 'very', 'very', 'very', etc. were also excluded from the analyses, considering that they often lacked a substantial contribution in textual analyses. Through this strategy, this paper ensures the focus and depth of textual analysis, and provides a solid data foundation for in-depth excavation of smart logistics policy texts. As shown in Table 5, a list of some of the deactivated words is demonstrated to exemplify the careful consideration of deactivated word processing in this paper.

**Table 5.** Glossary of smart logistics policies (partial)

| Smart Logistics Policy Deactivation Word List |
|---|
| Comprehensive, format, land, livelihood, experts, meat, national conditions, |
| pricing, items, production areas, procedures, construction, pilot areas...... |

## 3.2. Statistical Analysis of Intelligent Logistics Policy High Frequency Words

In-depth analyses of the content of the policy text are more reflective of the depth and practical application value of the research than merely describing its external features. By extracting keywords, the core topics of the smart logistics policy text can be revealed and the focus of the policy can be clarified [14], which is of great significance for researchers to assess the connotation and impact of the policy text. Since policy texts do not list keywords directly like academic papers, this study adopts

the TF-IDF algorithm and extracts key terms from smart logistics policy texts through a self-developed Python programme. By meticulously analysing the word frequencies of these key terms, we were able to reveal the main areas of concern of the smart logistics policy.

The TF-IDF algorithm assesses the importance of vocabulary by measuring the Term Frequency (TF) of the vocabulary in a single document as well as the Inverse Document Frequency (IDF) in the whole corpus [15]. The advantage of this algorithm is that it is able to identify words that occur frequently in a particular document but are relatively rare in the whole corpus, thus effectively highlighting the key information in the text. With this approach, it is not only possible to identify keywords, but also to assess their relative importance in the text of smart logistics policies.

After the key steps of data preprocessing, including data cleaning, Chinese word splitting, deactivated word removal, and custom dictionary integration, this study used the TF-IDF algorithm to extract feature words from the smart logistics policy text, and the results are summarised in Table 6.

**Table 6.** High-frequency vocabulary of smart logistics policies

| Keywords word | Frequency | Keywords word | Frequency | Keywords word | Frequency |
|---|---|---|---|---|---|
| Enterprises | 1486 | Country | 610 | international | 397 |
| SERVICES | 1242 | Supply Chain | 553 | Synergy | 396 |
| Cold Chain Logistics | 1004 | Management | 546 | Green | 380 |
| System | 806 | Distribution | 521 | Institutions | 360 |
| Express | 797 | Technology | 500 | Industry | 356 |
| Standard | 795 | Capabilities | 496 | Networks | 341 |
| Transportation | 654 | Platform | 494 | Standardisation | 327 |
| Information | 654 | Level | 451 | Infrastructure | 320 |
| Facilities | 646 | Digitalisation | 410 | Reform | 316 |

Based on the high-frequency terms of smart logistics policies in Table 6, the focus areas and implementation paths of current policies can be analysed in depth [16]. First of all, the highest frequency words "enterprise", "service" and "cold chain logistics" reflect that the policy attaches great importance to meeting the differentiated logistics service needs of enterprises, especially the quality of service and capacity building in special logistics areas such as cold chain logistics. This reflects that the policy attaches great importance to meeting the differentiated logistics service needs of enterprises, especially the quality of service and capacity building in special logistics areas such as cold chain logistics. Specific measures are expected to include: deepening the "last mile" reform, providing customised services to enterprises, increasing investment in cold chain logistics facilities, optimising the layout of cold chain transport routes and nodes, and improving the timeliness and reliability of cold chain distribution.

Secondly, high-frequency words such as "supply chain", "synergy" and "management" show that the policy will promote supply chain synergy between upstream and downstream enterprises and build an efficient integrated supply chain management system. The main ways are to improve the supply chain coordination mechanism, break down information barriers, achieve information sharing and business collaboration; optimise the supply chain layout of key industries, improve supply chain agility and robustness, and promote supply chain finance and other innovative modes to help small and medium-sized enterprises (SMEs) in financing.

In addition, the frequency of words such as "green", "standard" and "standardisation" is also high, indicating that the policy will adhere to the concept of green, low-carbon and sustainable development, and accelerate the logistics standardisation process. On the one hand, the development of green logistics evaluation indicators, the establishment of market constraints and incentives, and advocate

new energy logistics transport, on the other hand, the unification of logistics workflow, information standards, and improve the level of system interconnection and interoperability.

