Influencing Factors and Mechanisms of Knowledge Service Effectiveness in Science and Technology Think Tanks Based on Grounded Theory

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Abstract

[Purpose/Significance] By exploring the influencing factors and mechanisms of action on the effectiveness of knowledge services in science and technology think tanks, we can promote the overall improvement and sustainable development of such effectiveness, thereby enhancing their value in decision-making consultation, and also provide a reference basis for designing measurement scales and evaluation systems for the effectiveness of knowledge services in science and technology think tanks. [Method/Process] This study employs the procedural grounded theory method, investigates the implementation of knowledge services in science and technology think tanks through in-depth interviews, and then conducts three-level coding analysis on the raw interview data, ultimately constructing a theoretical model of the influencing factors and mechanisms of action on the effectiveness of knowledge services in science and technology think tanks. [Results/Conclusions] The effectiveness of knowledge services in science and technology think tanks encompasses three dimensions: application value realization, theoretical research deepening, and supply-demand mechanism formation. Basic resources (supporting force), intelligent collaboration (guaranteeing force), user demand (driving force), and service characteristics (constructing force) jointly determine the level of knowledge service effectiveness, with significant mutual promotion and interdependence relationships existing among the factors across these dimensions. Among them, the relationship between user demand and think tank knowledge service effectiveness, as well as other factors, exhibits radial characteristics, tending toward the central position of knowledge services. Therefore, demand-driven collaborative integration of diversified institutional resources not only has a significant impact on think tank knowledge service effectiveness but also helps alleviate the tense "think tank-decision" supply-demand relationship, which should be emphasized in future policy formulation and knowledge service practice.

Full Text

Research on the Influencing Factors and Mechanisms of Knowledge Service Effectiveness in Science and Technology Think Tanks Based on Grounded Theory*

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Abstract

[**Purpose/Significance**] Exploring the influencing factors and mechanisms of knowledge service effectiveness in science and technology think tanks can promote the overall enhancement and sustainable development of their knowledge service capabilities, thereby enabling them to deliver greater decision-making consulting value and providing a reference basis for designing measurement scales and evaluation systems for think tank knowledge service effectiveness. [**Method/Process**] This study employs the programmatic grounded theory method, investigating the implementation of knowledge services in science and technology think tanks through in-depth interviews, then conducting three-level coding analysis on the raw interview materials, and finally constructing a theoretical model of the influencing factors and mechanisms of knowledge service effectiveness. [**Result/Conclusion**] Knowledge service effectiveness in science and technology think tanks encompasses three dimensions: application value realization, theoretical research deepening, and supply-demand mechanism formation. Basic resources (supporting force), wisdom synergy (guaranteeing force), user demand (driving force), and service characteristics (constructing force) jointly determine the level of knowledge service effectiveness, with significant mutual promotion and interdependence among these dimensional factors. Among them, the influence of user demand on think tank knowledge service effectiveness and other factors exhibits radial characteristics, positioning it at the center of knowledge services. Therefore, demand-driven collaborative integration of diversified institutional resources not only significantly impacts think tank knowledge service effectiveness but also helps alleviate the tense "think tank–decision-making" supply-demand relationship, warranting emphasis in future policy formulation and knowledge service practices.

Keywords: science and technology think tank; knowledge service; service effectiveness; influencing factors; programmatic grounded theory
Classification Codes: C932; G252

1 Introduction

President Xi Jinping has emphasized that "the key to Chinese-style modernization lies in scientific and technological modernization," and knowledge services from science and technology think tanks can effectively support new decisions and arrangements in national scientific innovation and development strategies. In recent years, think tank knowledge services have become a focal point across multiple disciplines including management and communication studies. Within information resource management, think tank knowledge services refer to the provision of optimal theories, strategies, and ideas for decision-makers addressing complex problems through knowledge acquisition, development, and innovation. Specifically, science and technology think tank knowledge services target issues related to scientific and technological development and policy strategies, leveraging advantageous fields, integrating diverse resources, and discerning changes in national governance demands to deliver actionable and leading knowledge products.

