Knowledge Organization

Knowl. Organ. **2026**; 53(6): 54305
https://doi.org/10.31083/KO54305

Article

A Methodological Framework for Building a Multidomain Coupled Knowledge Base of Government Documents to Support Evidence-Based Decision-Making

Xinping Huang[1,2], Zheng Lv[1], Hengjing Zhang[1], Li Lin[3,*]

[1]School of Business and Management, Jilin University, 130012 Changchun, Jilin, China
[2]National Intelligent Social Governance Research Institute of Jilin University, Jilin University, 130012 Changchun, Jilin, China
[3]College of Software, Jilin University, 130012 Changchun, Jilin, China
*Correspondence: linli5522@mails.jlu.edu.cn (Li Lin)
Academic Editor: Natália Tognoli
Submitted: 27 May 2026 Revised: 10 August 2026 Accepted: 31 August 2026 Published: 20 November 2026



Xinping Huang is an associate professor and doctoral supervisor at the School of Business and Management, Jilin University, Changchun, China. His research focuses on government information management, knowledge management, and intelligent evidence-based decision-making. He has led several national-level scientific research projects of China and published more than 20 papers in SSCI, SCI, and CSSCI journals. He serves as a reviewer for some SSCI journals.



Zheng Lv is a master's student at the School of Business and Management, Jilin University, Changchun, China. Her research interests include electronic records management and government decision-making. She has participated in multiple research projects and is engaged in academic research in the field of knowledge organization.



Hengjing Zhang is a master's student at the School of Business and Management, Jilin University, Changchun, China, with research interests in evidence-based decision-making, knowledge management, and information services. She has participated in several research projects and academic competitions, and focuses on academic research in information resource management.



Li Lin is an undergraduate student majoring in Software Engineering at the School of Software, Jilin University, Changchun, China. His primary research interests include computer vision, computer graphics, and reinforcement learning.

Abstract

Government decision-making is becoming increasingly complex. Government documents, as important carriers of policy formulation and implementation, contain multidomain information and knowledge that can support decision-making. However, existing approaches to government document management are mostly limited to document-level storage and keyword-based retrieval. The lack of systematic cross-domain knowledge organization hinders the support of knowledge integration and utilization in complex situations. To address this gap, we herein explore the construction of a multidomain coupled thematic knowledge base of government documents for evidence-based decision-making. Based on a review of existing research and an analysis of requirements, we propose a conceptual framework and

Copyright: © 2026 The Author(s). Published by IMR Press.
This is an open access article under the CC BY 4.0 license.

Publisher's Note: IMR Press stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

construction methodology for a multidomain coupled thematic knowledge base that transforms government documents into structured, semantically rich, and dynamically traceable knowledge assets. The framework consists of three core layers, namely a knowledge resource layer primarily responsible for the standardized processing of heterogeneous policy texts, a knowledge organization layer that breaks down documents into fine-grained units of knowledge and constructs a semantic network of associations across documents and domains, and a knowledge evolution layer that uses version control and a timeline to track policy creation, adjustment, and repeal. To put this framework into practice, we focus on the dynamic evolution of policies, capturing generation, adjustment, and abolishment processes to achieve scalability and the ability to update the knowledge organization structure and thereby provide knowledge services for evidence-based government decision-making. Finally, an empirical study on business environment policies is conducted to verify the effectiveness of the proposed multidomain coupling–oriented government document thematic knowledge base in organizing multidomain knowledge and expressing associative relationships. The results show that this knowledge base can enhance the ability to integrate and utilize government document knowledge in complex contexts, thus supporting evidence-based decision-making for governments.

Keywords: government documents; evidence-based decision-making; multidomain coupling; thematic knowledge base; knowledge organization

1. Introduction

In the era of big data, with the rapid development of information technology and the deepening of digital transformation, the decision-making environments of governments have become more complex and multiple (Choi et al., 2016), facing an increasing number of cross-area and multifactor issues. In the data-driven context of government digital transformation (Yang et al., 2024), the establishment of strategies for integrating data and knowledge from multiple (e.g., economic, social, and environmental) dimensions to provide accurate and efficient knowledge services for governments has become important for improving the scientific nature of government decision-making and promoting the modernization of governmental governance.

Despite the growing demand for a shift to precise, dynamic, and integrated governmental governance (Dawes, 2010), governmental scientific decision-making is still characterized by the intertwined and complex problems of the heterogeneous sources of evidence (Head, 2016), fragmented distribution of knowledge, and limited rationality of decision-makers (Parkhurst, 2016), which brings about the dilemmas of decision-making quality and efficiency. To solve this problem, one should fully explore and utilize the value of government documents as a government information resource, leverage their role in credentials in the processing of affairs, and ensure that government documents supporting governmental scientific decision-making show unique advantages and practical value (Cairney, 2022). To cope with the abovementioned (and other) complex issues, one should not only acquire multidomain data but also secure in-depth coupling between the knowledge in these domains to correlate the policy elements in different domains and at different latitudes and enhance the experience and capacity of the government for evidence-based policy-making. In general, government documents are mostly present as single documents. When used to deal with complex systemic issues, these documents cannot integrate multiple knowledge sources (e.g., that at the intersection of different sectors and policies), which precludes a more complex understanding of government documents and indicates the need to construct a subject knowledge base for government documents (Huang et al., 2022). The application and formalization of evidence-based decision-making requires the traceability and cross-sectional applicability of the relevant evidence used for policy development. Therefore, multidomain coupled subject matter knowledge bases are used not only as technical building blocks in government practice but also as foundational knowledge facilities to provide and validate structured evidence for the transformation of government documents (Wang et al., 2026). That is, the collaborative integration of knowledge elements in different fields (Batty, 2018), construction of stable structures, and enhancement of the dynamic updating and adjustment ability (Zhang et al., 2025b) facilitate knowledge-driven decision-making and improve the scientific nature and accuracy of government decisions.

In light of the above, the present study addresses government decision-making, exploring the construction of subject knowledge bases for government documents. By integrating domain knowledge mapping, semantic association mining, and other technologies, we enable cross-domain knowledge extraction, association, and reasoning, generate scientific evidence to support scenarios such as decision analysis, effect simulation, and early risk warning, thereby supporting evidence-based government decision-making and the construction of subject knowledge bases.

2. Literature Review

2.1 Government Decision-Making

Existing works targeting government decision-making generally emphasize the central role of evidence in the decision-making process and suggest that the scientific nature and feasibility of decision-making should be enhanced through data analysis and empirical assessment (Wu, 2024). Relevant studies have conducted deep discussions in the fields of public health (Choi and Fox, 2022), science and technology policy-making, and complex policy-making, emphasizing the need to combine scientific

evidence with practical needs and thus provide external evidence-based advice for complex policy processes and decision-making, meet the high demand for specialized knowledge in decision-making, achieve evidence-based policy-making, and facilitate a rapid and skillful response in the face of sudden emergencies (Hukkinen et al., 2022). However, the evidence used in existing research is mainly written or oral (Schneider et al., 2026), thus lacking a dynamic nature and hindering the selection of truly effective dynamic data from massive data (Imler, 2018). Therefore, insufficient attention has been paid to the systematic integration and knowledge transformation among evidence, which hinders the establishment of stable and reusable knowledge support systems.

2.2 Evidence-Based Decision-Making

Information provides sufficient material for decision-making and enhances decision quality and efficiency, thus being the starting point of decision-making. The growing demand for scientific decision-making and policy effectiveness has triggered the emergence of the concept of evidence-based decision-making. Compared with traditional decision-making, evidence-based decision-making emphasizes the quality of information in the decision-making process, focusing on transforming data into actionable evidence. The quality of public decision-making strongly depends on that of analysis and advice provided through public organizations, and evidence-informed policy-making can markedly improve the attainment of cost-effective outcomes (Head, 2016). The consideration of evidence enhances the scientific rigor of the decision-making process (Zhang et al., 2021). In 2016 and 2018, the United States passed the Evidence-Based Policy Commission Act and the Evidence-Based Policy Framework Act, respectively, improving policy effectiveness by strengthening policy infrastructure and requiring federal agencies to develop and use evidence to support decision-making (Burkhauser and Burkhauser, 2024). In Australia, evidence-based decision-making is being promoted across various areas of social policy, with evidence-based policy solutions emphasized in the healthcare system and family and community services (Shang and Liu, 2023). The practices of these countries effectively integrate evidence into the policy-making process, thereby enhancing the precision and reliability of public policies.

2.3 Government Documents

Under the Federal Records Act of 1950, the term "government documents" refers to all recorded information that has been produced or received by a federal agency in accordance with federal law or in connection with the conduct of public affairs and is maintained or suitable for retention by the agency or its lawful successor as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the U.S. Government or because of the informational value of the data contained therein (United States, 1950). Specifically, government documents are normative and authoritative instruments and materials generated by state agencies, administrative agencies, and their subordinate departments in the course of performing their official duties, with the legal validity and regulatory format requirements, and are an important carrier of government operation and policy implementation. It is usually presented in the form of decisions, notices, announcements, reports, plans, etc., covering various aspects such as policy deployment, administrative measures, and statistical data. Herein, the term "government documents" mainly refers to official documents and policies published on government websites and usually presented in the form of electronic documents on government websites.

From a functional perspective, government documents are not only a tool for internal management but also a channel for formal communication between the government and society. This channel relies on the downward transmission of government documents to transmit policy requirements to departments at all levels, thus guaranteeing the successful operation of the administrative system. Government documents also meet public needs in terms of information access and utilization (Shi et al., 2024). With e-government development, government documents have evolved from traditional paper formats to digital formats, although their fundamental attributes as the basis for policy and administrative evidence remain unchanged (Li and Guo, 2021). From the knowledge management perspective, government documents contain a considerable amount of policy information and management experience. On one hand, such documents can serve as a data source for building databases and knowledge bases, providing a reference for research on government behavior and policy evolution. On the other hand, government documents have characteristics such as authority, normativity, timeliness, and specialized subject matter, which place higher demands on their knowledge-based processing (Wang, 2022). Therefore, when building a knowledge base, one should not only ensure the accuracy, authenticity, and traceability of government documents but also focus on the continuous updating and evolution of policy information and keep track of policy changes in a timely manner. At the same time, since government documents span multiple fields, efforts to organize knowledge must also focus on strengthening cross-domain integration capabilities and improving the quality of knowledge services tailored to specific application scenarios.

2.4 Subject Knowledge Bases

As an important application of knowledge engineering, subject knowledge bases have become a research hotspot, serving to realize knowledge storage, management, and reuse (Shi et al., 2024), and have been widely used in many fields, such as management, education, and healthcare (Yang et al., 2020b). Subject knowledge bases and re-

lated applications have been well researched, mainly with a focus on aspects such as construction methods, inference mechanisms, and practical applications (Francelin and Meschini, 2025; Moura, 2024). In terms of construction methodology, relevant research mainly uses semantic techniques such as the semantic description of metadata, knowledge mapping (Mu et al., 2024), and Resource Description Framework (RDF) schema data integration to complete the construction of subject knowledge bases. RDF is a framework for representing information in the Web using triples consisting of subject–predicate–object expressions (W3C, 2014). In terms of the reasoning level, the knowledge inference function is realized through mechanisms such as inference based on the formalization of knowledge rules or ontology-driven conceptual (Hashemi et al., 2018) and case-based reasoning. Regarding practical applications, corresponding knowledge base systems with different topics have been constructed as samples, and users have been provided with knowledge services facing thematic areas through knowledge search, intelligent questions and answers, and visualization search. For example, the formation of an archival knowledge base based on critical incident resources can help decision-makers retrieve the case descriptions and responses of similar incidents in the knowledge base and access relevant decision-making advice. This helps enhance the effectiveness of the archive department in carrying out decision-making services while promoting a fuller utilization of the role of archival resources in the disposal of emergencies and governmental decision-making (Geng and Chen, 2021). However, existing research related to subject matter knowledge bases focuses on single domains or static document collection and cannot cope with the multidomain coupling problems faced in government decision-making practice. For example, the practical policy issue of improving the business environment should be tackled with a view to collecting and applying knowledge on various aspects such as administration, law, industry, and taxation.

In summary, government decision-making is essentially a multistage dynamic evolutionary process characterized by notable differences in the demand for knowledge at different stages. Therefore, in the knowledge management of government decision-making, one should not only combine the various resources needed to support decisions but also move up to the information level, integrating and organizing relevant information from different fields. Knowledge organization is not only about categorizing information but rather about studying how to construct, organize, and express knowledge, which helps sort out the conceptual structure and semantic relationships between knowledge. This approach creates a multidomain coupled thematic knowledge service that can support decision-making and meet the governmental need for information integration (Hjørland, 2007). In the process of developing and utilizing the information resources of government documents, the storage and processing of information resources and value-added development and personalized services are attracting increasing attention (Gu and Xia, 2017). In addition, emergency management also needs to be based on multifactor and multibody coupling for information resource and data sharing, forming a coupled and linked emergency management function network and ultimately realizing the collective action process of complementary resources, mutual embedded capacity, value cocreation, and benefit sharing (Zhai and Hu, 2023). Public management and policy decision-making also have a need for different domains and types of information across a number of dimensions, including information content, information purpose, and evidence-based information. One also needs to consider the relevance of information and reduce the impact of decision noise and cognitive bias, which means reinforcing the use of scientific evidence in public policymaking while ensuring information criticality and diversity.

2.5 Related Work

2.5.1 Government Decision Support Systems

This section systematically reviews existing relevant research, focusing on government decision support systems, knowledge base construction methods, cross-domain knowledge organization, and policy evolution analysis, thereby clarifying the position of this study in the current research landscape.

Government decision support systems have been widely studied in the fields of e-government and public management. Chen et al. (2025) proposed an integrated artificial intelligence decision support system for e-government services. This study suggests that semantic knowledge graphs can anchor policy recommendations in regulatory contexts while maintaining responsiveness to public trust signals. However, the system mainly relies on structured data in government databases and cannot process unstructured policy documents. Research has begun to introduce artificial intelligence into government decision support systems. Guo and Guo (2009) designed a government decision support system for the safety of the Chinese automotive industry from the perspective of economic development. Hu et al. (2016) examined a Canadian health decision support system, systematically investigating the key factors determining the success or failure of government decisions.

Despite the above progress, research on government decision support systems features several limitations. Most systems treat policy documents as static information sources without organizing policy knowledge at a fine-grained level, and cannot capture cross-domain semantic associations. More importantly, few systems provide the dynamic evolution of policy knowledge over time. Therefore, research on government decision support systems has vertical and horizontal limitations, which weaken the ability to support evidence-based decision-making in specific practical contexts when dealing with multidomain policy knowledge and its real-time updates.

To address the above limitations, we herein focus on a frequently overlooked fundamental layer, namely the knowledge organization layer, and provide a method for transforming a collection of government documents into structured, semantically interconnected, and dynamically deducing knowledge resources to support the true implementation of evidence-based decision-making.

2.5.2 Knowledge Base Construction Methods

Knowledge base construction is an important issue in knowledge engineering. Early methods mainly relied on manual knowledge acquisition by domain experts, which had high time costs and was difficult to invest in large-scale construction. With the emergence of semiautomated methods, the combination of rule-based extraction and natural language processing (Guo and Fan, 2009; Zhou et al., 2021) has improved the quality and efficiency of knowledge base construction.

The study of ontology occupies an important position in research on knowledge base construction. Yao et al. (2014) proposed a method for constructing an ontology knowledge base for information security, which included steps such as data resource analysis, ontology pattern design, and knowledge import. Zhang et al. (2023) developed a template-based method for knowledge reuse that stores and reuses construction knowledge at multiple levels through parameterized templates.

The existing methods for building knowledge bases feature several shortcomings. First, most methods focus on a single domain and cannot integrate knowledge from multiple policy domains. Second, existing methods often overlook the dynamism of policy knowledge and do not support the dynamic inference of knowledge development. Third, methods specifically designed for government document design are scarce.

Unlike these construction-oriented studies, the present study focuses on government documents as the main knowledge source and conducts research on unstructured policy texts, positioning knowledge base design as an evolutionary organizational structure capable of capturing cross-semantic associations and temporal changes.

2.5.3 Cross-Domain Knowledge Organization

As policy issues become increasingly complex and interconnected, research is increasingly focusing on cross-domain knowledge organization, which aims to integrate knowledge from different fields into a unified structure and thus benefits the efficiency of handling complex issues across policy domains (Howlett and Ramesh, 2014). Various methods and techniques have been proposed to achieve cross-domain knowledge integration.

Ontology matching is a commonly used technique for cross-domain knowledge organization. Zhou et al. (2021) proposed a real-time ontology construction method based on adaptive filters capable of dynamically integrating domain ontologies according to user needs, thereby reducing dependence on prebuilt large-scale ontologies and improving construction efficiency.