Finally, in the high-frequency words of the intelligent logistics policy, "enterprise", "state" and "institution" as the multiple objectives and main body of action of policy making. As a direct beneficiary of the policy, the high frequency of "enterprise" in the policy text emphasises the policy's concern for stimulating enterprise innovation, enhancing competitiveness and promoting technology application. "The reference to "countries" reflects the strategic significance of smart logistics policy at the macro level, pointing to the key role of the state in planning, investment and regulation, as well as its far-reaching impact on economic development and international co-operation. Institutions" represents the intermediate level of policy implementation and industry self-regulation, and its appearance in the policy text reflects the importance attached to the functions of industry organisations and regulators in standard-setting, market supervision and technology dissemination. Together, these three keywords outline the implementation framework of the smart logistics policy, in which enterprises are the front line of innovation and application, the state provides strategic guidance and support, and institutions coordinate and implement policies in the middle to jointly promote the development of smart logistics and the progress of the industry.

In general, the current smart logistics policy focuses on three main aspects: first, to enhance the logistics service capacity of enterprises, especially in special logistics areas such as cold chain logistics; second, to promote synergy between upstream and downstream enterprises in the supply chain, and to build an efficient and integrated supply chain management system; and third, to adhere to the concept of green and low-carbon, and to accelerate the logistics standardisation process. In the implementation path, the policy will improve service quality by deepening reform, increasing investment, optimising layout and other measures; promote supply chain synergy by improving coordination mechanism, optimising industrial layout and promoting innovative models; and develop green evaluation system, guide new energy transportation and unify standard process to promote green and low-carbon transformation. It is worth noting that the development and implementation of the policy will mobilise the participation of enterprises, the state and industry bodies and other multi-principal, enterprises are the main body of innovation and application, the state to play a strategic role in leading the industry responsible for the development of standards and supervision, all parties will help to achieve the policy objectives of cooperation, and to comprehensively improve the efficiency of logistics operations, optimise the quality of service to promote the development of intelligent logistics.

### 3.3. Smart Logistics Policy Themes Identified

The LDA (Latent Dirichlet Allocation) model is a popular text analysis technique based on the principles of the bag-of-words model, which treats a text as a collection of words, regardless of the order between those words. The model assumes that each text contains multiple topics and that each word in the text is generated from an underlying topic. One of the shortcomings of this approach is that it fails to adequately consider the weights of the feature words in the text of the smart logistics policy. In the process of topic modelling, some high-frequency but generic words may dominate the model, while domain-specific words that are crucial for topic differentiation have relatively little influence in the model due to their low frequency of occurrence. This leads to an overabundance of generic terms and a paucity of specialised specific terms in the model, which reduces topic differentiation and the interpretability of the model.

Therefore, although LDA is an effective tool in many text analysis scenarios, it may produce some inaccurate results when dealing with smart logistics policy texts that need to consider word order and contextual information. In order to improve the accuracy and explanatory power of the models, it may be necessary to explore more advanced models or methods that can simultaneously consider

word frequency, word order and contextual information in order to more accurately capture the deeper semantic and structural features of the text.

Considering that LDA models may ignore differences in the importance of vocabulary when dealing with smart logistics policy texts, this study turns to the TF-IDF algorithm to extract the key feature words of the text in order to more accurately construct an LDA topic model.The TF-IDF algorithm evaluates the importance of the vocabulary in the set of documents by taking into account both the word frequency (TF) and the inverse document frequency (IDF), an approach that is particularly useful for enhance the weight of domain-specific vocabulary.

In implementing the TF-IDF algorithm, the TF-IDF algorithm implemented in this study through the sklearn library is able to more accurately extract key vocabulary reflecting the subject content from the smart logistics policy text, providing a richer and more differentiated vocabulary base for the construction of the LDA topic model, thus enhancing the explanatory power and practicality of the model.

### 3.3.1. Determination of Optimal Parameters

In applying the LDA topic model for thematic cluster analysis of policy texts, the first focus is on the key metric of perplexity (Perplexity) to guide parameter selection and model optimisation. Perplexity is a measure of the performance of a language model, reflecting the predictive accuracy of the model on new data. Specifically, the lower the perplexity, the better the model fits the data and the more stable the prediction of new text. In LDA models, the formula for perplexity is usually shown under equation (1):