Knowledge service, alongside theoretical innovation, public diplomacy, and public opinion guidance, represents a core function through which think tanks deliver decision-making consulting value. It can be further understood as a combination of "positioning + resources + demand + products," emphasizing the collaborative integration and application of multi-dimensional production factors to produce high-precision, cutting-edge outcomes that satisfy complex user needs. These outcomes can be manifested as intelligence knowledge, expert talent, and technical methods that solve practical problems. Knowledge service effectiveness refers to the overall effects generated by the interaction of various elements within this complex system. Our interviews revealed that the connotation of think tank knowledge service effectiveness can be analyzed from multiple perspectives, encompassing service outcomes, capabilities, quality, and satisfaction formed under the joint action of diversified resources within the system. This interpretation not only explains existing concepts but also expands their scope and orientation, providing references for multi-dimensional measurement of think tank knowledge service effectiveness.

Thus, knowledge service effectiveness in science and technology think tanks refers to the overall efficiency, capability, quality, and satisfaction generated by theoretical research, practical application, and supply-demand mechanisms under the interaction of different factors when facing user demands. This study primarily investigates which factors specifically influence knowledge service effectiveness in science and technology think tanks, how they exert influence, and the relationships among these factors. Since implementation status, efficiency, and capabilities can be examined through the firsthand experiences of think tank staff, while outcomes, quality, and satisfaction can be investigated through perceptions of users at different levels, a systematic understanding of knowledge service effectiveness requires considering both perspectives. Due to space limitations, this paper first explores knowledge service effectiveness from the think tank staff perspective, with subsequent research focusing on the user perspective. This study holds significant importance for promoting the evaluation, enhancement, and healthy development of science and technology think tank knowledge service effectiveness, thereby achieving greater decision-making consulting value.

2 Literature Review

Think tanks have formed diverse types of knowledge service entities while continuously exploring relationships with users in creating and exchanging policy knowledge to promote endogenous knowledge production and meet deeper needs of broader user groups. Current research primarily focuses on knowledge service mechanisms, models, and capability construction to explore how to elevate think tank knowledge service levels.

First, regarding knowledge service mechanisms, existing literature employs theoretical models such as system dynamics and value chain analysis, using case studies and systems theory to analyze the structure and elements of think tank knowledge service systems, constructing development mechanism models for think tank knowledge services, science and technology think tank knowledge service mechanisms, value-added knowledge product production mechanisms, and new knowledge construction processes in special fields, while revealing value co-creation mechanisms in local think tank knowledge services. Second, concerning knowledge service models, research grounded in knowledge management, synergy theory, and semantic association investigates local think tank strategic alliance knowledge synergy service models, publishing think tank knowledge service models based on service capability systems, and think tank knowledge service approaches based on customer demand. Third, regarding knowledge service capabilities, literature based on supply chain theory clarifies the scope and content of think tank knowledge service capabilities, constructs science and technology think tank knowledge service capability systems, and further proposes evaluation systems for party and government think tank knowledge service capabilities from stakeholder perspectives, while designing media think tank knowledge service capability evaluation systems by analyzing think tank knowledge service processes in specific contexts.

In summary, existing literature particularly emphasizes front-end issues of think tank knowledge services—namely, how to construct service mechanisms—while paying insufficient attention to back-end issues such as service outcomes and quality evaluation, and lacking research examining science and technology think tank knowledge services from an effectiveness perspective. Moreover, few studies specifically investigate influencing factors of science and technology think tank knowledge service effectiveness, with only limited research on individual service links such as quality influence mechanisms in intelligence collection and factors affecting output management. Although single-link factors can influence think tank knowledge services, insufficient service effectiveness often results from the joint action of multi-link factors. Therefore, systematic analysis of how multi-link factors affect think tank effectiveness and the relationships among different factors is lacking. Additionally, as knowledge-based organizational types of think tanks continue evolving with differences in functional positioning, funding sources, and administrative affiliation, existing research lacks specialized qualitative studies on the more in-depth and differentiated theme of science and technology think tank knowledge service effectiveness. Consequently, this study adopts grounded theory to analyze influencing factors and mechanisms of science and technology think tank knowledge service effectiveness from holistic and systematic perspectives, demonstrating potential interactive relationships among different factors to provide theoretical references for relevant institutions to evaluate and enhance think tank knowledge service effectiveness.