Despite these advances, cross-domain knowledge integration in the field of public policy largely remains at the theoretical or framework level. This article addresses these gaps by proposing a specific three-layer semantic association mechanism.

2.5.4 Policy Evolution Analysis

The evolution process of reference policies and analysis of their future development are of great importance for supporting evidence-based decision-making. However, existing research on knowledge bases pays little attention to the temporal dimension of policy knowledge.

Yang et al. (2020a) developed a policy evolution research framework based on bibliometrics, applying thematic models and co-word analysis to decades of data on China's information technology policies. Wang et al. (2025) conducted an integrated analysis of policy tools and networks to study the evolution of China's key metal policies. Kou and Chen (2025) examined the evolution of museum digitization policies, analyzing changes in policy subjects, tools, and thematic focus in different periods.

The above studies indicate that policy evolution can be systematically analyzed using computational methods, providing valuable methodological references for identifying policy change patterns. However, they view policy evolution as an external analysis task on document collections, and the evolution information of relevant policies is not included in the knowledge base structure itself. Therefore, organized knowledge cannot directly support temporal queries and serve evidence-based decision-making.

Herein, dynamic evolution is used as the core mechanism of the knowledge base model to address this issue. By preserving the time, attributes, and interrelationships between each knowledge unit, the knowledge base can support cross-spatial, cross-temporal, and cross-domain policy evolution analysis and thus support evidence-based decision-making.

2.5.5 Positioning Summary

This article summarizes the positioning and innovation relative to existing literature from four dimensions. More accurate knowledge associations can be established using knowledge units as the basic objects of knowledge organization. Furthermore, multidomain coupling is used as the core organizational logic to construct a cross-domain semantic association network connecting policy elements from different domains. On this basis, we also combine dynamic evolution mechanisms to preserve the time and state attributes of each unit, thereby truly realizing the framework analysis of policies, and ultimately construct a multidomain coupled knowledge base methodology framework for evidence-based decision-making.

3. Methods

3.1 Research Background and Identification of Initial Requirements

In a governance environment with growing uncertainty, government document thematic knowledge bases need to be deeply integrated into the whole policy-making process, providing evidence-based support at every stage. From a decision-driven knowledge organization perspective, the requirements for knowledge base building can be clarified by going through the entire process of managing government documents (knowledge collection, organization, storage, and application) and combining it with what decision-makers actually need from knowledge resources and services. Based on this analysis, the construction requirements can be summarized into content, functional, and performance ones (Wei et al., 2016). However, as the initial demand list cannot directly reflect the differential impact of various functions on user satisfaction, the Kano model is introduced to further explore the demand attributes and priorities and guide the precise design of the knowledge base.

3.2 Data Collection and Participant Profile

To identify the actual categories of the above needs, we designed a questionnaire based on the Kano model (Zhou and Yao, 2023). The main body of the questionnaire set two positive and negative questions for the 13 demands in Table 1, with each question featuring a five-level scale (like, should be like this, do not care, can bear, do not like). Through the online distribution and recovery of the questionnaire star platform, 204 valid questionnaires were obtained.

Among the participants, 48.04% had a bachelor's degree, 33.82% had a master's degree, 41.67% were 26–35 years old, and 27.45% were 36–45 years old. Among the types of units, government departments accounted for 35.29%, public institutions accounted for 33.82%, and universities/scientific research institutions accounted for 23.04%. The sample structure can better reflect the actual needs of public management and policy-related fields and account for other policy concerns, reflecting the publicity of government documents.

3.3 Survey Results and Demand Classification

To avoid the fuzzy classification of the traditional Kano maximum frequency method when the demand attribute is close, we calculated better–worse coefficients and used them to classify demand into different attribute quadrants (Fig. 1).

Expected attribute (first quadrant): the absolute values of the better and worse coefficients of C5 (multiscenario prediction and analysis), F2 (confidentiality and authority management), F3 (policy evolution tracking), and F4 (visual presentation) are higher than the average. Thus, the satisfaction of these needs will directly improve user satisfaction and hence, knowledge service experience.

Charisma attribute (second quadrant): the better and worse coefficients of P3 (cross-system interoperability) are high and low, respectively, indicating that the service can notably exceed user expectations and bring high satisfaction and should be optimized as a highlight function.

Essential attributes (fourth quadrant): the absolute values of the worse coefficients of C2 (knowledge unit structure), F1 (efficient collection and indexing), and P1 (operation efficiency) exceed the average, and the better coefficients are low. Thus, the lack of these baseline capabilities of the knowledge base will lead to a notable decline in satisfaction, and their marked reduction during building is therefore not appropriate.

Indifference attributes (third quadrant): the better and worse coefficients of C1 (cross-domain sequencing), C3 (information reliability), C4 (dynamic update), F5 (semantic retrieval), and P2 (fault recovery) are low, and the user sensitivity is relatively weak, which can be refined and transformed in the subsequent iteration.

According to the service provision order of the Kano model (essential attribute > expected attribute > charisma attribute > indifference attribute), the construction of a government document special knowledge base should initially consolidate basic services such as C2, F1, and P1, and then focus on meeting the expectations of F2, F3, F4, and C5 to accurately improve satisfaction. At the same time, the prospective development of P3 and other charisma functions creates surprises for users. Finally, one should evaluate and optimize the indifference attribute, promote its transformation to the charisma demand, and ultimately maximize the knowledge service efficiency and user satisfaction.

4. Multidomain Coupled Thematic Knowledge Base Framework of Government Documents for Evidence-Based Decision-Making

Building on the methodological design and requirement analysis results outlined in Section 3, we derived a systematic framework for organizing government document knowledge from practical needs. By incorporating the Kano model, we identified the key functional priorities of knowledge services and established a comprehensive approach with knowledge units as the core, semantic association as the main structure, and dynamic evolution as the supporting mechanism. This framework spans knowledge acquisition, organization, and service delivery, thereby providing a methodological foundation for structuring and linking cross-domain policy knowledge in support of evidence-based decision-making.

Against this background, Section 4 moves from methodological design to a more structured and operational articulation of the proposed framework, focusing on the implementation of multidomain coupling mechanisms. Section 4.1 addresses knowledge representation, explain-

Table 1. Main functions of government document knowledge bases.

No.	Dimension	Description
C1	Content requirements	Ability of cross-field, cross-department, and cross-level information collection and sequencing.
C2		Government documents are divided into structured and fine-grained knowledge units to support the composite reuse and in-depth analysis of multidomain documents.
C3		The information and knowledge stored in the knowledge base are authentic and reliable.
C4		Continuous dynamic updating is possible to ensure that the contents of the knowledge base can reflect the latest changes in the policy process in a timely manner.
C5		Based on multiscenario simulation and comparative analysis, the predictive scheme and basis are actively provided, and the potential results are evaluated.
F1	Functional requirements	Efficient and accurate information collection and information organization through classification indexing and other methods, convenient for knowledge retrieval and query.
F2		Pay attention to confidentiality and authority management, share knowledge within a certain range, and ensure the traceability of operation and the security of documents.
F3		Track and mark the complete evolution path of government documents, build a traceable policy development context and knowledge evidence chain.
F4		With the help of visualization or scene simulation tools, complex file knowledge is presented in the form of atlases, time sequence evolution diagrams, and other intuitive and easy to accept forms.
F5		Provide a personalized knowledge acquisition function based on semantic retrieval and a question-and-answer system for decision-makers to achieve accurate and effective knowledge services.
P1	Performance requirements	Stable structure, high operation efficiency, and ability to respond to and process users' complex retrieval and large-scale data analysis requests in a timely manner.
P2		Smooth operation and fault recovery abilities.
P3		Ability of cross-system and cross-standard interoperability and support of data transmission and sharing with various government systems at all levels.

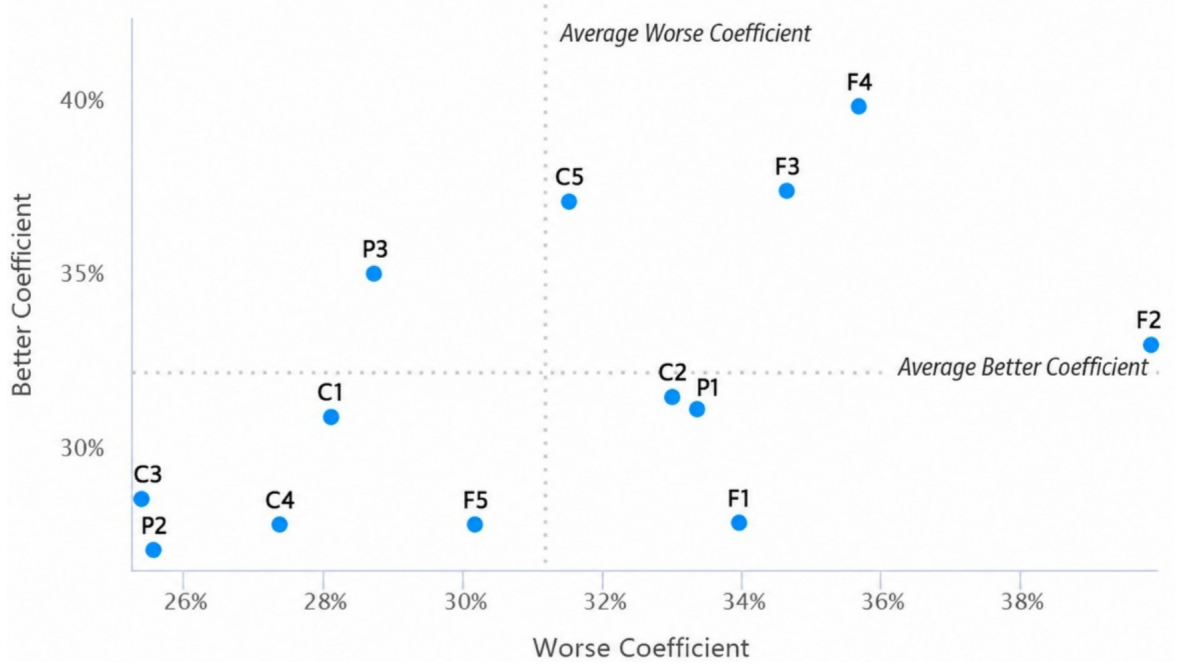


Fig. 1. Scatter diagram for better–worse coefficient analysis.

ing how government documents are transformed into computable knowledge entities based on knowledge units and thus laying the groundwork for subsequent semantic association and dynamic evolution processes.

4.1 Knowledge Representation of Government Documents Based on Knowledge Units

Government documents are not merely collections of administrative texts but important knowledge carriers embodying policy intentions, institutional arrangements, im-

plementation rules, and governance experience. For a thematic knowledge base aimed at evidence-based decision-making, if documents remain the basic unit of organization, knowledge can only be managed at the level of document storage and keyword retrieval, which makes supporting cross-document comparison, cross-domain association, and cross-time tracing difficult (Peters and Tarpey, 2019). Therefore, the knowledge organization of a government document thematic knowledge base should shift from a "document–text" paradigm to a "knowledge unit–concept structure" paradigm. That is, the most interpretable and reusable content of policy texts should be decomposed into fine-grained knowledge units, so that the objects of knowledge organization are transformed from static document entities into identifiable, associable, and inferable minimal knowledge entities.

A knowledge unit refers to the smallest knowledge entity extracted from government documents that can independently represent a certain policy element, institutional arrangement, or action rule. For government documents, knowledge units are usually organized around policy elements rather than textual fragments. Each knowledge unit preserves a relatively complete policy meaning and can represent a policy objective, policy measure, implementing agency, target group, or implementation requirement. This organization makes policy knowledge comparable across documents and supports semantic integration among different policy domains. Compared with traditional full-text preservation, knowledge units emphasize semantic completeness and structural independence: on one hand, they retain the core meaning within the policy context, avoiding interpretability loss after the whole text is chopped up; on the other hand, they serve as basic nodes for subsequent association, comparison, and reasoning, providing standardized input for building knowledge networks (Rajabi et al., 2023). In other words, the knowledge unit is an intermediary layer that transforms government documents from readable texts into organizable knowledge and a key prerequisite for the thematic knowledge base to achieve deep knowledge organization. Fig. 2 illustrates the process through which government documents are transformed into fine-grained knowledge units for subsequent knowledge organization. Therefore, knowledge units not only constitute the basic organizational objects of a thematic knowledge base but also provide the semantic foundation for cross-document association, policy evolution, and evidence-based knowledge services.

The overall framework of this study is grounded in an integrated perspective of the knowledge management lifecycle theory and the data–information–knowledge–wisdom (DIKW) model (Wolf et al., 2024). From a knowledge evolution perspective, the system follows a progressive pathway from information acquisition to knowledge transformation and ultimately to knowledge application. In this process, the information acquisition layer corresponds to the data and information stages in the DIKW hierarchy, serving as the foundational input of knowledge generation. The knowledge transformation stage reflects the transition from information to structured knowledge through semantic integration and organizational structuring. Finally, the knowledge application stage represents the externalization of knowledge into decision support and value realization.

At the level of knowledge transformation mechanisms, this study further draws on Nonaka's knowledge management spiral theory, which emphasizes the dynamic and continuous conversion of knowledge through socialization, externalization, combination, and internalization processes (Chen et al., 2024). Specifically, knowledge sharing and cross-domain interaction correspond to socialization, knowledge integration aligns with combination, while knowledge updating reflects the iterative and spiral evolution of knowledge within continuous feedback cycles.

By integrating these theoretical foundations, the proposed framework not only establishes a hierarchical pipeline from data to decision-making but also highlights the dynamic and generative nature of knowledge evolution, thereby providing a solid theoretical basis for cross-domain policy knowledge organization and evidence-based decision support.

At the level of knowledge representation, government document knowledge units cannot be presented only as keywords or field labels but can be semantically expressed through metadata, ontologies, and normalized markers. Metadata is used to describe the source, time, hierarchy, publisher, and subject domain of a knowledge unit; ontology is used to define concept boundaries and their contextual relationships; and normalized identifiers are used to ensure that synonymous concepts, heteronymous concepts, and cross-sectoral concepts can be mapped uniformly. Through this representation, policy statements originally dispersed in different documents are transformed into structured knowledge objects, which facilitates systematic retrieval as well as cross-domain correlation and subsequent reasoning. This organizational shift from the document level to the knowledge unit level essentially reflects the transformation of knowledge organization research from record keeping to semantic association.

4.2 Coupling of Cross-Domain Government Document Semantic Association Networks

The problems faced by government decision-making are often not confined to a single policy domain but represent complex issues where multiple domains such as industry, finance, regulation, and social governance intertwine (Howlett and Ramesh, 2014). If a thematic knowledge base of government documents only stores documents side by side by source or topic, revealing shared concepts, common constraints, and mutual influences among policies from different domains becomes difficult. Recent knowledge organization research suggests that complex knowledge envi-

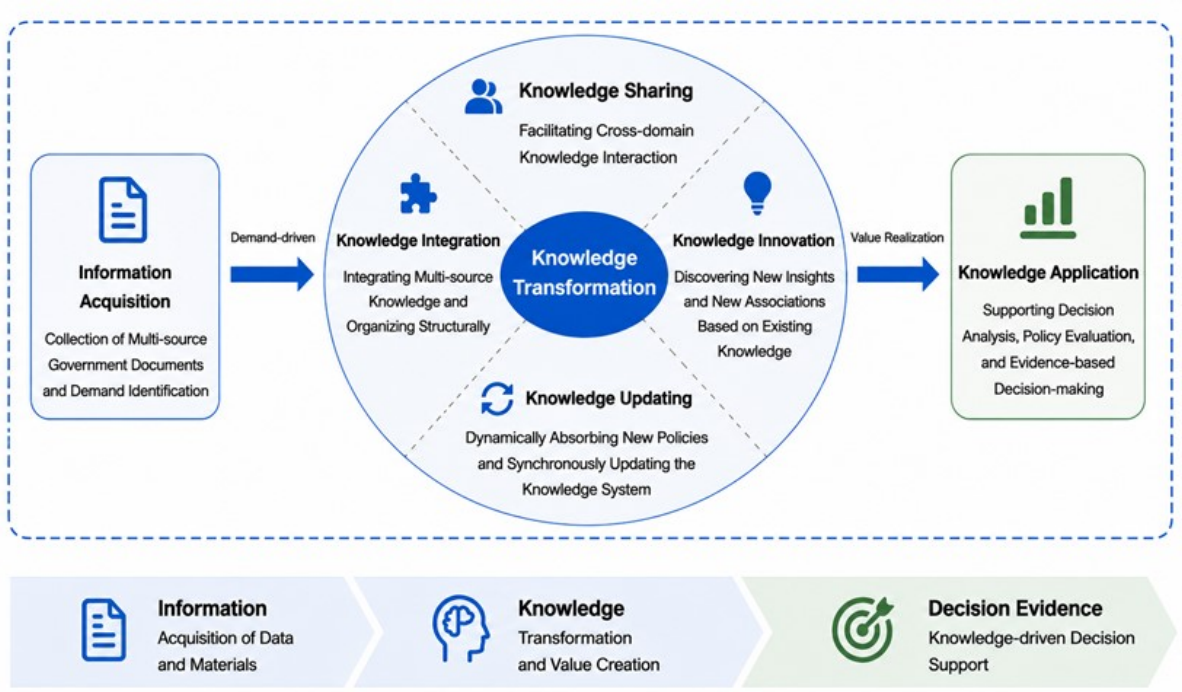


Fig. 2. The process of knowledge management.

ronments require interconnected organizational structures rather than isolated subject classifications (Zhitomirsky-Geffet, 2019). Therefore, the thematic knowledge base must move beyond organization by subject to organization by cross-domain semantic association, using semantic association networks to present the internal structure of policy knowledge (Gorskis and Borisov, 2013). Therefore, from the perspective of evidence-based decision-making, cross-domain coupling is crucial for policy formulation and governance effectiveness. Without the requisite semantic coupling, these multiple heterogeneous pieces of evidence will be isolated from each other, and decision validity and comprehensiveness will be compromised.

