Based on Text Mining and Analysis of Beijing's Achievement Transformation Policy Research

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Abstract. This study utilizes text mining to analyze Beijing's technology transfer policies from 2006-2023. Frequency and semantic network analysis provide an in-depth investigation of the regional policy landscape.

The study found frequent keywords like innovation, development, enterprise, reflecting policies aim to support enterprise innovation. Network shows continuous promotion across financial support, tax incentives, IP protection to integrate R&D with economic and social development.

Beijing's policies have achieved remarkable results and exemplify nationwide leadership. Suggestions proposed to further improve policies include increasing fiscal support, establishing evaluation incentives, simplifying approvals, strengthening industry-academia ties, and cultivating intermediaries.

Keywords: technology transfer policies, text mining, word frequency analysis, semantic network analysis

1 Introduction

The 2022 National Science Popularization Plan highlights innovation and popularization's importance per Xi Jinping. Innovation is core to development, and popularization is also vital. Transforming achievements is a focus for researchers, and popularization can enable public appreciation, acceptance, and utilization of innovation, allowing research to benefit society and gain recognition.[1]

Popularization plays a key role in research's journey from lab to marketplace by addressing needs. Researchers should communicate achievements, and communicators should make research comprehensible. With integrated research and popularization, the path to transform achievements will broaden.[2]

The revised Law emphasizes applied research driving basic and accelerating transformation into productive forces, showing the state's emphasis on transformation policies. Under China's system, policies play a crucial role in actualizing achievements.

This research analyzes Beijing's 2006-2023 policies using public data, extracting keywords to examine the landscape on transformation. It delineates macro characteristics to help formulate integrated policies, catalyzing innovation and growth in Beijing. The analytical approach can be referenced by other regions.

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2 Selection of STI Policy Texts

This research primarily compiles policy texts on transforming scientific and technological achievements issued by Beijing government and national authorities from 2006 to 2023. Employing text mining, it gathers and organizes relevant policy texts closely associated with achievement transformation. After careful screening, outdated or less relevant contents are excluded. Through collation, 79 valid and highly relevant current policy texts are finalized for subsequent frequency and semantic network analysis. This targeted corpus concentrates on effective policies with abundant implications for investigating Beijing's policy landscape regarding transforming achievements. The refined dataset guarantees analytical rigor and policy insights.

3 Word Frequency Analysis and Semantic Network Analysis

3.1 Keyword Extraction

Keywords are an important entry point for mining policy texts. Understanding the keywords in the texts can help comprehensively grasp the content structure of policies on the transformation of scientific and technological achievements through analysis, and infer the key hot areas covered by the policies. This study starts from the content of the policies on the transformation of scientific and technological achievements themselves. First, the collected text content is read carefully. Text mining is used for word segmentation to find keywords with high frequency of appearance. Then, high-frequency words with the same or similar semantics are combined and organized. For example, promote) and advance are unified as promote.

3.2 Word Frequency Analysis

Since transformation policies are often unique, keywords in each may differ greatly. After text mining on 79 texts, 50 keywords were extracted. The 24 most frequent words (≥920 times) are shown in Table 1, representing hotspots in recent policies. There are 5 keywords over 2,000 times: innovation, development, enterprises, construction, and science/technology. Innovation appeared 3,309 times, ranking first, showing Beijing's emphasis on innovation's role in promoting transformation.[3]

Fig. 1. Beijing Guohua political text word cloud

The sorted keywords are used to generate a word cloud based on frequency (Fig. 1). The font size represents keyword frequency - larger fonts indicate higher frequency. The word cloud shows transformation relies on enterprise development and innovation. Innovation is the focus for transforming achievements in Beijing. Factors like enterprises, talents, technologies, and industries are also frequently mentioned. To realize transformation, Beijing strongly supports enterprise innovation and development, and formulates policies regarding technology, talents, science, industry, etc. The ultimate goal is supporting enterprise technological innovation.[4]