3 Methodology

3.1 Research Method

Grounded theory involves coding raw materials based on existing literature and theory according to researchers' knowledge and experience to construct theoretical models. This qualitative method offers strong explanatory power for systematically exploring practical social problems, particularly in emerging fields with insufficient research and theoretical gaps. Among the three major grounded theory schools, programmatic grounded theory posits that researchers must stay as close to data as possible to reveal patterns, connecting existing experience and hypothetical theories through causal relationships. Its coding procedure core lies in clarifying conceptual orientations, where orientation changes generate new conceptual connotations, and refined concepts interconnected through relational propositions collectively form a complete framework. This aligns with this study's logic of constructing new theory upon existing foundations. Since research on influencing factors and mechanisms of science and technology think tank knowledge service effectiveness remains inadequate, this study follows programmatic grounded theory principles to investigate key questions regarding which factors influence knowledge service effectiveness.

3.2 Theoretical Sampling

Based on purposive sampling principles, this study obtains core data through offline interviews, supplemented and validated by online database and platform data. Offline think tank and expert sampling criteria include: (1) Science and technology think tanks selected from different regions and types, included in either the Shanghai Academy of Social Sciences' "China Think Tank Report (2021-2022)" or Nanjing University's CTTI, or possessing regional representativeness, domain specialization, and industry relevance. (2) Established think tanks must be at least 20 years old; emerging think tanks at least 5 years old, with relatively complete organizational structures including research, consulting, management, and support departments. (3) Respondents must hold associate professor, professor, or researcher positions, with research fields distributed across scientific and technological innovation strategy, science and technology policy, and enterprise technological innovation, having worked in frontline positions for over 5 years and long provided knowledge services for local governments, macro-management departments, and enterprises, with team achievements receiving leadership instructions or published in important journals at least 5 times. Additionally, respondents should have extensive contact with various users, maintain fixed and smooth communication channels, and accurately perceive user needs. Ultimately, 18 think tank experts were selected. Online expert sampling criteria include: (1) Selecting from authoritative platforms such as science and technology think tank official websites, professional news media, domestic and international literature databases, and ResearchFriend. (2) Choosing think tank experts with high influence on these platforms (referenced by relevance, downloads, citations, and views of published materials). Five think tank experts were ultimately selected.

Following theoretical saturation sampling principles, coding analysis was conducted immediately after each interview and upon retrieving each piece of online data, with continuous comparison among data-data, data-codes, and code-code relationships until no new concepts, categories, or relationships emerged. Cross-validation through multi-source, multi-format interview data, databases, and online data achieved theoretical saturation. Previous experience indicates that 15-25 interviewees are appropriate for determining theoretical saturation. This study ultimately identified 23 experts as the research sample (see Table 1).

3.3 Data Collection

Data collection occurred from August 2023 to February 2024. (1) Interview data: One-on-one interviews were conducted with respondents, lasting 30-60 minutes and fully recorded with consent. Ambiguous content was probed during interviews. Recordings were transcribed, manually proofread and corrected, then returned to respondents for verification to ensure authenticity. Eighteen standardized transcripts were ultimately obtained. (2) Database and online data: Academic papers, interview reports, and expert commentaries were manually collected, such as professional news agency interviews with typical think tank experts containing rich details about service effectiveness perceptions rather than general social phenomena. After searching, reviewing, and evaluating, five materials were selected. These 23 documents were labeled Z1-Z23, with Z1-Z20 used for coding and Z21-Z23 for theoretical saturation testing. Based on existing research on influencing factors in think tank service links, this study further explored and expanded factors affecting science and technology think tank knowledge service effectiveness through phenomenon observation, refined core research questions, and preliminarily designed an interview outline. After consulting three senior science and technology think tank experts on interview content, modifications were made and two think tank experts were selected for pilot interviews to collect feedback from different angles. After discussion and revision, the formal semi-structured interview outline was finalized (see Table 2).