The core of a cross-domain semantic association network is not simply connecting knowledge from different domains in a parallel way but establishing computable semantic relations based on shared concepts and association rules. This idea is also consistent with the Linked Data paradigm, which uses RDF-based semantic links to connect distributed knowledge resources and enable integrated access across heterogeneous data sources (Bizer et al., 2009). In practice, upper-level concepts can be used to link different domain ontologies, so that originally scattered domain knowledge becomes related knowledge under a unified semantic framework (Zhang et al., 2025a). In this cross-disciplinary knowledge organization process, the key lies in the connection and coordination at the semantic level. For government documents, such an association network is especially important, as many policy clauses, although distributed across different documents, departments, or even levels, may revolve around the same governance goal. For example, tax incentives, financial support, and streamlined approval processes often jointly aim to boost corporate investment. Making these associations explicit enables a knowledge base to truly become an organizational system for multidomain coupling (Deng et al., 2023).

From the perspective of knowledge organization, a semantic association network should include at least three types of basic relations. Conceptual relationships, such as superiority, subordination, synonymy, and proximity, are used to solve conceptual unification and semantic disambiguation. Policy-level relations, such as the supportive, constraining, substitutive, juxtapositional, or progressive relationship between policy provisions, are used to reveal the policy logic. Context-level relations, such as differences in the same policy across different regions, times, or implementation scenarios, support horizontal comparison and vertical tracing (Stanton and Roelich, 2021). The overlaying of these three types of relations makes a government document thematic knowledge base no longer a mere collection of individual clauses but a knowledge network with semantic density and structural depth. This network not only reflects the systematic nature of knowledge organization but also enhances the interpretability of knowledge services (Chu and Lin, 2022).

4.3 Dynamic Evolution and Update Logic of Government Documents

Unlike static knowledge resources, government documents have a strong temporal and evolutionary nature. New policies are constantly issued, while old ones are revised,

replaced, or abolished. Moreover, policy adjustments often occur across different administrative levels and departments, which drives the continuous evolution of the relationships among government documents. Even under the same policy topic, expressions, instruments, and implementation methods change as governance goals shift (Phua et al., 2024). Therefore, if a thematic knowledge base of government documents is to serve evidence-based decision-making, it must have a dynamic evolution mechanism that enables the knowledge organization structure to reflect the whole process of policy generation, change, and expiration. This requires the knowledge organization system to continuously update policy knowledge while maintaining the consistency of policy hierarchy, semantic relationships, and policy validity, which is especially critical for a government document thematic knowledge base (Mele et al., 2024).

The core task of a dynamic evolution mechanism is to incorporate policy changes into the knowledge organization framework rather than treat changes as external disturbances. The knowledge base should assign time attributes and status attributes to each knowledge unit, recording its first appearance time, revision time, applicable period, and expiration status. In addition, policy-specific attributes, including issuing authority, administrative level, document validity, and implementation status, should also be maintained to preserve the organizational characteristics of government documents. Ontology evolution research emphasizes that knowledge organization systems should continuously adapt to changes in the represented domain while maintaining semantic consistency (Zablith et al., 2015). The relationships among knowledge units should be versioned, preserving the historical traces of how associations were established, strengthened, weakened, or terminated. In this way, the knowledge base can not only demonstrate the current policy structure but also retrace the evolutionary path of a given policy topic in the time dimension, thus supporting policy comparisons, historical interpretations, and trend judgments (Ma et al., 2025).

In terms of knowledge organization methods, dynamic evolution is not just a simple update of data but a continuous reorganization of knowledge structures, requiring the system to automatically recognize new knowledge units when new documents are entered and complete classification, linking, and versioning based on existing ontologies and semantic rules. In the case of older knowledge units, a judgment is made as to whether they are still valid, need to be retained in their historical versions, or established in substitution for the new articles. In this way, one can avoid semantic confusion in the knowledge base, where the old and new coexist without being able to be analyzed. This is why dynamic evolution mechanisms are not only a technical issue but also a requirement for the ability to manage change in the knowledge base in a way that ensures that policy knowledge is always traceable, interpretable, and up-to-date.

4.4 Overall Framework of Thematic Knowledge Base

Based on the three mechanisms of knowledge unit, semantic association, and dynamic evolution, it can be constructed as a knowledge organization–centered framework of a thematic knowledge base of government documents. The basic logic of the framework is as follows. First, multisource government documents are transformed into standardized knowledge resources while preserving policy-specific metadata, such as issuing authority, administrative level, policy validity, and effective period. Second, fine-grained knowledge units are taken as organizational objects, and the semantic representation is completed through ontologies and metadata. Third, dispersed policy knowledge is organized into a structured knowledge system through cross-domain semantic association networks, in which policy subjects, policy instruments, target groups, implementation objectives, and inter-policy references are explicitly linked. Fourth, the continuous updating and historical traceability of the knowledge base are maintained through a dynamic evolution mechanism, which enables the capture of policy issuance, amendment, replacement, and abolition throughout the policy lifecycle. The goal of this framework is not simply to improve retrieval efficiency but to form a thematic knowledge organization system that can consistently reveal the structure of knowledge, relationships, and changes in government documents.

The framework can be summarized in three (knowledge resource, knowledge organization, and knowledge evolution) layers. The knowledge resource layer is responsible for collecting government documents from different departments, levels, and time periods and performing focused collection, classification, storage, and metadata normalization. Policy attributes such as issuing department, administrative level, document type, implementation period, and policy status are retained as important metadata to preserve the original characteristics of government documents and provide a basis for subsequent knowledge organization. The knowledge organization layer takes knowledge units as its core, representing, associating, and clustering concepts, clauses, and rules in the documents and thereby forming cross-document and cross-domain semantic networks. Based on the semantic relationships among policy entities, such as issuing bodies, policy objectives, policy instruments, implementation objects, and policy domains, dispersed policy knowledge is reorganized into an interconnected knowledge system. This process allows government documents from different departments and policy fields to be linked through shared concepts and semantic relations, thereby supporting the integrated organization of multidomain policy knowledge. The knowledge evolution layer manages versioning and relationship updates for policy changes, so that the thematic knowledge base can continuously adjust its structure as policies change. The three layers are not linearly connected but form a cyclic feedback loop: when a new policy enters, it is organized into knowl-

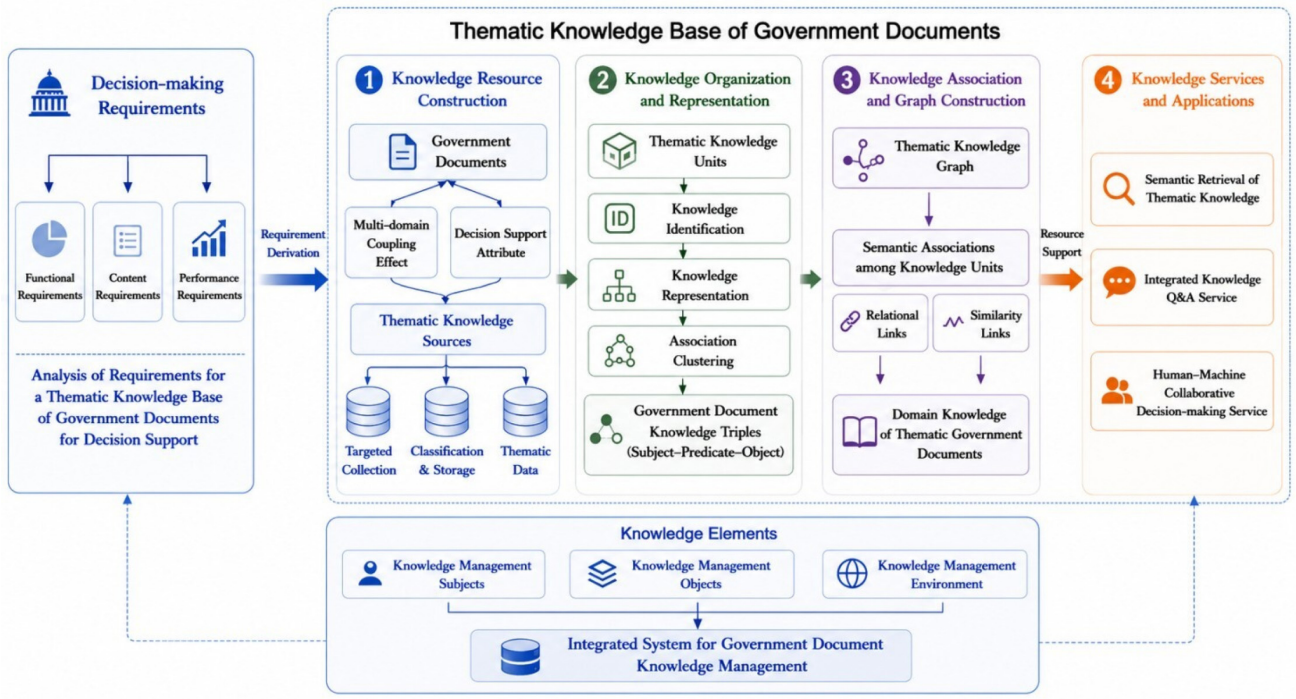


Fig. 3. Framework concept of the government document thematic knowledge base.

edge units and incorporated into the semantic network; finally, the overall structure of the system is updated through the evolution mechanism. By recording policy issuance, revision, replacement, and abolition, the framework preserves the evolutionary process of policy knowledge and maintains the temporal relationships among different policy documents. In this way, the knowledge base not only reflects the current policy system but also supports the tracing of historical policy changes and the continuous updating of policy knowledge.

Accordingly, the core value of a thematic knowledge base lies not in the number of stored documents but in the organization of knowledge to enable interconnections and evolution over time. This is exactly the key stance of knowledge organization research: an ideal knowledge organization does not merely record documents but extracts knowledge units from them and reveals their internal connections through conceptual systems and semantic networks. For government documents as a special type of knowledge carrier, this organizational approach is particularly effective in highlighting their policy logic, domain coupling, and evolutionary trajectories, thereby laying a foundation for subsequent knowledge mining, evidence comparison, and decision support. At this point, the theoretical framework of the government document thematic knowledge base is established. The modeling concept of the government document thematic knowledge base is illustrated in Fig. 3.

5. Methods of Constructing a Multidomain Coupled Thematic Knowledge Base for Government Documents

The theoretical framework proposed in the previous section establishes a conceptual outline for government literature knowledge organization; however, the practical value of the framework depends on implementation effectiveness. Hence, this section takes knowledge organization as guidance and transforms the theoretical framework into a landing construction framework through the system modeling method. The research follows the four principles of knowledge unit extraction, semantic expression, cross-domain association, and dynamic evolution and gradually transforms the unstructured policy text into standardized knowledge resources, supporting semantic retrieval, knowledge reasoning, and evidence-based decision-making. The subject knowledge base built using this process can not only realize the fine-grained sorting of policy knowledge but also establish semantic associations between heterogeneous policy resources in different fields and at different administrative levels, providing practical support for subsequent knowledge services.

Based on the framework described above, building a government document thematic knowledge base requires a full-cycle knowledge organization process that turns multisource policy texts into a structured, semantic, and well-connected knowledge system. This section presents the implementation method from the aspects of knowledge source generation, knowledge acquisition and representation, semantic association construction, and knowledge service

(Laihonen and Kokko, 2023), which collectively form a complete organizational path from raw texts to knowledge networks and then to knowledge use. The structure of the process for constructing the government document thematic knowledge base is shown in Fig. 4.

Regarding implementation feasibility, the proposed framework does not require the redevelopment of underlying technologies. The main techniques involved, including named entity recognition, ontology modeling, knowledge representation, and semantic reasoning, have been extensively studied and can be implemented using existing NLP tools and knowledge engineering platforms.

Unlike traditional rule-based approaches that rely heavily on manually constructed entity dictionaries, the proposed framework combines existing NLP models with domain-specific knowledge adaptation to support entity identification in government documents. Therefore, the implementation focus is not on developing new algorithms, but on adapting and coordinating existing technologies for government document knowledge organization. This mainly involves domain knowledge modeling, semantic relationship definition, and knowledge validation to ensure that the resulting knowledge representations reflect the characteristics of government documents.

Implementing the framework requires the coordination of domain expertise and technical resources. Domain experts contribute to the definition and maintenance of domain terminology, core concepts, hierarchical structures, semantic relationships, and domain rules. Their involvement helps ensure that the knowledge schema accurately represents the structure of policy knowledge.

Technical resources support key processes, including document preprocessing, knowledge unit extraction, knowledge storage, and semantic reasoning. Existing NLP models, knowledge graph technologies, and knowledge engineering tools can provide support for these processes. Meanwhile, because government policies change over time, the constructed knowledge base requires regular maintenance and updating to remain aligned with policy developments.

The level of required investment varies depending on the application scope, document volume, and complexity of the target domain. For a specific policy topic with a limited document collection, implementation can be achieved through the adaptation of existing tools combined with expert-based knowledge modeling and validation. In contrast, large-scale knowledge base construction across multiple policy domains requires greater efforts in knowledge acquisition, expert participation, technical support, and long-term maintenance.

The contribution of this study lies in developing a knowledge organization approach that integrates existing technologies for government document management. Rather than proposing new computational algorithms, this study focuses on adapting knowledge representation, semantic modeling, and knowledge extraction methods to the government policy context. Through the design of policy knowledge units, semantic relationships, and entity association patterns, the proposed framework provides a structured approach for organizing heterogeneous policy resources and transforming fragmented government documents into interconnected knowledge resources.

5.1 Generation and Preprocessing of Thematic Knowledge Sources for Government Documents

Building a thematic knowledge base for government documents requires a stable and standardized knowledge source input. Unlike general information resources, government documents have diverse sources and inconsistent formats and greatly differ in structure, terminology, and expression across government and functional department levels. Therefore, at the initial stage of knowledge organization, multisource heterogeneous texts should be systematically integrated to form a unified and processable knowledge input system.

Before conducting knowledge acquisition from heterogeneous government documents, this study constructs a domain knowledge schema tailored to specific policy domains to regulate the semantic descriptions involved in subsequent knowledge extraction, organization, and representation processes. The domain knowledge schema developed in this study is tailored to the characteristics of government documents and the requirements of evidence-based decision-making. It specifies relevant concepts, entity types, and semantic relationships based on the structure and organization needs of policy knowledge. Through this schema, policy information from heterogeneous documents can be represented in a more structured and consistent manner.

As shown in Fig. 5, the domain knowledge schema is applied across both knowledge acquisition and knowledge representation processes. It provides a common semantic basis for identifying and organizing policy knowledge units.

During knowledge acquisition, domain terminology and entity categories support the recognition and classification of policy-related entities. The hierarchical structure and attribute relationships describe connections among concepts and knowledge units, while domain rules guide the extraction and association of knowledge elements. These components work together to improve the consistency and interpretability of the constructed knowledge.

With the support of the domain knowledge schema, heterogeneous government documents can be converted from unstructured text into structured knowledge units. In this way, the schema connects document resources with subsequent knowledge representation and semantic association processes, serving as an important foundation for government document knowledge organization.