$$PP(W) = P\left(w_1, w_2, \ldots, w_N\right)^{-\frac{1}{N}} \tag{1}$$

Perplexity is a metric for evaluating the performance of language models in natural language processing, especially in the field of topic modelling, where perplexity is used to determine the optimal number of topics for a smart logistics policy by plotting the perplexity-number of topics curve as shown in Figure 2.
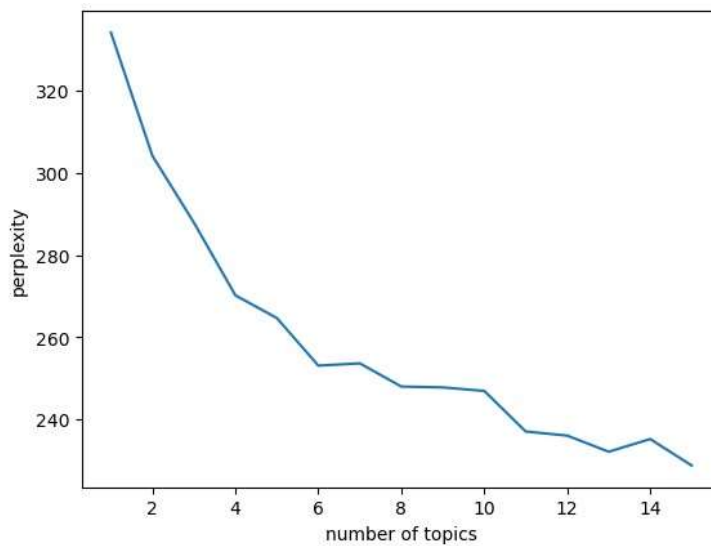


**Figure 2.** Confusion - number of topics graph

The "inflection point" criterion is a common heuristic used in clustering and topic modelling to determine the optimal number of clusters or topics, balancing the trade-off between model complexity (number of topics) and model fit (perplexity). As can be seen from Figure 2, the choice of 8 topics

appears to strike a good balance between these two factors, capturing most of the relevant structure in the data while avoiding overfitting or introducing too much complexity, and thus this paper determines the optimal number of topics topic_num = 8.

## 3.4. Analysis of Intelligent Logistics Policy Themes

After obtaining the optimal number of themes, this study carried out LDA theme model analysis using the sklarn library in the Python environment, which in turn effectively extracted and presented the core themes of the text data, and the detailed distribution of themes is shown in Table 7.

**Table 7.** Intelligent Logistics Policy Theme

| Topic | subject line | percentage |
|---|---|---|
| 0 | rural, agricultural, projects, authorities, funding, cold chain, nodes, agriculture, central, situation | 18.2% |
| 1 | Economy, Convergence, Digitalisation, Manufacturing, Emergency, Quality, Cultivation, Intelligence, Industry Chain, Global | 14.8% |
| 2 | Logistics companies, commerce, logistics services, recycling, shared, crates, units, duties, vehicles, logistics distribution | 14.4% |
| 3 | Credit , Cargo , Aviation , Pilot , Airports , Integrity , System , Quality , Regulation , Service , Quality | 12.1% |
| 4 | Hub , Railway , Modern , Logistics , Logistics Industry , Multimodal Transport , Project , Highway , Society , Port , Project | 12.1% |
| 5 | Traffic, Pilot, Port, Smart, Time, Results, Road, Vehicle, Content, Operations | 11.3% |
| 6 | Cold Chain Logistics, Cold Chain, Digital, Agricultural Products, Regulatory, Origin, Cold Storage, Food, Processing, Cold Storage | 9.4% |
| 7 | express, postal, e-commerce, express enterprise, e-commerce, express mail, circulation, outlets, express business, mail | 7.6% |

The smart logistics policy theme reflects the government's systematic thinking and all-round layout in promoting the transformation and upgrading of the logistics industry and building a modern and efficient logistics system, covering 8 major themes.

Rural and agricultural logistics is one of the key areas of concern (theme 0, accounting for 18.2%). The policy proposes to increase the construction of rural logistics system, improve the "agricultural products into the village into the park, industrial products into the village to the home" two-way circulation network. Focus on supporting the construction of rural cold chain logistics facilities, improve the freshness of agricultural products storage and long-distance transport capacity. At the same time, the development of rural e-commerce, for agricultural products to open up new sales channels. Optimise the layout of rural logistics outlets and improve the accessibility and timeliness of services. Comprehensive digital transformation is a must for the development of the logistics industry (Theme 1, 14.8%). Policy deployment to vigorously promote logistics digital, intelligent, from the top design of the Internet of Things technology application scenarios for logistics information technology, automation, unmanned to provide scientific and technological support. Build a big data centre for intelligent logistics, converge logistics data from various links, achieve a high degree of integration of information flow and physical flow, and improve the level of transport organisation and resource allocation. Cultivate a number of logistics technology innovation enterprises, development and application of intelligent transport route planning, intelligent warehousing management and other new modes of logistics. The policy focuses on the modernisation and upgrading of the industrial chain (Theme 2, accounting for 14.4%), proposing the development of new modes of the modern logistics industry, such as vehicle-less carriers, supply chain finance, common distribution, etc., and providing policy and financial support. Encourage logistics and express delivery enterprises to promote the application of new materials and new technologies, and