4 Data Analysis

4.1 Open Coding

Open coding primarily involves extracting initial concepts from all interview data through line-by-line, sentence-by-sentence, and paragraph-by-paragraph coding based on theoretical sampling, "local concepts," and abstraction principles, then determining conceptual categories, attributes, and dimensions. Three doctoral student coders performed the coding using NVivo 11.0 to facilitate analysis and track coding traces. Since the initially obtained concepts were numerous and partially overlapping, conceptual screening and merging were conducted during categorization, eliminating concepts with repetition frequency below 3 times. This ultimately generated 105 concepts and, based on existing research and content analysis, produced 26 subcategories (A1-A26) with high relevance and frequency (see Table 3).

Due to the substantial workload of open coding involving numerous reference points and coding content from raw materials, only partial coding processes are listed here due to space limitations (see Table 4).

4.2 Axial Coding

Axial coding refines, distinguishes, and clusters concepts obtained from open coding based on logical relationships such as similarity, causality, and sequence. It involves in-depth analysis and comparison of research target characteristics to excavate potential association clues among conceptual categories and establish higher-dimensional subcategories and main categories. Accordingly, this study inductively organized the 26 subcategories from open coding into 5 main categories (see Table 5).

4.3 Selective Coding

Selective coding identifies core categories and their typical relational structures based on main categories, usually through classification and abstraction methods. Through repeated comparison and analysis of the 5 main categories, this study extracted 10 key relationships (see Table 6) and developed the following storyline: Under holistic and systematic perspectives, science and technology think tank knowledge services are fundamentally supported by data and technology resources, with expert talent and group synergy serving as key guarantees. User demand can affect overall knowledge service effectiveness and influence the configuration and adjustment of other dimensional factors, necessitating orderly management of diverse user demands to construct knowledge service functions and characteristics. Ultimately, through the interaction of all dimensional factors, science and technology think tank knowledge service effectiveness (application value realization, theoretical research deepening, supply-demand mechanism formation) is optimized and stably delivered.

4.4 Theoretical Saturation Testing

After completing interview material coding, concept refinement, and revision, this study conducted coding analysis on materials Z21-Z23 based on coding results, continuously comparing data-data, data-codes, and code-code relationships. The new round of coding did not yield any new important concepts, categories, or relational structures. Documents Z21-Z23 still reflected the 5 main categories in the analytical framework of influencing factors of science and technology think tank knowledge service effectiveness, with extracted free nodes still covered by the constructed theoretical model. Therefore, the theoretical model in this study has achieved saturation.

5 Research Findings

The grounded analysis reveals two types of mechanisms: First, the mechanism through which each dimensional factor influences science and technology think tank knowledge service effectiveness. Data and technology serve as fundamental support for initiating and implementing think tank knowledge services, while evidence-oriented, data-driven output effectiveness relies more heavily on prior resource accumulation. Expert talent and group synergy constitute the fundamental guarantee for improving resource dissemination, sharing, and comprehensive judgment efficiency. The continuous evolution of user demands and behaviors represents the core driving force for establishing efficient and smooth supply-demand mechanisms, requiring orderly demand management as the driving force strengthens. Institutional policies and other service characteristics can empower and guide the effectiveness of think tank theoretical research and practical outcomes. Second, significant mutual promotion and interdependence exist among dimensional factors. For instance, expert talent and group synergy can enhance think tank management of basic resources and optimize service characteristics.

Evidently, the four main categories—basic resources, wisdom synergy, user demand, and service characteristics—influence and jointly affect science and technology think tank knowledge service effectiveness, leading to the incorporation of the service effectiveness dimension as a core category. Based on the organic integration of these four main categories, this study extracts a theoretical model with supporting force, guaranteeing force, driving force, and constructing force as core elements (see Figure 1).