In generating knowledge sources, focused collection should be carried out around specific policy topics. Rele-

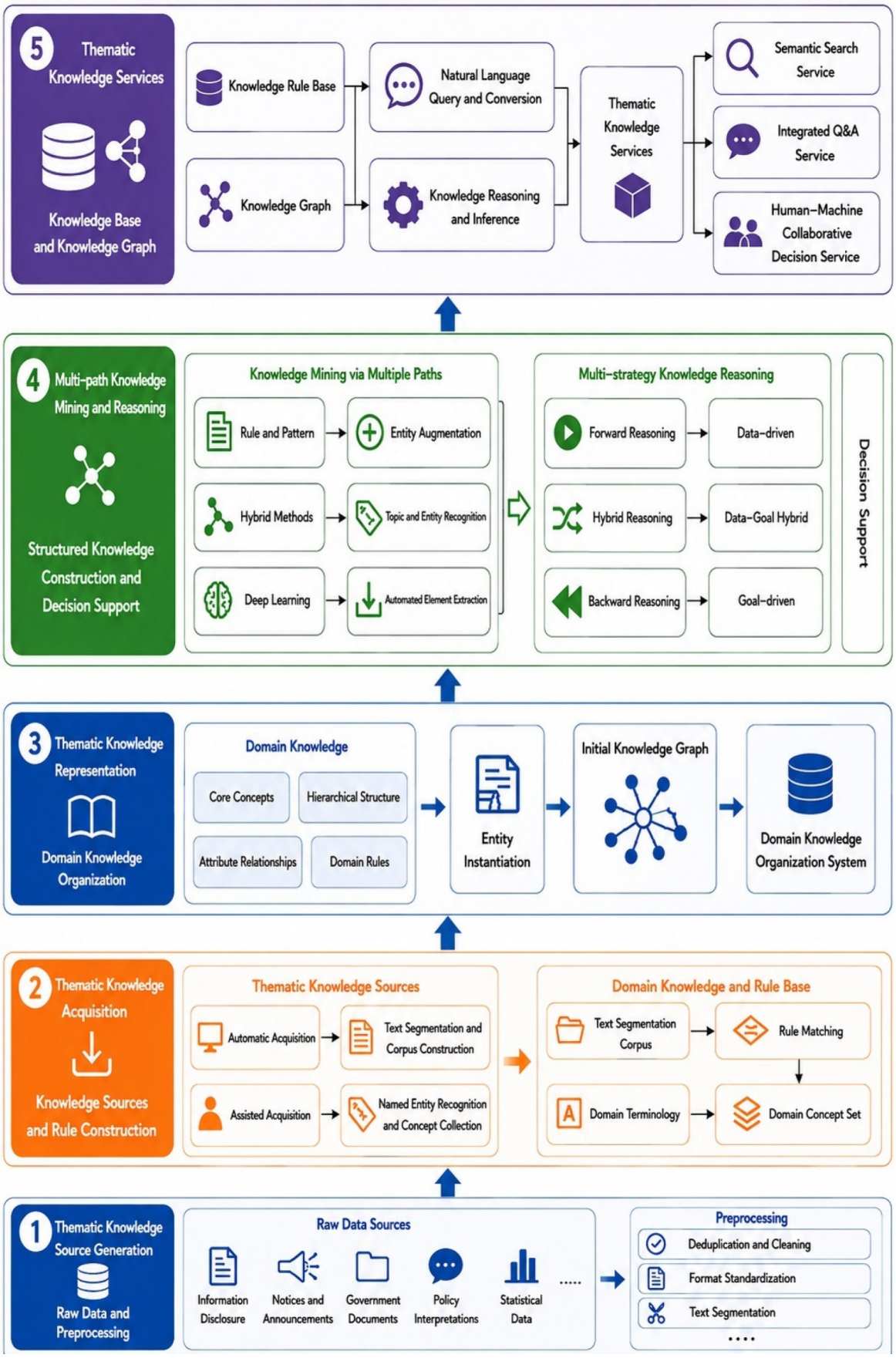


Fig. 4. Structure of the process for constructing the government document thematic knowledge base.

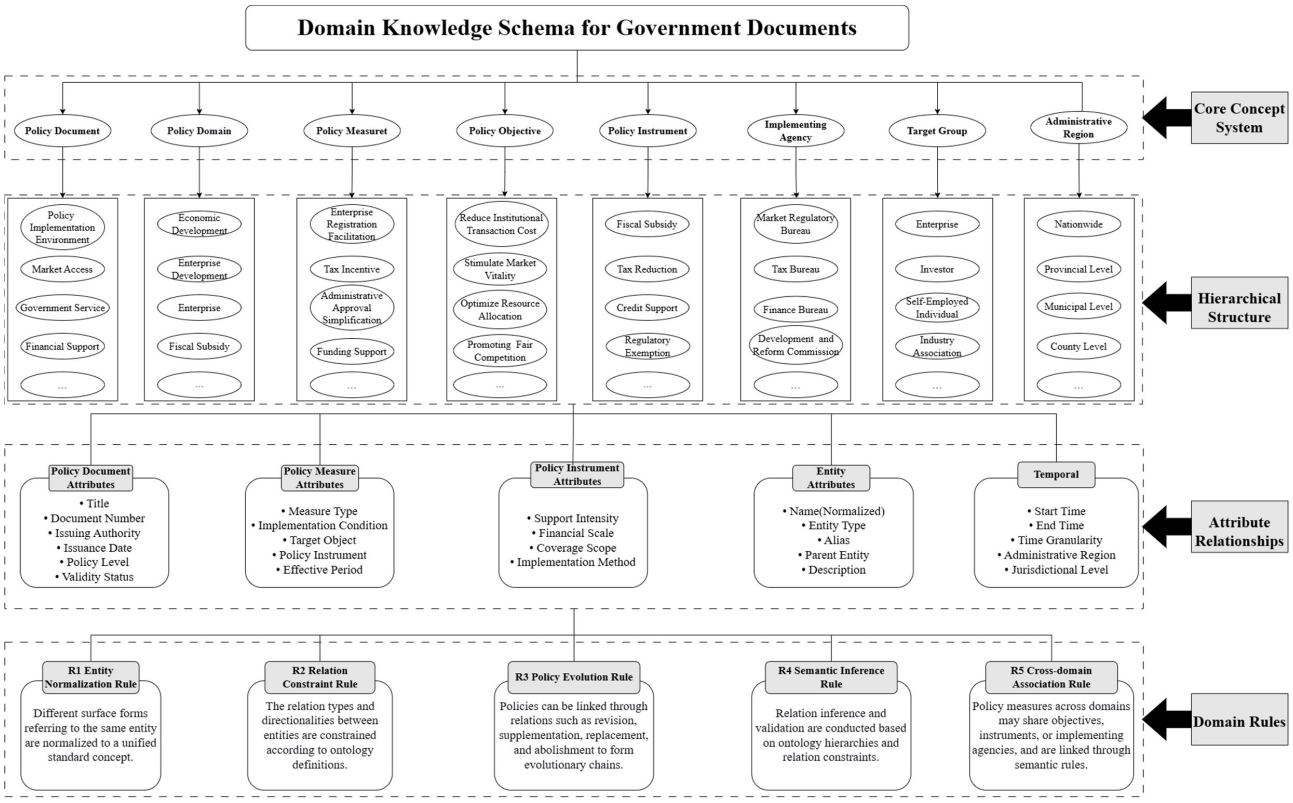


Fig. 5. Domain knowledge schema for government documents.

vant literature was obtained from government portals, policy dissemination platforms, and public databases and initially categorized by industry, finance, and regulation. This process is not merely data collection but also the first step of knowledge organization: the knowledge boundary is initially delineated by defining the topic, providing a clear context for the subsequent extraction of knowledge units.

In the data preprocessing stage, one should clean and standardize the original text of government documents, e.g., remove redundant symbols, unify coding formats, separate the body and appendices, and standardize the title hierarchy. At the same time, a unified data description system should be established to standardize the description of the subject of issuance, time of issuance, type of policy, scope of application, etc. The core goal of this process is to eliminate structural differences in heterogeneous data and thus ensure that policy texts from different sources are comparable and relatable at the syntactic structure and metadata level. This process is not only a technical preparation for knowledge organization but also an important part of knowledge standardization. Through the harmonization of formats and metadata, policy texts from different sources are brought into the same descriptive framework to lay the foundation for subsequent knowledge extraction, semantic mapping, and cross-domain linkages. This approach enables the transformation of government document information from a collection of dispersed texts to an organizable knowledge resource, laying the foundation for the construction of a thematic knowledge base. The data content of government documents is shown in Fig. 6.

5.2 Fine-Grained Knowledge Acquisition and Representation of Government Documents

After the completion of knowledge source generation and data preprocessing, unstructured policy texts should be further transformed into structured knowledge units to realize the leap from textual information to knowledge objects. This process is essentially the processing of natural language in government documents to decompose and reconstruct knowledge and is typically supported by natural language processing techniques, including fundamental tasks such as named entity recognition and dependency parsing, which enable the structured parsing of policy texts.

The core of knowledge acquisition lies in the identification of key elements in the policy text, including policy objectives, applicable objects, implementation subjects, policy tools, constraints, and implementation rules. These elements constitute the basic semantic units of policy knowledge. For specific implementation, rule recognition and natural language processing methods can be combined. On one hand, policy elements with clear expression forms are extracted through rule recognition based on syntactic structure and semantic patterns. On the other hand, named entity recognition, relationship extraction, and other meth-

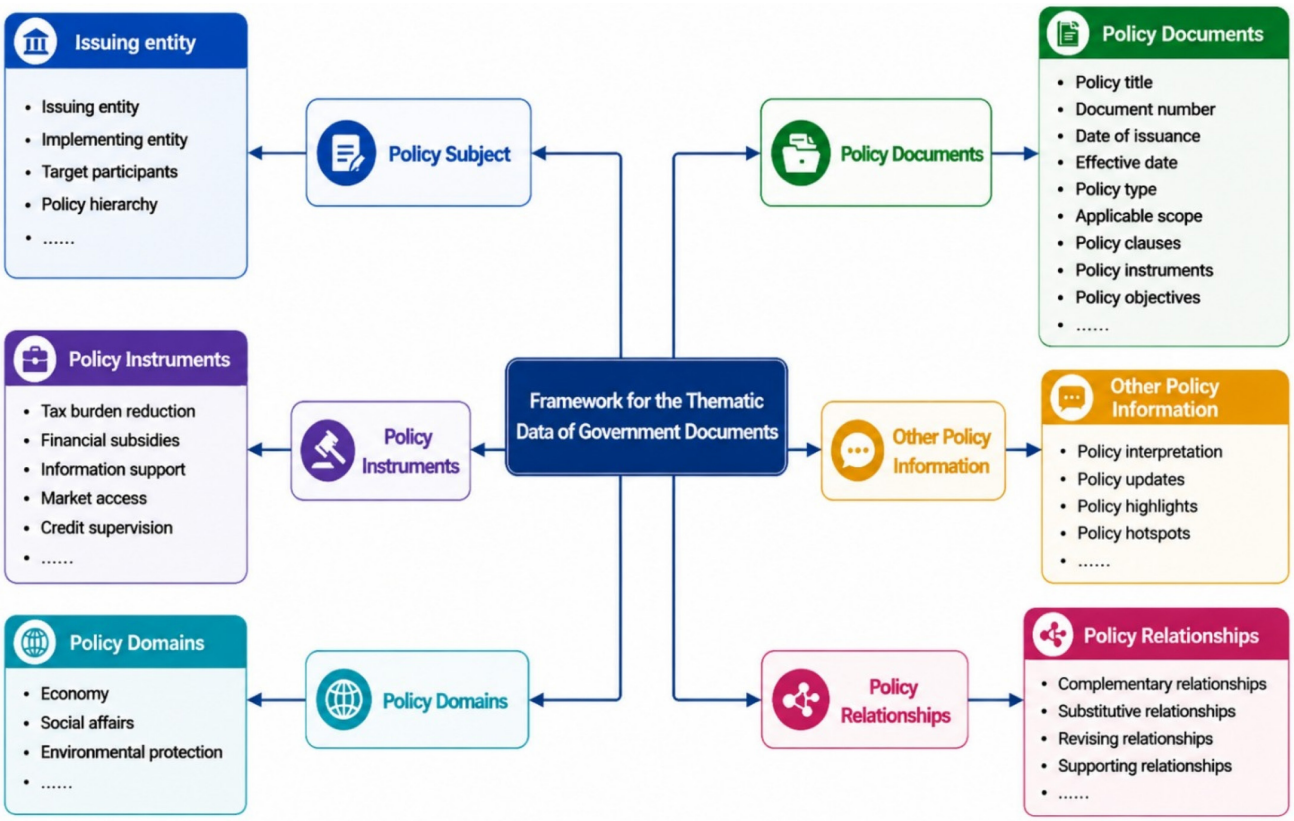


Fig. 6. Content framework of the thematic database for government documents.

ods are utilized to identify and supplement the entities and their relationships implicit in the text. In practice, these elements are often extracted using pretrained language models, which improves the detection of semantic boundaries in complex policy texts. These processes correspond to key stages of knowledge graph construction, including knowledge acquisition, refinement, and enrichment (Paulheim, 2017).

At the knowledge representation level, the extracted knowledge units need to be transformed into a standardized structure. An ontology-driven representation can usually be used to define core concepts in the policy domain and establish a conceptual hierarchy. Each knowledge unit contains not only content information but also metadata such as semantic type, domain, temporal attributes, and source identification, thus forming a multidimensional description structure. In addition, formal representations such as RDF or OWL can be used to enable knowledge unit understanding and processing by machines and achieve a unified representation of the semantic layer. RDF and OWL-based semantic modeling provide formal mechanisms for representing domain concepts and relationships, allowing knowledge resources to be organized according to explicit conceptual structures (Allemang and Hendler, 2011). The W3C Web Ontology Language (OWL) is a Semantic Web language designed to represent rich and complex knowledge about things, groups of things, and relations between things (World Wide Web Consortium, 2012). At the data storage layer, RDF triples are commonly managed using graph databases or semantic storage engines such as Neo4j or Apache Jena, which also support SPARQL-based semantic querying and retrieval. SPARQL is a standard query language for RDF graph data, supporting pattern matching and associative retrieval (World Wide Web Consortium, 2013). The specific process is shown in Fig. 7.

The key to knowledge acquisition and representation is achieving the unity of granularity and normalization. On one hand, the knowledge unit should be the smallest unit that can characterize the content of the policy text to support cross-document comparisons and correlation analyses. On the other hand, their representation must be uniform so that knowledge from different sources can be integrated under the same semantic framework (Huang et al., 2022). Through this process, implicit knowledge in government documents becomes explicit, scattered information becomes structured, and knowledge organization shifts from the text level to the semantic level.

5.3 Cross-Domain Semantic Association Discovery and Reasoning for Government Documents

Once knowledge units are formed, the main function of the thematic knowledge base lies in organizing and representing the relations among them. Isolated knowledge units cannot support complex decision analysis. The inter-

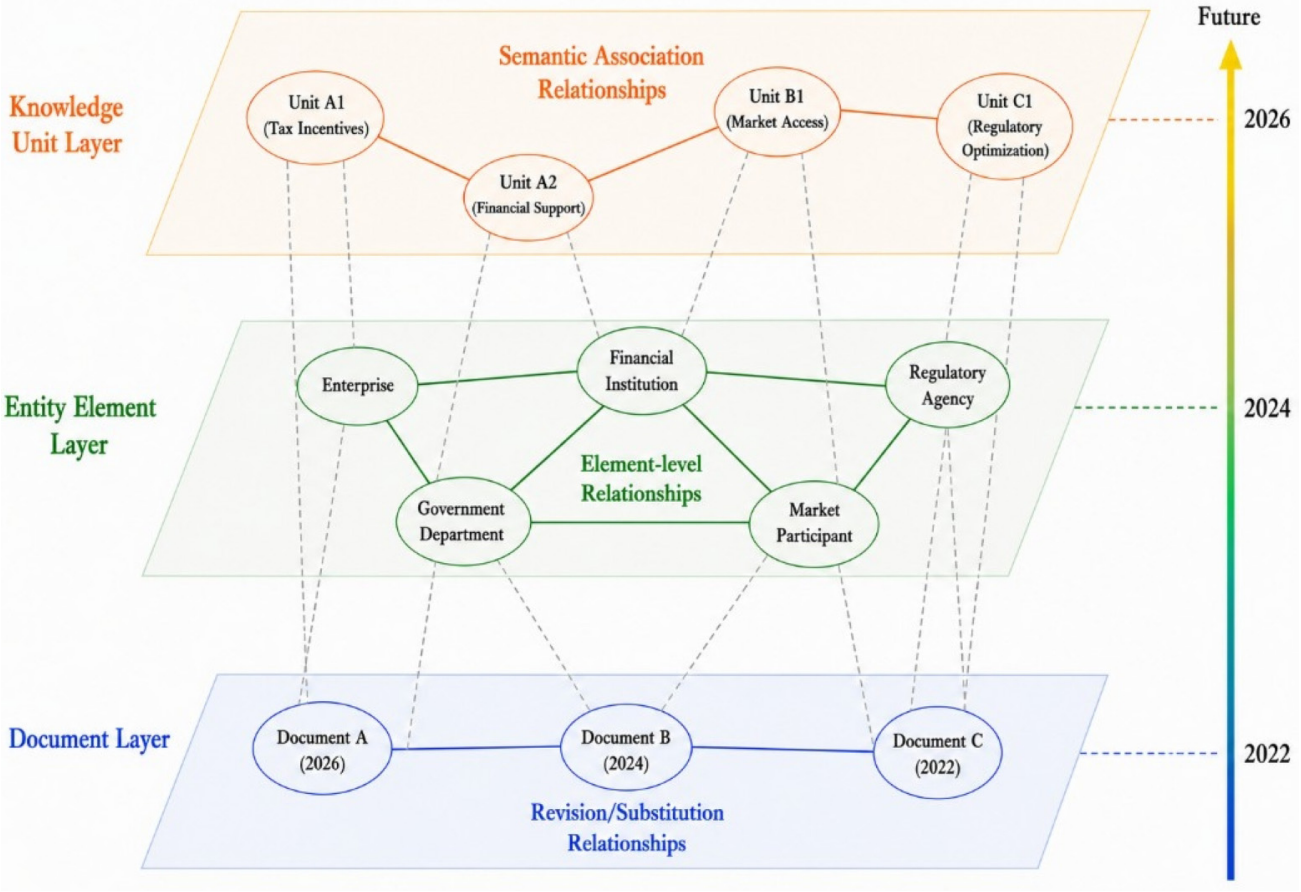


Fig. 7. Fine-grained knowledge acquisition and representation of government documents.

nal logic and cross-domain connections among policy elements can be revealed only by organizing these units into a network through semantic associations. Therefore, semantic association discovery and reasoning are the key steps of the knowledge organization process. Regarding implementation, this process is typically modeled using a graph-based structure where knowledge units are represented as nodes and semantic relations as edges to form a computable knowledge network.