Table 1. Chengguozhuanhua high-frequency words

NUMBER	VOCABULARY	FREQUENCY
1	INNOVATION	3309
2	DEVELOP	2893
3	ENTERPRISE	2755
4	CONSTRUCTION	2302
5	TECHNOLOGY	2136
6	SERVE	1883
7	SUPPORT	1196
8	TECHNOLOGY	1813
9	INDUSTRY	1721
10	IMPETUS	1300
11	ENHANCEMENT	1113
12	CARRY OUT	1042
13	MECHANISM	1038
14	HOIST	1003

NUMBER	VOCABULARY	FREQUENCY
15	ESTABLISH	1027
16	TALENT	1009
17	SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS	1003
18	UNIT	958
19	PROJECT	954
20	INVERT	937
21	REFINE	937
22	INSTITUTION	927
23	R&D	927
24	INNOVATION	926

4 Semantic Network Analysis

Co-occurrence analysis studies keyword associations. Mapping co-occurrences as a network reflects content relationships. Node distance indicates closeness, clarifying policy focuses and interconnections. [5]

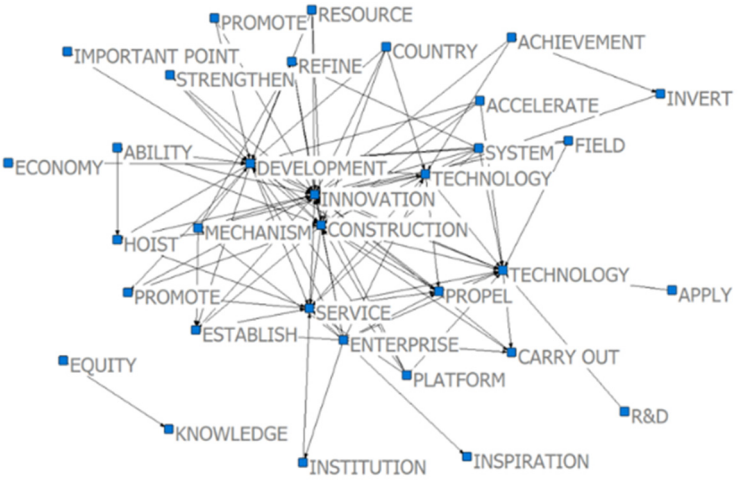

Fig. 2. Semantic keyword network diagram

In Fig. 2, Beijing has introduced policies to improve mechanisms and promote transforming research into productive forces. Policies encourage industry-academia collaboration, joint technology transfer platforms, and industrialization of R&D results.[6] China's national innovation system provides institutional safeguards for innovation and transformation. These policies have continuously enhanced professional transformation capacity, evolving widespread innovation. Beijing emphasizes bolstering R&D capabilities for higher-quality research. Intellectual property policies provide legal

guarantees for transformation and innovation. Overall, Beijing has promoted integration of research with economic and social development.

5 The Results of The Construction of Beijing's Achievement Transformation Policy

As the capital, Beijing's advantage is its developed talent and science/technology. Serving national innovation strategy is Beijing's mission. To help enterprises overcome innovation bottlenecks, Beijing has introduced policies supporting transformation across fields, with emphasis on talents, technologies, services, science/technology. Clarifying intellectual property rights legally safeguards innovators' interests. A dedicated innovation fund addresses insufficient patient capital. Enhanced IP awareness in Beijing has catalyzed innovation and growth nationwide, exemplifying Beijing's pioneering role.

6 Suggestions for Improving Beijing's Achievement Transformation Policy

1. Increase financial support and tax incentives for transformation. Establish dedicated funds and implement tax exemptions to reduce costs and encourage engagement.

2. Implement evaluation and incentive mechanisms. Increase weighting in evaluations and set up rewards to motivate focusing on application and transformation.

3. Simplify administrative approval procedures to enable faster transformation. Establish information platforms to facilitate enterprise understanding of R&D outcomes.

7 Conclusions

Frequency analysis of keywords shows policies aim to support enterprise innovation, so policies should align with needs. Semantic networks reveal mutually supportive policies across areas like finance, tax, IP, and collaboration. Findings affirm Beijing's exemplary role in spurring innovation, providing a model for other regions.

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