[Figure 1: see original paper]

5.1 Mechanism of Basic Resources on Knowledge Service Effectiveness

(1) Data aspects. Data sources, characteristics, and types significantly influence the scientific rigor, depth, and efficiency of think tank research. As research content becomes increasingly broad and complex, some official and university think tanks obtain data through social surveys and expert consultations, conducting research through multi-agent, multi-category, multi-characteristic data fusion to ensure scientific rigor and authenticity. For example, they collaborate with database providers like Elsevier, Springer, and Clarivate through purchased service permissions to complete projects, or share data with government departments through "project-task" contracts. However, normalized partial data confidentiality and lag hinder timely and effective data acquisition, suppressing comparative analysis across time and regions—though this effect diminishes when think tanks possess long-accumulated data in advantageous fields. As one expert noted: "Data monopoly and timeliness affect think tank development. Only with timely data can correct conclusions be drawn. If a think tank owns data in a particular field, it occupies the high ground in that field" (N2). Government and statistical data are widely applied and play crucial roles due to their reliability and authority, but contradictory data from different departments affect overall research efficiency. Social network and survey data, increasingly valued for their high value in reflecting actual social states and trends, suffer from poor authority and completeness. Insufficient objective and in-depth empirical surveys by think tanks weaken the objectivity and depth of research conclusions. Literature data differs between academic and think tank research needs, often lacking critical data such as expert experience, scientific and technological indicators, and case knowledge—data that mostly originates from conferences, Weibo, WeChat, etc., thereby limiting literature's guiding role for think tank research.

Due to policy environments and capability awareness, data management in science and technology think tanks remains suboptimal, affecting research efficiency and data capabilities. In practice, data barriers among entities exacerbate acquisition difficulties. Official and research institute think tanks urgently need structured data from statistical bureaus, ministries of industry and information technology, and science and technology departments, but different hierarchical departments exhibit varying attitudes toward data disclosure, presenting problems such as incomplete data disclosure systems and untimely, inadequate disclosure that limit think tank research efficiency. As one expert stated: "Data barrier issues persist. When conducting government-commissioned research in a certain region, relevant statistical departments failed to provide two key indicators, impeding the research" (W1). Additionally, think tanks increasingly apply unstructured data such as social and network data, but due to inadequate self-management and external issues like data discontinuity and lack of standardization, further sorting and screening are required to extract beneficial information. Challenges include effectively identifying misleading foreign intelligence, excessive pursuit of data modeling forms, and lack of construction norms and unified standards for government- and enterprise-level scientific and technological indicator systems, causing indicators to constantly change or disappear. These factors reduce the reliability, validity, and depth of data management and project research, resulting in insufficient ideation and innovation in think tank outputs. Although various think tanks have implemented data governance, official and local think tanks differ in cognition and emphasis, with significant variations in data control processes—such as whether to adopt self-organization or collaborative governance, whether to clarify main business directions to select key fields and build targeted indicator systems, whether to complete research reports and extract methodologies, whether to achieve outcome transformation during service mid-term and implement post-evaluation—all affecting think tank data capability enhancement and research accumulation.

(2) Technology aspects. Technical method characteristics, types, and platforms influence think tank research effectiveness and service element deployment and optimization. Think tanks often establish different departments based on responsibilities and functions, each requiring different tools and methods such as survey statistics, basic theoretical research, and front-end strategic analysis. Different project categories also lead to varying technology applications. For instance, special studies focusing on single issues employ singular research methods, making substantive methodological breakthroughs difficult, while some studies rely solely on experienced strategic scientists' knowledge to grasp scientific and technological strategy issues. Think tank projects often comprise multiple sub-issues requiring personalized solutions, making technology integration positively affect research effectiveness. As one expert explained: "Think tank research involves multiple technologies. For example, a UK think tank's future technology foresight (FTA) integrates dozens of existing methods in one study because specific methods solve specific problems" (B4). Currently, most local think tanks are establishing deep analysis method libraries for big data and artificial intelligence, such as linking computer processing technology with government policy formulation to provide technical support for long-term tracking surveys and sustainable development. However, insufficient research on efficiently applying modern technologies to analyze scientific and technological dynamics and trends, and failure to deeply explore quantitative research models based on massive data analysis combined with expert qualitative analysis, hinder service standardization, normalization, and scientific rigor. Additionally, lack of service integration platforms obstructs overall think tank service effectiveness. Existing functional platforms struggle to systematically categorize and display specific data, personnel, and policy information within research scopes. Services such as multi-resource library construction, dissemination and sharing, and comprehensive integration seminars remain inadequate, lacking strong technical support for improving resource utilization, judgment depth and breadth, and accelerating knowledge service deployment. These factors inevitably increase think tank data management and technology application costs. As one expert noted: "Much of our big data analysis relies on the National Supercomputing Jinan Center, such as government informatization means, information system construction, and policy document simulation, all depending on computers—this represents an important future direction" (J3).