Semantic associations are built mainly based on ontological relations and rule constraints. Concept-level semantic connections can be established through hypernym–hyponym, synonym, and attribute relations defined in the ontology. Functional connections among knowledge units can be established through logical relations in the policy context. For example, fiscal subsidy and tax incentive provisions in different documents may be functionally synergistic and can be connected as different realization paths under the same policy objective through rule identification.

On this basis, inference mechanisms can be introduced to discover implicit relationships in different government documents. Knowledge reasoning can be realized through rule- or path-based analysis to derive new associations based on already relevant ones. This approach allows knowledge bases to not only store explicit relationships but also generate latent knowledge, thus enhancing the depth of knowledge organization. Moreover, semantic associations should also consider the influence of time and space, that is, differences and evolutionary relations among policy clauses from different regions and time periods. Moreover, semantic associations should account for temporal and spatial variations, including differences and evolutionary relationships among policy provisions across regions and time periods. By incorporating temporal and spatial attributes into knowledge units and their associated relations, the semantic network can represent policy knowledge within its spatiotemporal context, thereby extending knowledge organization beyond a static structure to a dynamic representation (Zhao et al., 2023). Technically, temporal dimensions are represented using timestamps or version chains, while spatial dimensions are encoded via regional identifiers or geographic attributes to support policy evolution analysis.

Overall, this stage organizes scattered knowledge units into a multilayer semantic network by constructing multiple types of relations. The resulting structure resembles a knowledge graph and places more emphasis on the standardization and interpretability of knowledge organization. In this way, the thematic knowledge base becomes a semantic knowledge system. The implementation process of knowledge reasoning is shown in Fig. 8.

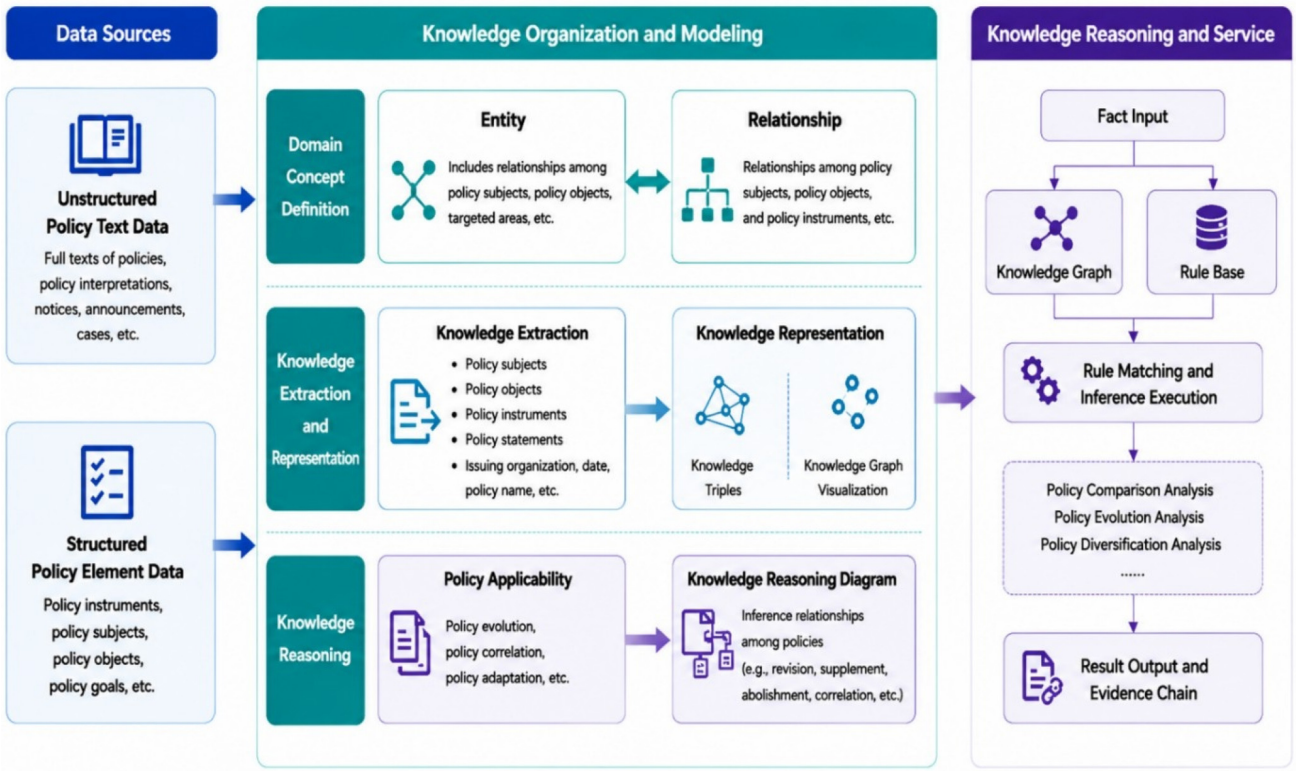


Fig. 8. Knowledge reasoning process of the government document thematic knowledge base.

5.4 Knowledge Services for Evidence-Based Decision-Making

After knowledge representation and semantic association construction are completed, the thematic knowledge base needs to provide appropriate knowledge services to turn organized results into usable knowledge resources. For evidence-based decision-making, the core of knowledge services lies in whether they can accurately reflect the knowledge structure and help users understand policy relations (Wang et al., 2024).

First, semantic retrieval is the most basic service form. Unlike traditional keyword-based retrieval, semantic retrieval matches queries based on knowledge units and their relations and can understand the conceptual meaning of a user's query and return relevant knowledge units along with their contextual relations, thereby improving the accuracy and completeness of retrieval results. Second, knowledge question answering can answer specific user questions based on the semantic network and reasoning mechanisms. For example, when a user inquires about the implementation of a policy tool in different regions, the system can retrieve the relevant knowledge units through the association network and combine them with the temporal and spatial attributes to provide a comprehensive answer. This type of question and answer method is essentially a direct application of the results of knowledge organization. Finally, human–computer interaction collaborative decision-making is also an important form of knowledge services, which refers to the gradual agreement between the knowledge base system and human value judgment in multiple rounds of interaction, thus enhancing the quality and efficiency of government decision-making. The basic approach is to couple, through a knowledge layer, the ability of a machine to rapidly process numerous government documents and make inferential predictions with the aggregated ability of a human to make value tradeoffs in complex situations, with the two constantly interacting to transform the information into the evidence and experience needed to make decisions. For this synergy to operate stably, one should provide decision-makers with visual reasoning paths at the micro level and use algorithms to simulate the effects of policies, coordinate the interests of multiple parties, track and evaluate the effects of decision-making, and continuously optimize them. Ultimately, by documenting the chain of evidence, this approach makes decision-making more transparent and credible and improves the efficiency of knowledge services and the accuracy of decision-making.

Knowledge services are different outputs of knowledge organization results, their common goal being the integration and presentation of knowledge units, semantic relationships, and evolutionary information so that users can analyze and judge based on structured knowledge. As a result, the thematic knowledge base achieves the transformation from knowledge organization to knowledge utilization and completes the closure of the framework from theory to practice.

6. Construction of a Multidomain Coupled Government Document Thematic Knowledge Base for Evidence-Based Decision-Making: A Case Study of Business Environment Policies

Building on the thematic knowledge base framework from the previous section, this section takes business environment policies as the application scenario and implements the proposed government document thematic knowledge base. In building a knowledge base, we mainly follow the knowledge organization process, which covers four aspects, namely generating knowledge sources, acquiring and representing knowledge, knowledge mining and reasoning, and knowledge services. Through this process, government documents are transformed from heterogeneous policy texts into structured knowledge units, semantic association networks, evolving knowledge structures, and ultimately user-oriented knowledge services for decision support.

6.1 Generation of Thematic Knowledge Sources for Business Environment Policies

The business environment policy has cross-domain attributes, and its policy content usually simultaneously involves industrial access, tax incentives, financial support, market regulation, government services, and other governance dimensions, which helps better reflect the multidomain coupling characteristics of government documents and facilitates the testing of the cross-policy and cross-domain semantic organization ability of the knowledge base. At the same time, the business environment thematic policy can cover the relevant documents issued by the central government and local authorities and departments, which are a more suitable data source for the thematic knowledge base.

At the document source stage, this study collects policy documents related to the business environment through the database of national laws and regulations, the websites of the State Council and its constituent departments, the official websites of the people's governments of provinces, municipalities, and counties, the columns of the government gazettes, and the notices, announcements and yearbooks issued by the statistical departments, covering different types of business environment–related policies and documents ranging from national laws and administrative regulations to local laws and regulations, departmental regulations, and implementation opinions, and the notices and announcements of the normative documents, thus ensuring case representativeness. The collected policy texts were systematically cleaned, deduplicated, and formatted, with additional manual screening conducted to remove redundant and noisy information, thereby improving the overall quality of the corpus. Ultimately, a dataset comprising 1377 policy documents was constructed, providing a comprehensive sample for investigating business environment policies. Selected examples of the dataset are presented in Table 2.

In addition, as business environment policies are inherently hierarchical and chronological, an evolutionary relationship of revising, supplementing, and repealing documents is present at different levels. After data collection, the documents are filtered by theme and then labeled with information such as document number, issuing organization, issuing date, policy subject, document type, and document status according to the unified metadata standard, and the index of "theme–level–time" is established to support the subsequent multidimensional query and aggregation analysis. The recording of document status and revision history also provides the basis for the subsequent identification of the policy evolution chain. This data preparation process is also the front-loading component of knowledge organization, i.e., the organization of raw policy texts into computable and traceable knowledge inputs through topic definition, metadata normalization, and state identification. Domain concepts are represented in a structured form as follows:

$$\text{Concept} = < \text{Term}, \{\text{Alias}\}, \text{Type}, \text{Definition} >$$

where Term refers to the standardized term used to identify a concept, while Alias records alternative expressions or synonyms that may appear in government documents. Type specifies the category of the concept, and Definition provides its basic semantic description.

The semantic relationships among concepts are represented as:

$$ConceptRelation = \\ < SourceConcept, TargetConcept, RelationType >$$

where SourceConcept and TargetConcept represent the concepts or entities extracted from government documents, and RelationType specifies the semantic category of their relationship. This representation provides a unified way to organize domain concepts and their associations, facilitating subsequent semantic analysis and knowledge reasoning. Taking the Negative List for Market Access (2018 Edition) (National Development and Reform Commission, Ministry of Commerce of the People's Republic of China, 2018) and the Negative List for Market Access (2025 Edition) (National Development and Reform Commission, Ministry of Commerce of the People's Republic of China, State Administration for Market Regulation, 2025) as examples, Table 3 presents several representative triples automatically extracted from the collected policy documents during the knowledge acquisition stage.

To examine how the proposed framework can be applied to government document processing, this study further employs the Negative List for Market Access (2025 Edition) as an example. Using the selected policy docu-

Table 2. Data source — list of policy documents on optimizing the business environment in China (Excerpt).

No.	Central government/ Local government	Policy document name	Date of issuance
1	Central Government	Regulation on Optimizing the Business Environment	October 2019
2		Opinions of the CPC Central Committee and the State Council on Promoting the Growth and Development of the Private Economy	July 2023
3		Notice of the General Office of the China Banking and Insurance Regulatory Commission on Deepening the Reform of Streamlining Administration, Delegating Powers, Improving Regulation, and Optimizing Services in the Banking and Insurance Sectors to Improve the Business Environment	December 2020
……	……	……	……
436	Shaanxi Province	Implementation Opinions of the People's Government of Shaanxi Province on Promoting the Modernization of Domestic Trade Circulation and Developing a Law-Based Business Environment	May 2016
437		Opinions of the People's Government of Shaanxi Province on Deepening the Reform of Streamlining Administration, Delegating Powers, Improving Regulation, and Optimizing Services and Comprehensively Enhancing the Business Environment	July 2017
438		Notice of the General Office of the People's Government of Shaanxi Province on Issuing the Key Tasks for Deepening the Reform of Streamlining Administration, Delegating Powers, Improving Regulation, and Optimizing Services and Optimizing the Business Environment in 2020	March 2020
……	……	……	……
750	Qingdao City	Notice of the General Office of the Qingdao Municipal People's Government on Issuing the Implementation Plan for the Year of Enhancing Qingdao's First-Class Business Environment	June 2018
751		Notice of the General Office of the Qingdao Municipal People's Government on Issuing the Plan for the Allocation of Responsibilities for Key Tasks in Deepening the Reform of Streamlining Administration, Delegating Powers, Improving Regulation, and Optimizing Services and Optimizing the Business Environment in Qingdao	November 2019
752		Notice of the Qingdao Municipal Bureau of Housing and Urban-Rural Development on Further Optimizing the Business Environment for Tendering and Bidding in Housing Construction and Municipal Infrastructure Projects	September 2021
……	……	……	……
1376	Tancheng County	Notice of the Tancheng County Bureau of Culture, Radio, Television, Press and Publication on Issuing the Implementation Plan for Accelerating the Reform of Streamlining Administration, Delegating Powers, Improving Regulation, and Optimizing Services and Optimizing the Business Environment	May 2018
1377	Xintai City	Notice of the People's Government of Xintai City on Issuing the Opinions on Further Optimizing the Business Environment to Support the Development and Construction of the City's Power Grid and Ensure Reliable Electricity Supply	February 2020

Table 3. Examples of triples for selected policy documents.