promote the reform of green packaging and recyclable means of transport. Cultivate and grow a number of modern logistics enterprises, guide leading enterprises to build a national and global network layout, drive the transformation and upgrading of small and medium-sized enterprises, forming a reasonable division of labour between small and medium-sized enterprises, complement each other's advantages of the modern logistics industry ecosystem. Policies focus on logistics finance, aviation logistics, quality management and supervision (theme 3, accounting for 12.1%). Clearly define the rules for the flow of logistics factors, establish unified industry access standards, and regulate the order of circulation. Strengthen the management of logistics vehicles, sites, warehouses and personnel, and enhance the awareness of law-abiding units and personnel. Implement and improve the quality traceability system to monitor the quality and safety of goods. Establishment of arbitration and mediation mechanism to resolve logistics disputes. Infrastructure construction is an important guarantee for the efficient operation of logistics (theme 4, accounting for 12.1%). Policy deployment to speed up intelligent, green logistics infrastructure to make up for the shortcomings, to open up the logistics transport "last kilometre". Optimise the layout of regional logistics hubs and backbone corridors, and build a three-dimensional, intelligent transport and logistics network. Increase support for multimodal transport projects, promote the organic connection of ports, airports, railways and highways, and improve the quality of integrated services such as customs clearance and inspection, flow supervision and so on. The policy focuses on intelligence, timeliness and operation management (Theme 5, accounting for 11.3%), and calls for opening up the "last kilometre" of logistics and transport, and improving the quality of services such as customs clearance, inspection and flow supervision. Cold chain logistics is also a key area (theme 6, 9.4 per cent). The policy emphasises the digitalisation and supervision of cold chain logistics, storage and processing to ensure the quality and safety of agricultural products. Express logistics services are also a focus of policy (theme 7, 7.6 per cent). The policy supports the development of cross-border e-commerce, international freight transport and other emerging logistics industry. At the same time, the policy also focuses on connecting with the world to promote the internationalisation of logistics. Encourage enterprises to "go out", the development of cross-border e-commerce, international freight and other new business. Guiding foreign capital to participate in the construction of domestic logistics infrastructure, and absorbing advanced global logistics concepts and management experience. Deepen international co-operation in the field of logistics and participate in the formulation of global logistics standards and rules. Cultivate modern logistics service providers with international competitiveness and expand logistics exports.

In short, this systematic logistics policy reflects the government's determination to attach great importance to and deeply participate in the healthy development of the logistics industry. It is based on national conditions, focuses on the overall situation, and systematically deploys a series of upgrading measures, which points out the direction and provides important grasps for promoting the transformation and upgrading of the logistics industry and realising high-quality development, and will surely contribute to the construction of a modern logistics power.

## 4. SUMMARY

This study comprehensively analyses China's intelligent logistics policies through text mining technology, revealing the core themes, focuses and implementation paths of the policies, which is of great significance for grasping the policy orientation and judging the development trend of the industry. The main findings and conclusions include: policy releases show an increasing and then decreasing trend, and may have been adjusted in recent years; operational policies such as notices and opinions dominate, reflecting more implementation and guiding work; the Ministry of Commerce and the Ministry of Finance dominate the policy formulation, while other departments are also involved; the policy focus is multi-dimensional, including the enhancement of enterprise services, cold chain construction, supply chain synergy, green standardisation, The main implementation path is to improve quality by deepening reform, increasing investment and optimising layout, to promote

synergy by improving coordination and innovating models, and to promote low-carbon transformation by developing green evaluation, promoting new energy transportation and unifying standards; Enterprises are the main body of innovation and application, the state provides strategic support and regulatory guidance, and industry organisations promote the implementation of policies. It also attaches importance to international integration, encourages "going out", guides the participation of foreign capital, deepens cooperation and cultivates international competitiveness.