5.2 Mechanism of Wisdom Synergy on Knowledge Service Effectiveness

(1) Expert talent aspects. Talent types, characteristics, and management significantly influence think tank ideological innovation, impact shaping, and potential development. As interdisciplinary integration becomes increasingly prominent, single-discipline content can no longer support orderly service delivery. Think tanks lack professionals in natural sciences, non-economic management, and non-humanities/social sciences, resulting in insufficient comprehensive judgment capabilities and reduced scientific rigor and ideation in theoretical research. As one expert stated: "When undertaking planning projects, we need talents in urban design, urban-rural planning, and environmental engineering, as well as electronics, life sciences, and medicine to analyze technological innovation roadmaps" (W1). Talent types and sources emphasize joint effects on think tank service effectiveness. To cope with more complex tasks, some official and university think tanks are shifting talent work focus toward constructing deep integration models of strategic, communication, and intelligence experts to reasonably determine technical routes, scientifically decompose tasks, and leverage the judgment roles of experts from universities, research institutions, and intelligence agencies in grasping international scientific and technological development trends and frontiers. The scarcity of interdisciplinary, high-level leading talents prevents think tanks from forming broader talent aggregation effects. As one expert noted: "The phenomenon of a famous think tank expert simultaneously holding positions in multiple think tanks is prominent. Once leading talent is lost, research in related fields immediately 'shuts down'" (C1). Insufficient management and communication talents cause some research institute think tanks to have only a few personnel in management positions, even experiencing business idling, and failing to timely establish teams cooperating with various media, resulting in users being unable to see or understand outputs and seriously hindering outcome influence. Therefore, improved talent management mechanisms can maximize talent enthusiasm and creativity, directly determining their contribution and satisfaction levels. However, most local and even official think tanks have not established talent selection, team formation, and comprehensive evaluation mechanisms adapted to development needs, lacking foundational cultivation of talents with solid theoretical foundations, independent innovation capabilities, international academic heights, and conceptual consensus, thereby constraining the formation of different-level talent echelons, research efficiency, and sustainable development potential.

(2) Group synergy aspects. Group synergy institutions, characteristics, and content affect think tank service expansion, research processes, and communication power. Think tanks often select different collaboration partners based on tasks, presenting dual or multiple synergy forms. Some research institute and university think tanks are advancing deep cooperation with governments, intelligence agencies, and science and technology departments but have not yet formed benign interactions relying on policy, disciplinary, and innovation advantages, resulting in suboptimal service expansion effects. As one expert described: "Institutions like the Northeast University of Finance and Economics Economic and Social Development Research Institute have established entity platforms for government-think tank and enterprise-think tank cooperation around national economic construction needs, breaking through limitations caused by unilateral development goal differences in cooperation mechanisms" (B2). During collaboration, think tanks guide active partner participation in services, requiring continuous communication across different stages to integrate service value into user decision-making. However, issues such as outcome ownership and trust reduce synergy efficiency. Without pre-established long-term cooperative relationships and consensus mechanisms on terminology, standards, and research paradigms, stalemates occur, leading to collaboration failure. Therefore, most official think tanks choose partners with solid synergy foundations to accelerate research processes, as one expert explained: "We generally select institutions with long-term cooperation history. With trust and consensus built through multiple interactions, communication costs are much lower, facilitating subsequent work" (B4). Currently, think tanks have established some interconnection platforms and regularly conduct interdisciplinary cooperation, gradually transitioning to collaborative 攻关. However, such collaboration remains limited to shallow levels such as conference exchanges and mutual promotion, with less deep-level synergy on data, talent, and professional capabilities, mainly due to partners' resource scarcity, weak professional capabilities, and unclear division of labor. This hinders the formation of multi-level, three-dimensional research capabilities through resource synergy and complementary advantages, as noted: "We have extensive contact with the Wuhan Documentation and Information Center, discussing how to cooperate, and also cooperate frequently with Dalian University of Technology, such as on data and analysis methods" (J3). Additionally, group synergy models affect service effectiveness. Most think tanks passively purchase required resource services through order models and deliver outcomes for user acceptance. Only a few official and provincial think tanks, through long-term interaction with governments and other users, actively predict demands and submit products through green channels to enhance user stickiness and outcome communication power.