Subject	Relation	Object	Description
Negative List for Market Access (2025 Version)	Applicable to	Nationwide	Scope of application
Negative List for Market Access (2025 Version)	Evolved from	Negative List for Market Access (2018 Version)	Evolution relationship
Negative List for Market Access (2025 Version)	Includes	Enterprise registration facilitation	Inclusion relationship
Enterprise registration facilitation	Targets	Enterprises	Target object
Enterprise registration facilitation	Belongs to	Market access	Domain
Enterprise registration facilitation	Implemented by	Market regulatory department	Implementing body

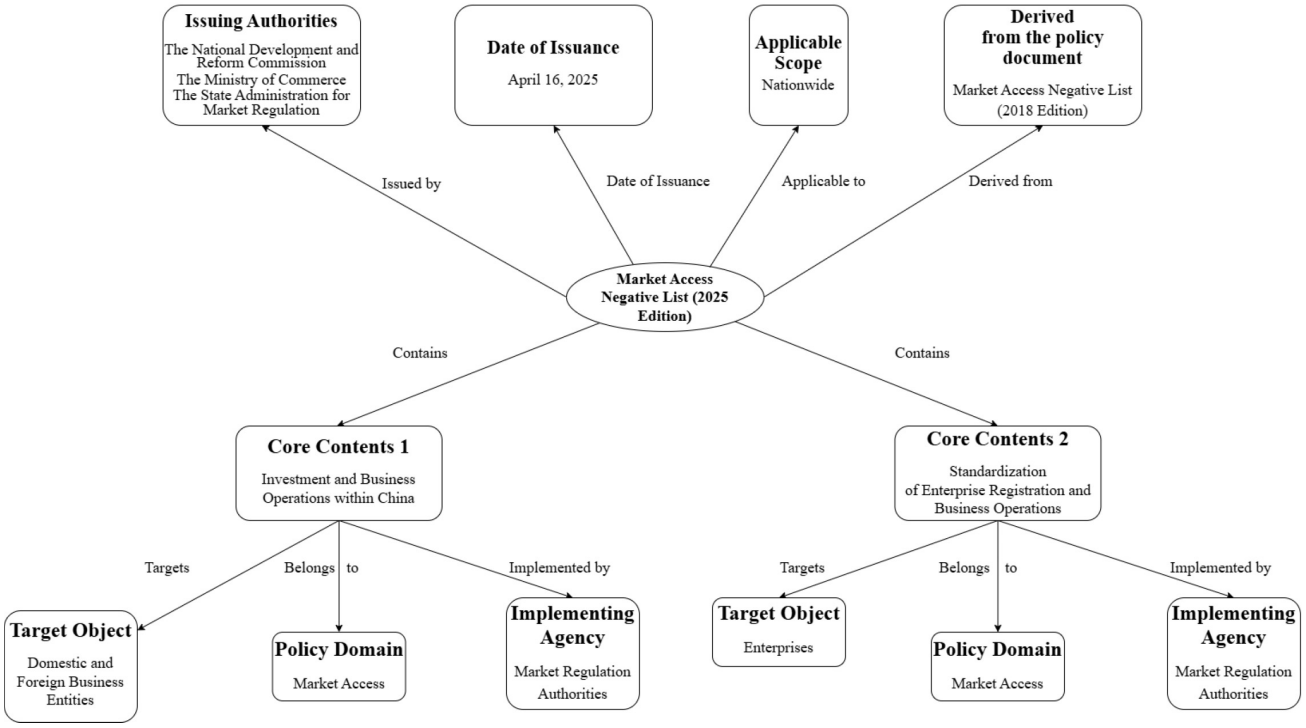


Fig. 9. Example of key attribute analysis for a policy document.

ment as the reference point, this study analyzed and visualized its key attributes, including the issuing authorities, date of issuance, policy antecedents, applicable scope, and core contents. The specific details are illustrated in Fig. 9.

6.2 Knowledge Acquisition and Representation of Business Environment Policy Documents

On the basis of thematic knowledge sources, the business environment policy text is further transformed into fine-grained knowledge units, which are stored in a structured way in relational, vector, and graph databases forming a three-tier data architecture to support knowledge organization and knowledge reasoning. PostgreSQL (PostgreSQL Global Development Group, open-source community) is used to store the original policy text and structured clause records, pgvector (pgvector project, no single location) is used to support semantic similarity retrieval, and Neo4j (Neo4j, Inc., San Mateo, CA, USA) is used to organize entity relationships with inference links through nodes, relationships, and attributes, providing support for semantic association, graph traversal, and knowledge reasoning. Neo4j also provides the Cypher query language, which enables the efficient storage, retrieval, and association analysis of policy knowledge. Such an architecture is essentially a hierarchical disassembly and organization of "policy documents–knowledge units–policy entities–semantic relationships". Consequently, government documents are transformed from static textual records into an organized knowledge network that supports semantic retrieval, association analysis, and policy reasoning.

At the knowledge acquisition level, key entities such as policy subjects, policy objects, time points, and quantitative indicators are identified from policy provisions, and the problem of the heteronymity of the same entity in different documents is solved through normalization, such as unifying "General Administration of Taxation" and "State Administration of Taxation" into a standard entity. Similarly, different expressions referring to the same policy instrument, government department, or target group are also normalized according to predefined rules to ensure the consistency of knowledge organization across multiple policy documents. Further, based on the syntactic structure and predefined relationship framework, the system can extract the "entity–relationship–entity" triad, such as the policy document and measure, measure and applicable object, measure and domain to which it belongs, and measure and executing body. This treatment compresses policy knowledge originally dispersed in long texts into standardized knowledge units and preserves the semantic boundaries in their policy contexts, thus laying the foundation for subsequent correlation and reasoning in knowledge organization.

Regarding knowledge representation, this study organizes the key elements of business environment policies into a visual semantic network using relations. And represent policy documents, policy domains, policy subjects, policy instruments, administrative regions, and issuing authorities as different types of nodes, while their logical associations are represented through semantic relationships. According to different classification methods, such as regional and issuing authority nodes, policy documents can

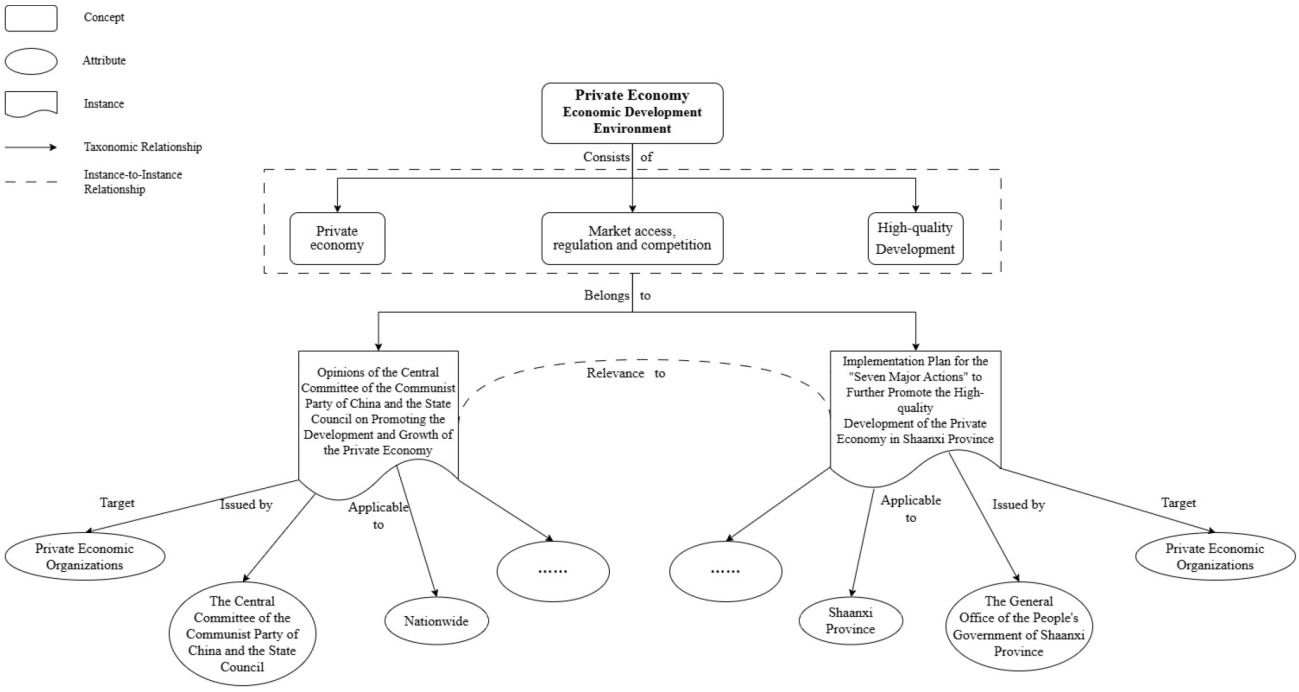


Fig. 10. Example of a semantic association network for knowledge representation.

be associated with administrative division nodes, such as provinces, cities, and counties, to identify regional policy differences and local innovation characteristics. Within a given domain, the subordination of different concepts can be determined through hierarchical relationships to enhance the efficiency of knowledge navigation and retrieval. Thus, the focus of knowledge organization is no longer on simply storing terms but on transforming the policy text into a hierarchical, associative, and interpretable knowledge network through nodes and relationships (Krishnamurthy and Awazu, 2016).

Fig. 10 uses two policies—the "Opinions of the Central Committee of the Communist Party of China and the State Council on Promoting the Development and Growth of the Private Economy" and the "Implementation Plan for the "Seven Major Actions" to Further Promote the High-quality Development of the Private Economy in Shaanxi Province"—as examples to illustrate in detail this study's analysis of the logical relationships among various nodes, such as administrative regions, policy documents, policy domains, and issuing authorities.

6.3 Knowledge Reasoning in the Thematic Knowledge Base for Business Environment Policies

An outstanding feature of business environment policies is their notable temporal evolution and frequent dynamic associations between policy documents. In the knowledge reasoning process, this study takes the relationship of "repeal, supplement, and revision" as the logical basis of mapping reasoning, and these relationships are directly incorporated into the knowledge graph during knowledge organization. For the implicit or hidden associations between policies, semantic similarity between policy clauses is further calculated based on vector representations, so that both explicit facts and probabilistic semantic associations can be considered during reasoning. Thus, a thematic knowledge base needs not only to identify static semantic relationships but also be able to organize the policy change process into a traceable and replayable temporal chain (Colombo et al., 2025).

The key to policy evolution analysis is showing what kinds of relational changes have occurred for which knowledge units. Through such a chain-based organization, when users raise a specific policy question, the system employs the Cypher query language to retrieve all possible policy chains connected with the target policy through relationships such as revision, supplementation, repeal, and replacement. These policy chains are automatically sorted according to the issuing time of policy documents and then presented in the form of an evolution graph. The system can link many seemingly scattered documents into a policy influence path, thereby revealing how the governance focus of business environment policies changed at different stages. Every reasoning result is accompanied by a complete evidence chain, in which the intermediate reasoning process, associated policy documents, and semantic relationships are displayed together with the final conclusion. This approach allows users to trace every reasoning result back to its original policy clauses, thereby improving the transparency and interpretability of the reasoning process. Such evolution chains serve not only historical tracing but also policy comparison and forward-looking analysis.

Furthermore, the study presented user query results in the form of policy evolution relation graphs, helping users examine the chains formed by relations such as supplementation, revision, and abolition for a given policy topic and thereby understand the trajectory of policy change. In the system, users can freely define different retrieval conditions, such as issuing authority, issuing time, policy domain, or target group, to obtain relevant policy documents. Based on these conditions, the system filters candidate policies and then automatically organizes their semantic relationships into a visual policy evolution graph, in which policy nodes, relationship types, representative policy changes, and major policy contents are displayed simultaneously. From a knowledge organization perspective, this dynamic representation is very important because it shows that relations in the knowledge base are not static one-time annotations but can be continuously updated with version management and reasoning support. In other words, a thematic knowledge base organizes not only currently effective policies but also the way policies have evolved to their present state step by step. This is precisely what distinguishes evidence-based decision-oriented knowledge organization from ordinary document retrieval systems.

Based on the semantic associations that have been established, the subject knowledge base can further support the knowledge reasoning process in policy analysis. Fig. 11 uses a selection of policy provisions as examples to illustrate how the knowledge base, based on ontological relationships and rule constraints, can identify and track semantic connections between relevant policy documents to enable further knowledge inference. This, in turn, reveals the evolutionary logic of relevant policies and provides ample material and insights for subsequent evidence-based decision-making. Therefore, the framework proposed in this study not only supports traditional policy document retrieval but also enables more in-depth semantic exploration and evidence-based decision-making.

6.4 Thematic Knowledge Services for Business Environment Policies to Support Evidence-Based Decision-Making

Building a thematic knowledge base for government documents does not end with knowledge extraction, semantic association, and evolution representation, as its ultimate goal is to turn organized knowledge resources into knowledge services that can directly support decision-making. Based on the results of knowledge unit organization, semantic network construction, and policy evolution tracing, the system can provide multilevel knowledge support for users around the business environment policy theme (Workman et al., 2024).

In terms of service forms, the thematic knowledge base first offers semantic retrieval. Unlike traditional keyword-based retrieval, semantic retrieval no longer relies on literal matching but rather understands user queries based on knowledge units and their relations and returns policy knowledge that better matches the topic, clauses, domain, and time conditions. For example, when a user submits a natural language query "political sanctions against relevant personnel for damaging the business environment", the system does not literally search for these terms but maps the query statement and the huge document library into a unified high-dimensional semantic vector space. In this space, the meaning of the text is transformed into computable vectors, and the system calculates the similarity between these vectors to find the text fragment from the document library that is semantically closest to the user's query intent. Semantic vectors are generated through the Qwen3-embedding model, which can map user queries and knowledge units extracted from policy clauses into a high-dimensional semantic vector space, turning the semantic information in policy texts into computable vector embeddings. Semantic vectors are generated based on knowledge units extracted from policy clauses and stored in a pgvector vector database. PostgreSQL is used to keep the original policy texts and metadata. During retrieval, vector similarity search calculates the semantic similarity between the query vector and knowledge unit vectors stored in pgvector, allowing the system to identify policy knowledge that is semantically related instead of only matching literal keywords. By combining vector similarity search with filters such as the issuing department, policy level, release date, and policy domain, one can account for both semantic relevance and policy constraints. The system matches the query with knowledge units and their semantic connections, enabling the return of the most relevant policy texts and providing the context and relationships between them, thus improving search result accuracy and completeness. Ultimately, the system returns a structured list of results sorted by confidence level, with each item explicitly displaying the policy title, symbol, issuer, date of issuance, and snippet of evidence text. The results are shown in Fig. 12. The interface supports semantic query transformation, metadata-based filtering, policy content retrieval, and semantic reasoning for evidence-oriented policy analysis.

Moreover, the system can provide a knowledge quiz service that maps the user's natural language questions to a structured knowledge base and provides direct traceable answers or evidence summaries using retrieval and extraction. The knowledge quiz aims not only to return a list of relevant documents but also to extract key sentences from the retrieved relevant policy clauses, cluster them in chronological order, and return them, finally presenting a structured policy overview and thus helping the user rapidly locate the relevant policy points. To improve the reliability of the generated answers, the system retrieves semantically related policy clauses from the vector database, combines the entity relationships and policy associations stored in Neo4j to expand the retrieval scope, and finally generates answers together with the original policy evidence. In this

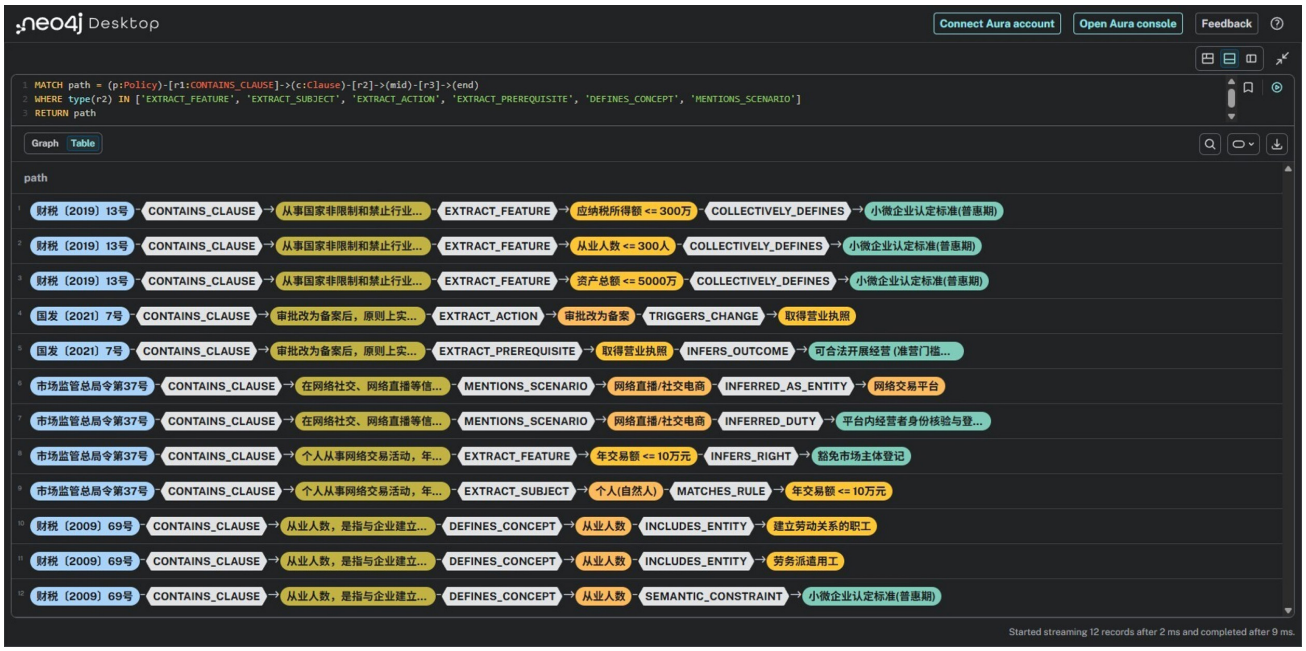


Fig. 11. Example of knowledge reasoning process in policy analysis.