In order to further play a leading role in policy, promote the transformation and upgrading of the logistics industry, and promote high-quality development, it is suggested that: first, improve the top-level design, co-ordinate the systemic nature of the policy, strengthen the top-level design at the macroscopic level, rationally plan the development priorities, and improve the foresight and systemic nature. The second is to strengthen departmental synergy, the formation of policy synergy, various departments to strengthen information sharing, cooperation and synergy, cohesion, to avoid duplication of contradictions, and play a synergistic effect. Third, innovative policy tools, focusing on precision, in addition to the traditional means, the use of big data, artificial intelligence and other new technologies and new means to develop accurate and effective policy combinations to improve targeting and effectiveness. Fourth, guide the main role of enterprises, play the market-led function, focusing on the main role of enterprises, stimulate innovation and vitality, while playing the leading role of the market in resource allocation, the formation of a benign interaction between policy and market mechanisms. Fifth, strengthen social participation, enhance policy transparency, expand public participation channels, strengthen interpretation and guidance, enhance public understanding and acceptance of policies, and improve the transparency and democracy of decision-making. Sixth, focus on policy evaluation, promote dynamic optimisation, establish and improve the evaluation and feedback mechanism, according to the implementation of the situation and new changes in a timely manner to assess and optimise the policy, to ensure that the policy is compatible with the actual situation. Seventh, to increase investment in intelligent logistics, enhance core competitiveness, increase policy support, guidance to increase funding, talent, technology and other factors to enhance the level of intelligent management, enhance the overall strength of the industry and international competitiveness. Through the policy top-level design, departmental coordination, tool innovation, enterprise main body, social participation, policy evaluation, continuous investment and other aspects of joint efforts, will certainly inject greater momentum for the high-quality development of intelligent logistics, to build a modern logistics power to contribute to the important force.

# REFERENCES

[1] NOWICKA K. Smart city logistics on cloud computing model[J]. Procedia - Social and Behavioral Sciences, 2014, 151: 266-281.

[2] ISSAOUI Y, KHIAT A, BAHNASSE A, et al. Toward smart logistics: engineering insights and emerging trends[J]. Archives of Computational Methods in Engineering, 2021, 28(4): 3183-3210.

[3] ZHANG N. Smart logistics path for cyber-physical systems with internet of things[J]. IEEE Access, 2018, 6: 70808-70819.

[4] Wanda HU, Yue HE, Jiming HU. Paths and Strategies for Developing Efficient Logistics in the Era of "Internet Plus" - Taking Chongqing Logistics Industry as an Example[J]. Journal of Southwest University (Natural Science Edition), 2021, 43(07): 139-145.

[5] CAO Y, ZHANG X. The impact of urban green and intelligent logistics on urban environmental protection[J]. IOP Conference Series: Earth and Environmental Science, 2021, 781(3): 032065.

[6] SAHAMI M, DUMAIS SusanT, HECKERMAN D, et al. A bayesian approach to filtering junk e-mail[J]. National Conference on Artificial Intelligence,National Conference on Artificial Intelligence, 1998.

[7] BLEI D M, NG A Y, JORDAN M I. Latent dirichlet allocation[J]. Journal of Machine Learning Research, 2003, 3(Jan):993-1022.

[8] CAO Q, DUAN W, GAN Q. Exploring determinants of voting for the "helpfulness" of online user reviews: a text mining approach[J]. Decision Support Systems, 2011, 50(2): 511-521.

[9]   DASGUPTA S, SENGUPTA K. Consumer reviews for market structure analysis: a text mining approach[J]. LBS Journal of Management &amp; Research, 2015, 13(1): 44.

[10]  ZONDERVAN N A, TOLENTINO-ZONDERVAN F, MOEKE D. Logistics trends and innovations in response to COVID-19 pandemic: an analysis using text mining[J]. Processes, 2022, 10(12): 2667.

[11]  Zhaoyuan HU, Xiaoyi JIN. A study of regional variability in China's pension policy provision[J]. China Population-Resources and Environment,2020,30(07):151-161.

[12]  Huayi Xiao, Xi Hu. Evolutionary stages, characteristics and trends of vocational education industry-teaching integration policies - an analysis based on policy texts[J]. Journal of Shenzhen Institute of Vocational Technology, 2022,21(04):3-14.

[13]  Yuting Ding. A textual measurement study of rural e-commerce policy in China [D]. Zhejiang Gongshang University,2021.

[14]  Jiahui Zhang. Research on the Chinese government's online public opinion governance policy:posture and direction[J]. Journal of Intelligence,2015,34(05):123-127+133.

[15]  Jin Zhang. Intelligence keyword extraction method based on improved TF-IDF algorithm[J]. Journal of Intelligence, 2014,33(04):153-155.

[16]  Xiaoping JIANG, Ning GUO. The Policy Objectives and Evolutionary Laws of Equalisation of Basic Public Services in China - A Textual Analysis Based on the Central Policies since the 18th Party Congress[J]. Public Management and Policy Review,2020,9(06):33-42.