5.3 Mechanism of User Demand on Knowledge Service Effectiveness

User types, demand characteristics, and management exert value-oriented effects on think tank outcome precision, feasibility, and supply-demand balance. When facing users such as governments, science and technology departments, and enterprises, think tanks generate different effectiveness levels, even positive or negative. Blocked user communication channels and lack of demand docking mechanisms, combined with users' limited understanding of think tank research patterns and characteristics, result in demands lacking synergy, orientation, and standardization, leading to imprecise or unrealistic expressions that affect overall service efficiency. As one expert stated: "Think tank research often originates from user demands, but regarding demands themselves, there is still a lack of standardization and understanding of scientific activity characteristics and patterns, with expectations exceeding certain scopes requiring guidance" (B4).

User demand management directly determines think tank service accessibility and precision, following a three-stage growth process. First, **demand capture**: Most think tanks are in this primary stage, attempting to create smooth communication environments through joint docking platform construction with users. However, when facing enterprise users with vague demands susceptible to professionalism and occupational influences, think tanks fail to reasonably utilize expert wisdom judgment and data-driven factual analysis to understand demands, resulting in insufficient service-demand fit. When facing government users with clearer demands, think tanks must emphasize independent thinking, demand orientation, and outcome feasibility and operability—mastery of this distance also affects service effectiveness. Second, **demand guidance**: Most university and even official think tanks have not effectively embedded themselves in user demand processes—namely, how to proactively display advantageous resources, exchange classic cases, reveal potential effects, and gradually clarify demands to enhance user sense of gain. Therefore, strengthening the mutual promotion relationship between services and demands to targeted improve service effectiveness becomes crucial. Demand guidance may require long-term cooperation while avoiding power and economic influences. Third, **demand prediction**: This advanced stage is limited to a few official and provincial think tanks that can continuously track user demands—anticipating unthought thoughts and unseen sights, actively and timely reporting achievements, such as what aspects have been addressed, to what extent, and their social impact and practical significance. This largely determines whether think tanks can form efficient supply-demand mechanisms and promote continuous service usage, as one expert expressed: "We produced a report this year, and I believe users will seek me out again next year, even anticipating which specific aspects" (N2).

5.4 Mechanism of Service Characteristics on Knowledge Service Effectiveness

Institutional policies, comprehensive management, and service links can guide think tanks to embed themselves in user decision-making and regulate orderly service delivery. Immature standardized procedures for major decision-making to fulfill pre-consultation, mid-term participation, and post-evaluation limit institutionalized connections between think tanks and decision-making, constraining think tanks' transformation from policy interpretation to potential crisis early warning, dilemma analysis and response, and hidden danger disclosure. As one expert noted: "The decision-making communication platform remains inadequate, and the system for think tanks' deep participation in decision-making processes is lacking. Their core values have not been thoroughly explored, hindering the full play of decision-making influence" (TJ1).

Service links affect the stability and orderliness of think tank knowledge services, obstructing the integration of knowledge production, transmission, and application effectiveness. Due to differences in service targets, think tank service approaches, methods, and levels vary, determining the ability to effectively organize and manage involved institutions and resources, thereby influencing service practicality and precision. Currently, think tank organizational management methods remain relatively traditional, inadequately adapted to scientific and technological development trends, with insufficient self-media influence and limited collaborative interaction with external media, causing user attention to shift to other social media platforms and constraining outcome communication effectiveness. Lack of effectiveness-oriented evaluation management limits functions such as demand-driven resource construction, organizational management, and outcome tracking. As one expert stated: "Much work is done in the front end, but little in the back end. Most reports are delivered to government departments and left there without monitoring their role or what role they play—this is an important issue" (J2).