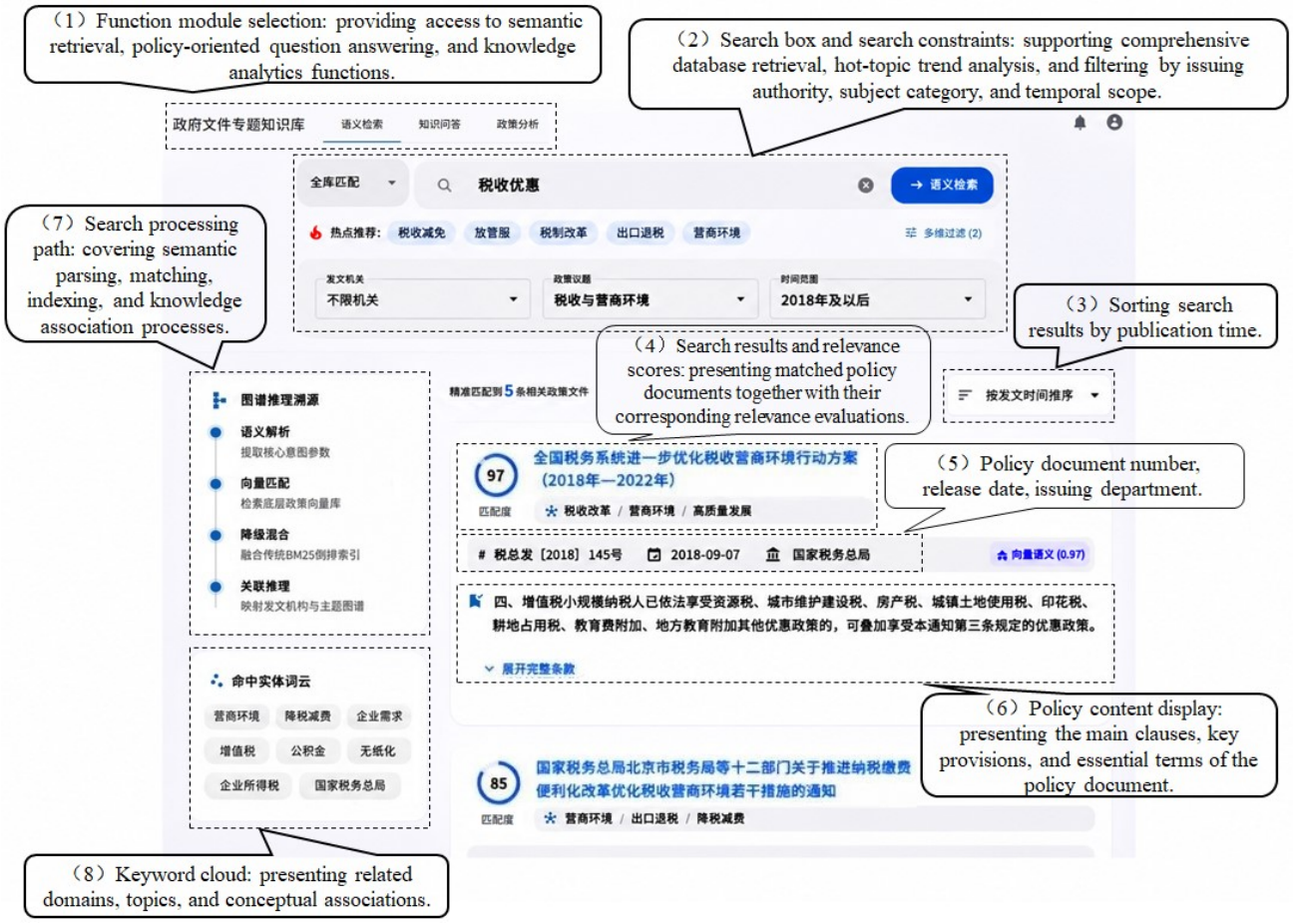


Fig. 12. Semantic retrieval interface of the government document thematic knowledge base.

way, every answer can be traced back to the corresponding policy documents and clauses, which helps avoid unsupported responses generated only by language models. For the topic of business environment, this type of service can

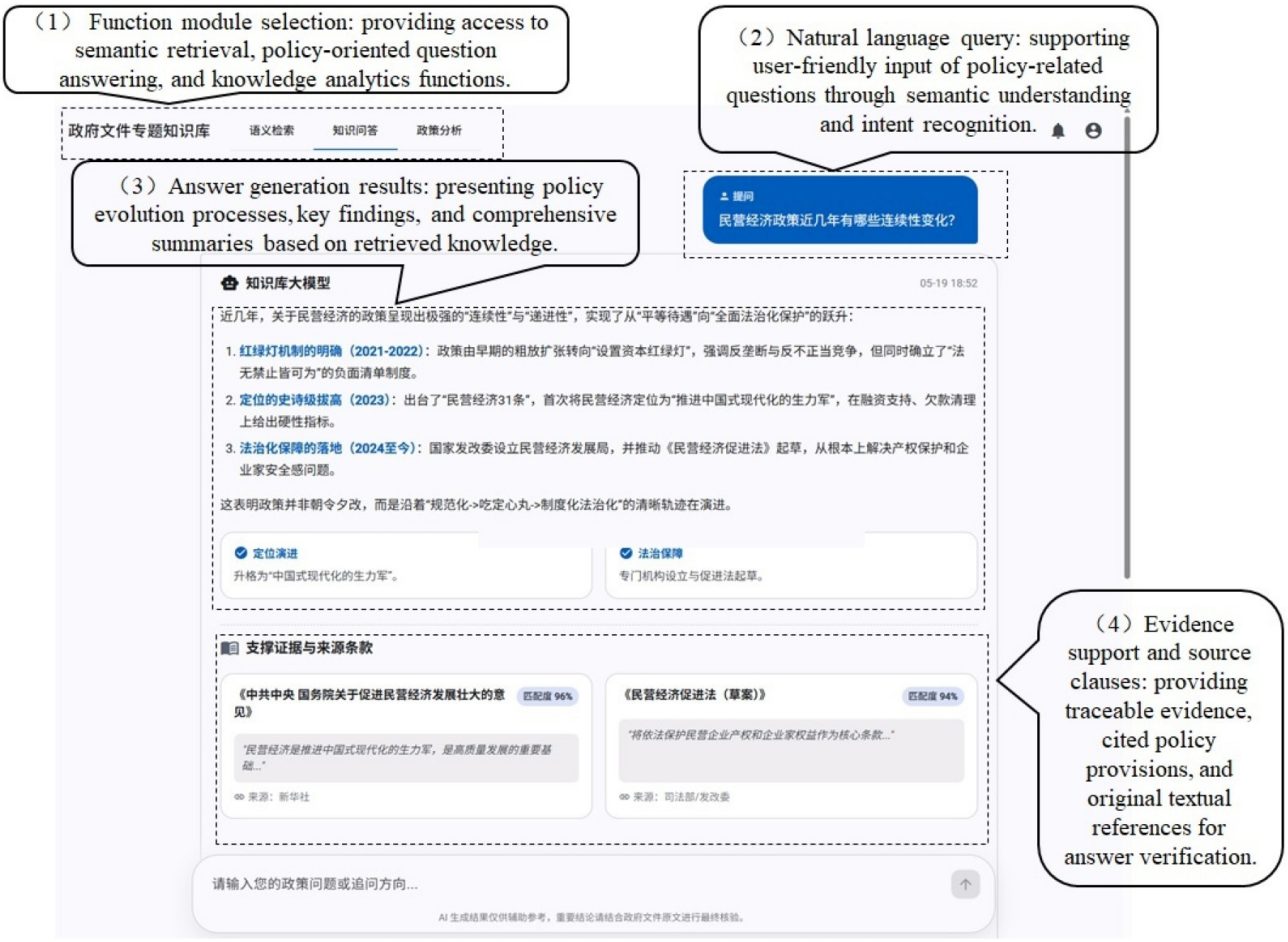


Fig. 13. Knowledge question-answering interface of the government document thematic knowledge base.

more effectively organize cross-disciplinary dispersed policy information such as industry, taxation, finance, and regulation, and improve the efficiency of knowledge acquisition (Phua et al., 2024). Fig. 13 presents the knowledge question-answering interface of the government document thematic knowledge base. Users can select different functional modules and submit policy-related questions through natural language queries. The system generates structured answers based on semantic analysis and knowledge association. Relevant policy clauses and supporting evidence are provided to improve the interpretability and reliability of the generated answers, thereby supporting evidence-oriented policy analysis and decision-making.

In addition, the thematic knowledge base can present the historical path of policy change through evolutionary relationship diagrams, etc., so that users can intuitively grasp the relationship between the supplementation, amendment, and repeal of provisions on a certain topic. This type of service is not a mere display of information but a visual expression of the results of knowledge organization, which transforms the policy logic originally hidden in the text into an interpretable and traceable knowledge structure, thus enhancing policy understanding and comparative analysis. The evolution graphs are generated according to the temporal relationships and policy dependency relations stored in the graph database. By querying policy nodes and relationship paths with Cypher, the system can automatically organize policy evolution chains and visually present the development process of specific policy topics in chronological order. During comparison, the system aligns policy knowledge units according to policy entities, semantic relations, and time attributes and highlights newly added, revised, retained, or abolished policy contents, thereby helping users rapidly identify policy differences and evolution characteristics. Policy simulation is based on the comparative analysis of historical facts to achieve future-oriented policy analysis. Users define policy parameters and external scenario assumptions, and the system simulates the potential consequences of these assumptions over a specified time horizon. The outputs are presented in an explainable and traceable format, thereby facilitating option selection and risk assessment in policy decision-making. The results are shown in Fig. 14. The knowledge services provided by the knowledge base are essentially the extension and transformation of the results of knowledge organization in specific application scenarios, which can better serve the needs of evidence-based decision-making (Gao and Li, 2012).

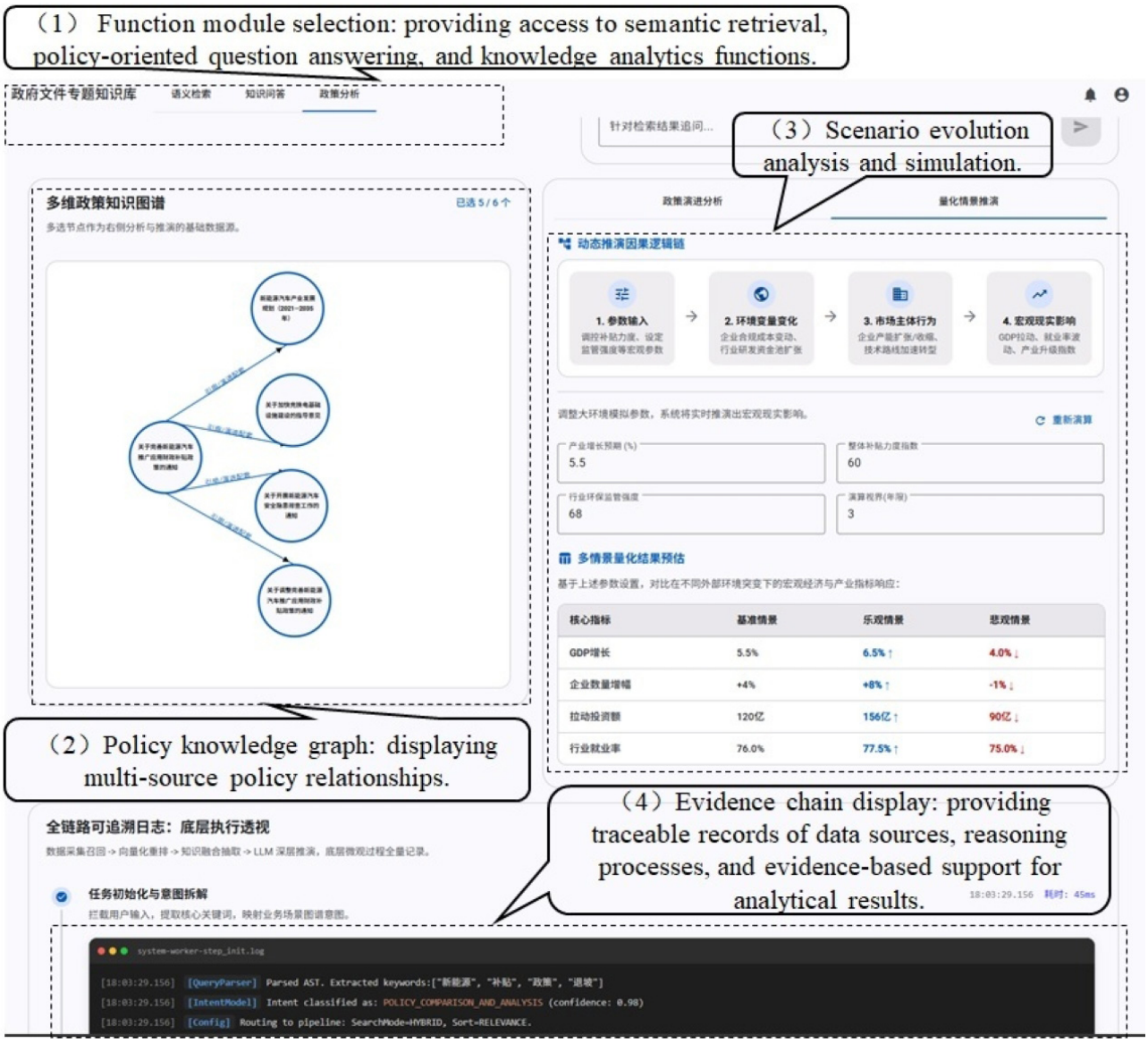


Fig. 14. Interface of policy analysis results in the government document thematic knowledge base.

In summary, the thematic knowledge base constructed herein is capable of not only storing doing-business policies but also of directly serving evidence-based decision-making by supporting cross-domain coupled semantic retrieval, comparative analysis, and evolutionary path tracing. This further confirms that multidomain coupling is not just a theoretical concept but a form of knowledge organization that can be practiced and serve decision-making.

7. Conclusion

The thematic knowledge base for business environment policies achieves the transformation from policy texts to knowledge units, semantic networks, and finally to evolution chains. Structural processing improves data standardization, entity recognition, and relation extraction enhance the computability of knowledge, and cross-domain relation modeling makes the multidimensional connections among policies explicit. This framework overcomes the document-centered limitation of traditional government document management by incorporating policy evolution into the knowledge organization framework, thus supporting historical tracing and relation reasoning. Based on this system, the thematic knowledge base provides evidence-oriented knowledge services, including semantic retrieval, knowledge question answering, policy comparison, policy evolution analysis, and policy simulation, thereby supporting evidence-based decision-making in different policy scenarios. Although the case study focuses on business environment policies, the proposed framework may provide some reference for thematic knowledge base construction in other government policy domains. However, further validation is needed before applying it to different policy scenarios.

However, the current validation is based only on the business environment policy theme, and further verification is required to extend the framework to other policy domains with different knowledge characteristics. In addition, as the number of policy documents continues to increase, large-scale knowledge construction may introduce challenges in entity consistency, semantic association accuracy, and graph storage efficiency. At the same time, government documents are continuously updated through issuance, revision, supplementation, and repeal, which places higher requirements on the dynamic updating and maintenance of the knowledge base.

Future research could more extensively focus on knowledge unit organization, semantic modeling, and evolution representation. More attention should be paid to improving the cross-domain adaptability of the framework, optimizing large-scale automatic knowledge construction, and enhancing dynamic knowledge updating mechanisms. Furthermore, integrating large language models into semantic retrieval, knowledge question answering, and knowledge reasoning may improve semantic understanding, reasoning capability, and human–computer collaborative decision support, thereby providing more comprehensive and reliable evidence for government decision-making.

Availability of Data and Materials

The dataset used in this paper is available at the following link: https://doi.org/10.6084/m9.figshare.35093620.

Author Contributions

XH: Writing—review & editing, Resources, Methodology, Conceptualization, Supervision. ZL: Writing—original draft, Writing—review & editing, Visualization, Formal analysis. HZ: Writing—original draft, Formal analysis, Investigation, Validation. LL: Writing—original draft, Visualization, Formal analysis, Investigation, Validation. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Acknowledgment

We extend our heartfelt appreciation to all the experts and participants who generously contributed their time, insights, and professional perspectives through interviews and evaluations.

Funding

This research was funded by The National Natural Science Foundation of China, "Research on Intelligent Evidence-Based Policymaking Information Awareness and Its Dynamic Deduction Driven by Knowledge Computing" (Grant No. 72374082).

Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used ChatGPT-3.5 in order to check spelling and grammar and enhance the figures. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

References

Allemang D, Hendler J. Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL. Morgan Kaufmann Publishers: Burlington. 2011.

Batty M. Digital twins. Environment and Planning B: Urban Analytics and City Science. 2018; 45: 817–820. https://doi.org/10.1177/2399808318796416

Bizer C, Heath T, Berners-Lee T. Linked Data - The Story So Far. International Journal on Semantic Web and Information Systems. 2009; 5: 1–22. https://doi.org/10.4018/jswis.2009081901

Burkhauser RV, Burkhauser SV. Policy research institutes' role in the development of evidence for evidence-based policymaking in the United States. Journal of Policy Analysis and Management. 2024; 43: 1260–1269. https://doi.org/10.1002/pam.22593

Cairney P. The myth of 'evidence-based policymaking' in a decentred state. Public Policy and Administration. 2022; 37: 46–66. https://doi.org/10.1177/0952076720905016

Chen J, Lou Z, Chen G, Zhang C, Li Y. Research on the Application of AI-Based Intelligent Decision Support Systems in E-Government Services. Journal of Organizational and End User Computing. 2025; 37: 1–25. https://doi.org/10.4018/joeuc.392618

Chen Y, Pan X, Liu P, Vanhaverbeke W. How does digital transformation empower knowledge creation? Evidence from Chinese manufacturing enterprises. Journal of Innovation & Knowledge. 2024; 9: 100481. https://doi.org/10.1016/j.jik.2024.100481

Choi Y, Fox AM. Fact-value framework for adjudicating public health policy debates. Review of Policy Research. 2022; 39: 820–844. https://doi.org/10.1111/ropr.12495

Choi YJ, Jeon MS, Yoon SY. Evidence-informed policy-making in an uncertain world: Exploratory analysis of interactions between mental models, evidence, and uncertainty. Korean Public Administration Review. 2016; 50: 243–270. https://doi.org/10.18333/kpar.50.2.243

Chu JW, Lin HW. Research on the composition, characteristics and operational evolution mechanism of big data knowledge ecosystem. Information Science. 2022; 40: 18–25, 63. https://doi.org/10.13833/j.issn.1007-7634.2022.04.003 (In Chinese)

Colombo A, Bernasconi A, Ceri S. An LLM-assisted ETL pipeline to build a high-quality knowledge graph of the Ital-

ian legislation. Information Processing & Management. 2025; 62: 104082. https://doi.org/10.1016/j.ipm.2025.104082

Dawes SS. Stewardship and usefulness: Policy principles for information-based transparency. Government Information Quarterly. 2010; 27: 377–383. https://doi.org/10.1016/j.giq.2010.07.001

Deng H, Duan SX, Wibowo S. Digital technology driven knowledge sharing for job performance. Journal of Knowledge Management. 2023; 27: 404–425. https://doi.org/10.1108/jkm-08-2021-0637

Francelin MM, Meschini FO. Knowledge Organization and the Technological Challenges of the Big Data Era. Knowledge Organization. 2025; 52. https://doi.org/10.31083/ko40017

Gao WX, Li B. Research on the framework model and operation mechanism of government knowledge management. Information Studies: Theory & Application 2012; 35: 23–27. (In Chinese)

Geng ZJ, Chen JH. The Assumption of the Construction of the Emergencies Archives Knowledge Base. Archives Science Bulletin. 2021: 63–70. (In Chinese)

Gorskis H, Borisov A. Reusable Components in Knowledge-based Configuration Design Systems. Information Technology and Management Science. 2013; 16: 66–72.

Gu Y, Xia Y. Analysis on Business Models of Public Information Reuse Under Open Data Environment. Library and Information Service. 2017; 61: 5–13. https://doi.org/10.13266/j.issn.0252-3116.2017.04.001 (In Chinese)

Guo W, Fan X. A knowledge-base for web information integration and retrieval. In Proceedings of the 2009 WRI Global Congress on Intelligent Systems (Vol IV, pp. 188–192). Xiamen, China. IEEE. 2009. https://doi.org/10.1109/GCIS.2009.449

Guo Y, Guo B. Design on government decision support system of China automotive industry security. In Fourth International Conference on Cooperation and Promotion of Information Resources in Science and Technology (COINFO 2009) (pp. 16–17). Beijing, China. IEEE. 2009. https://doi.org/10.1109/COINFO.2009.34

Hashemi P, Khadivar A, Shamizanjani M. Developing a domain ontology for knowledge management technologies. Online Information Review. 2018; 42: 28–44. https://doi.org/10.1108/oir-07-2016-0177

Head BW. Toward More “Evidence-Informed” Policy Making? Public Administration Review. 2016; 76: 472–484. https://doi.org/10.1111/puar.12475

Hjørland B. Semantics and knowledge organization. In: Annual Review of Information Science and Technology. Information Today. 2007; 41: 367-405. https://doi.org/10.1002/aris.2007.1440410115

Howlett M, Ramesh M. The two orders of governance failure: Design mismatches and policy capacity issues in modern governance. Policy and Society. 2014; 33: 317–327. https://doi.org/10.1016/j.polsoc.2014.10.002

Hu H, Dai T, Gao X, Chen Q, Lei X. Development of the health decision support system (HDSS) in Canada and its implications in China In: 2016 12th International Conference on Natural Computation and 13th Fuzzy Systems and Knowledge Discovery (ICNC-FSKD). IEEE: Piscataway, NJ, USA. 2016. https://doi.org/10.1109/FSKD.2016.7603381

Huang XP, Pan RZ, Mao YH, Zhu SY, Xu SQ. Construction of Subject Knowledge Base of Government Website Pages Based on Domain Ontology: Taking the Subject of“COVID-19 Vaccine Science Popularization”as an Example. Library and Information Service. 2022; 66: 35–46. https://doi.org/10.13266/j.issn.0252-3116.2022.17.004 (In Chinese)

Hukkinen JI, Eronen JT, Janasik N, Kuikka S, Lehikoinen A, Lund PD, et al. The policy operations room: Analyzing path-dependent decision-making in wicked socio-ecological disruptions. Safety Science. 2022; 146: 105567. https://doi.org/10.1016/j.ssci.2021.105567

Imler NB. Strengthening Central Intelligence: An Evidence-Based Framework for Action. International Journal of Intelligence and CounterIntelligence. 2018; 31: 544–567. https://doi.org/10.1080/08850607.2018.1466569

Kou Y, Chen M. Digitalization in Chinese museums: A policy evolution perspective. Museum Management and Curatorship. 2025; 40: 609–641. https://doi.org/10.1080/09647775.2025.2467704

Krishnamurthy R, Awazu Y. Liberating data for public value: The case of Data.gov. International Journal of Information Management. 2016; 36: 668–672. https://doi.org/10.1016/j.ijinfomgt.2016.03.002

Laihonen H, Kokko P. Knowledge management and hybridity of institutional logics in public sector. Knowledge Management Research & Practice. 2023; 21: 14–28. https://doi.org/10.1080/14778238.2020.1788429

Li HT, Guo J. An analysis of the regulations and policies of electronic records evidence in Guangdong Province facing single-track system reform. Archives Science Bulletin. 2021; 6: 40–49. https://doi.org/10.16113/j.cnki.daxtx.2021.06.004 (In Chinese)

Ma YM, Li XX, Wang YF. Research on clue discovery in the semantic analysis of public policy texts in the context of evidence-based decision making. Information Studies: Theory & Application. 2025; 48: 132–140. https://doi.org/10.16353/j.cnki.1000-7490.2025.07.015 (In Chinese)

Mele G, Capaldo G, Secundo G, Corvello V. Revisiting the idea of knowledge-based dynamic capabilities for digital transformation. Journal of Knowledge Management. 2024; 28: 532–563. https://doi.org/10.1108/jkm-02-2023-0121

Moura MA. Information and Code Biases: Social Differentiation, Intersectionality and Decoloniality in Knowledge Organization Systems. Knowledge Organization. 2024; 51: 514–520. https://doi.org/10.5771/0943-7444-2024-7-514

Mu H, Wu P, Su W. Construction of Knowledge Graph for Emergency Resources. International Journal of Intelligent Systems. 2024; 2024: 1–18. https://doi.org/10.1155/2024/6668559

National Development and Reform Commission, Ministry of

Commerce of the People's Republic of China. Negative list for market access (2018 edition). 2018. Available at: https://www.ndrc.gov.cn/xxgk/zcfb/tz/201812/t20181228_962356_ext.html (Accessed: 16 May 2026).

National Development and Reform Commission, Ministry of Commerce of the People's Republic of China, State Administration for Market Regulation. Negative list for market access (2025 edition). 2025. Available at: https://www.ndrc.gov.cn/xwdt/ztzl/sczrfmqd/tzggg1/202504/t20250423_1397351_ext.html (Accessed: 16 May 2026).

Parkhurst J. The politics of evidence: From evidence-based policy to the good governance of evidence. Routledge: London. 2016.

Paulheim H. Knowledge graph refinement: A survey of approaches and evaluation methods. Semantic Web. 2017; 8: 489–508. https://doi.org/10.3233/sw-160218

Peters BG, Tarpey M. Are wicked problems really so wicked? Perceptions of policy problems. Policy and Society. 2019; 38: 218–236. https://doi.org/10.1080/14494035.2019.1626595

Phua SZ, Hofmeister M, Tsai YK, Peppard O, Lee KF, Courtney S, et al. Fostering urban resilience and accessibility in cities: A dynamic knowledge graph approach. Sustainable Cities and Society. 2024; 113: 105708. https://doi.org/10.1016/j.scs.2024.105708

Rajabi E, Midha R, de Souza JF. Constructing a knowledge graph for open government data: the case of Nova Scotia disease datasets. Journal of Biomedical Semantics. 2023; 14: 4. https://doi.org/10.1186/s13326-023-00284-w

Schneider MD, Slanickova H, Rubin H, Heesen R, Schwenkenbecher A, Bortolus A, et al. Revisiting the Base in Evidence-Based Policy. Political Studies. 2026; 74: 210–228. https://doi.org/10.1177/00323217251320728

Shang ZC, Liu Y. The relative value of 'evidence' in evidence-based policy making: An analysis based on a population-wide salt reduction. Studies in Science of Science. 2023; 41: 2147–2154. https://doi.org/10.16192/j.cnki.1003-2053.20230103.003 (In Chinese)

Shi Z, Gu J, Huang WX, Wang L, Peng F, Chen JX. Research on the Construction of the Think Tank Knowledge Base Oriented to International Communication. Journal of Intelligence. 2024; 43: 173–181. https://doi.org/10.3969/j.issn.1002-1965.2024.03.024 (In Chinese)

Stanton MCB, Roelich K. Decision making under deep uncertainties: A review of the applicability of methods in practice. Technological Forecasting and Social Change. 2021; 171: 120939. https://doi.org/10.1016/j.techfore.2021.120939

United States. Federal Records Act of 1950, Pub. L. No. 81-754, 64 Stat. 578. 1950.

W3C. RDF 1.1 Concepts and Abstract Syntax. 2014. Available at: https://www.w3.org/TR/rdf11-concepts/ (Accessed: 3 May 2026).

Wang F. Studies on government information publicity, sharing and data openness from the perspective of information science: Twenty years review and future outlook. Library & Information. 2022; 42: 51–65. (In Chinese)

Wang SL, Li HJ, Meng QH, Zhang L, Yao XN. Research on the implementation of semantic retrieval services for domain knowledge bases based on deep learning models. Research on Library Science. 2024; 10: 40–49. https://doi.org/10.15941/j.cnki.issn1001-0424.2024.10.011. (In Chinese)

Wang Y, Gong YY, Li J, Zhu Z, Li J. Agentic Information Architectures for Global Climate Governance: A Multi-Agent Decision-Support System for Cross-National Policy Analytics. Journal of Global Information Management. 2026; 34: 1–31. https://doi.org/10.4018/jgim.403439

Wang Z, Shao H, Chao B, Yang T. Policy Evolution of China's Critical Metals: An Integrated Analysis of Instruments and Networks. Sustainability. 2025; 17: 9001. https://doi.org/10.3390/su17209001

Wei K, Hao Q, Zhang B. Requirement Analysis of the Construction of Government's Decision-oriented Archives Knowledge Base. Archives Science Study. 2016: 32–35. https://doi.org/10.16065/j.cnki.issn1002-1620.2016.05.016 (In Chinese)

Wolf P, Skov Madsen E, Steppe JA. Bridging the theory-practice gap: a genealogical perspective on the most debated knowledge management challenges. Knowledge Management Research & Practice. 2024; 23: 263–286. https://doi.org/10.1080/14778238.2024.2379922

Workman M, Darch G, Denisart B, Roberts D, Wilkes M, Brown S, et al. A robust decision-making approach in climate policy design for possible net zero futures. Environmental Science & Policy. 2024; 162: 103886. https://doi.org/10.1016/j.envsci.2024.103886

World Wide Web Consortium. OWL 2 Web Ontology Language: Primer (Second Edition). 2012. Available at: https://www.w3.org/TR/owl2-primer/ (Accessed: 5 July 2026).

World Wide Web Consortium. SPARQL 1.1 Query Language. 2013. Available at: https://www.w3.org/TR/sparql11-query/ (Accessed: 5 July 2026).

Wu Y. Industrial Technology Innovation Accelerator: New Energy and Industrial Technology Development Organization. Competitive Intelligence. 2024; 20: 50–59. (In Chinese)

Yang C, Gu M, Albitar K. Government in the digital age: Exploring the impact of digital transformation on governmental efficiency. Technological Forecasting and Social Change. 2024; 208: 123722. https://doi.org/10.1016/j.techfore.2024.123722

Yang C, Huang C, Su J. A bibliometrics-based research framework for exploring policy evolution: A case study of China's information technology policies. Technological Forecasting and Social Change. 2020a; 157: 120116. https://doi.org/10.1016/j.techfore.2020.120116

Yang R, Du G, Duan Z, Du M, Miao X, Tang Y. Knowledge System Analysis on Emergency Management of Public Health Emergencies. Sustainability. 2020b; 12: 4410. https://doi.org/10.3390/su12114410

Yao Y, Ma X, Liu H, Yi J, Zhao X, Liu L. A semantic knowledge base construction method for information security. In 2014 IEEE 13th International Conference on Trust, Security

and Privacy in Computing and Communications (TrustCom) (pp. 803–808). Beijing, China. IEEE. 2014. https://doi.org/10.1109/TrustCom.2014.106

Zablith F, Antoniou G, d'Aquin M, Flouris G, Kondylakis H, Motta E, et al. Ontology evolution: a process-centric survey. The Knowledge Engineering Review. 2015; 30: 45–75. https://doi.org/10.1017/s0269888913000349

Zhai J, Hu F. From Interaction Barriers to Coupling Symbiosis: Exploring the Dilemma and Relief Path of Emergency Intelligence Collaborative Governance: Taking Major Public Health Emergencies as an Example. Information Studies: Theory & Application. 2023; 46: 110–118. https://doi.org/10.16353/j.cnki.1000-7490.2023.11.015 (In Chinese)

Zhang C, Zhang Z, Yang D, Ashourizadeh S, Li L. When cognitive proximity leads to higher evaluation decision quality: A study of public funding allocation. Frontiers in Psychology. 2021; 12: 697989. https://doi.org/10.3389/fpsyg.2021.697989

Zhang H, Zhao W, Han Z, Zhu J, Zhu Q, Ning X, et al. Template-based knowledge reuse method for generating high-speed railway virtual construction scenes. International Journal of Digital Earth. 2023; 16: 1144–1163. https://doi.org/10.1080/17538947.2023.2197259

Zhang J, Ruan X, Si H, Wang X. Dynamic hazard analysis on construction sites using knowledge graphs integrated with real-time information. Automation in Construction. 2025a; 170: 105938. https://doi.org/10.1016/j.autcon.2024.105938

Zhang L, Wang J, Wang X, Gao Y. Research on cross-city emergency management collaboration mechanism in major emergencies: insights from a knowledge management perspective. Journal of Knowledge Management. 2025b; 29: 735–751. https://doi.org/10.1108/jkm-05-2023-0442

Zhao X, Cao Y, Wang J, Fan X, Chen M. A hierarchical spatio-temporal object knowledge graph model for dynamic scene representation. Transactions in GIS. 2023; 27: 1992–2016. https://doi.org/10.1111/tgis.13109

Zhitomirsky-Geffet M. Towards a diversified knowledge organization system: An open network of inter-linked subsystems with multiple validity scopes. Journal of Documentation. 2019; 75: 1124–1138. https://doi.org/10.1108/jd-10-2018-0163

Zhou J, Song X, Li Y, Gao Y, Zhang X. Building Real-Time Ontology Based on Adaptive Filter for Multi-Domain Knowledge Organization. IEEE Access. 2021; 9: 66486–66497. https://doi.org/10.1109/access.2021.3076833

Zhou K, Yao Z. Analysis of Customer Satisfaction in Tourism Services Based on the Kano Model. Systems. 2023; 11: 345. https://doi.org/10.3390/systems11070345