Comprehensive management status affects think tank functional paradigms and outcome applications. Relevant construction entities have not formed scientifically consistent understandings of fundamental issues such as think tank basic concepts, functional positioning, and research paradigms, resulting in imprecise service positioning, incomplete functions, and unstandardized forms—though factors such as development stages, resource organization, and policy systems also play roles. Currently, think tanks have many academic experts, but think tank paradigms differ from academic research. Conducting think tank research entirely through academic paradigms may lead to excessive theoretical orientation and reduced outcome operability, as noted: "The research paradigm here needs to change. Without paradigm change, emphasizing other aspects seems meaningless" (J3). Additionally, demand-driven knowledge service process optimization and problem-oriented applied technology system development can exert different promoting effects on the scientific rigor and innovation of think tank services.

5.5 Interaction Mechanisms Among Influencing Factors

Strong mutual promotion and interdependence exist among factors influencing science and technology think tank knowledge service effectiveness. Aggregating, introducing, and managing data science talents enables think tanks to improve data sorting, transformation, and judgment levels. Group synergy can strengthen data and technology sharing and communication efficiency and construct supervision and control mechanisms for data and technology content, forms, and quality, thereby affecting basic resource management and application effectiveness. Specialized selection and foundational cultivation of interdisciplinary talents can help think tank personnel achieve superior judgment literacy, thereby optimizing service links and improving comprehensive management status. Therefore, wisdom synergy and basic resources, as well as service characteristics, can be understood as mutually promoting relationships.

User demand-driven integration and management of data and technology resources enable think tanks to conduct targeted knowledge services, promoting value realization based on basic resource management and application. As one expert stated: "Starting a think tank report from scratch will certainly differ from final user demands. Re-collecting data—what kind of data can you find? Without accumulated data, it's impossible. Data must respond to government demands" (N2). Organizing and building expert teams from different fields and types around user demands and selecting appropriate institutions for collaborative research can also improve think tank knowledge service wisdom synergy effectiveness. User demand can further drive think tanks to optimize service links and stimulate comprehensive management awareness. Therefore, relationships between user demand and basic resources, wisdom synergy, and service characteristics can be understood as driving and interdependent relationships. Additionally, service characteristics and basic resources exhibit a constructive relationship, as service characteristics can empower, shape, and optimize think tank basic resource management and application efficiency and capabilities through policy formulation, service links, and comprehensive management.

6 Conclusion

Systematically analyzing influencing factors of science and technology think tank knowledge service effectiveness to promote its enhancement constitutes important current work for think tanks. As user demand gradually moves toward the center of knowledge services, trends of think tank proactive service supply and user active service acceptance become prominent. Demand-driven collaborative integration of multi-agent institutional resources can improve think tank service effectiveness and reverse passive service situations. In future services, think tanks must seize the opportunity of scientific and technological modernization, establish systematic and holistic perspectives, advance data and technology resource construction and accumulation, collaboratively integrate diverse wisdom resources from governments, universities, and research institutions, unblock user demand docking channels, cultivate demand literacy, construct advantageous characteristics, and achieve precise service supply and comprehensive effectiveness enhancement.

This study has several limitations: First, the qualitative research coding process involves subjectivity, requiring improved reliability of research models and conclusions. Second, the exploration of influencing factors of think tank knowledge service effectiveness from the staff perspective needs further deepening, such as the degree of influence of different factors on service effectiveness and the extent of user demand's driving role. Third, systematic investigation and analysis from the user perspective are needed to form holistic judgments and objective understanding of think tank knowledge service effectiveness. Future research will collect data from broader think tank personnel and decision-making users for empirical studies, more finely exploring influence paths and relationships among variables in think tank knowledge service effectiveness to enhance the robustness and generalizability of research models and conclusions.

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Author Contributions:

Wu Yawei: Conceptualized the research question, collected and processed data, wrote and revised the paper;

Zhu Hongtao: Collected and processed data, designed the study, wrote and revised the paper.

Note: Figure translations are in progress. See original paper for figures.