

# Research on Science and Technology Innovation Policy of Wenzhou City Based on Text Analysis

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## Abstract

**This paper takes a total of 74 science and technology innovation policy texts in Wenzhou City from 2006 to 2022 as the research object, uses the content analysis method, from the perspective of policy text attributes and policy tools, carries out coding statistics on key content, analyzes the categories of policy texts, the use ratio of publishing institutions and policy tools, summarizes the problems of science and technology innovation policies in Wenzhou City, and puts forward corresponding policy recommendations to rationally layout science and technology policies for local governments, Improve the science and technology policy system to provide reference.**

## Keywords

**Wenzhou science and technology innovation policy; Text analysis; Policy tools.**

## 1. INTRODUCTION

The fifth plenary session of the 16th CPC Central Committee in 2005 determined the strategic decision to build an innovative country. The following year, the Outline of the National Medium and Long term Science and Technology Development Plan 2006-2020 [1] was released, which further clarified the long-term goal of building an innovative country. With the rise of the fourth scientific and technological revolution and the acceleration of industrial reform, the deep integration of science and technology and economy has become one of the important factors affecting a country's international status and competitiveness. In order to comprehensively enhance the comprehensive national strength and cultivate the core competitiveness, China has placed scientific and technological innovation in a pivotal position. In the context of building an innovative country, domestic cities have responded.

With the goal of building a high-level and innovative city, Wenzhou City implements the new development concept, deeply implements the innovation driven development strategy, builds a regional innovation system while accelerating industrial transformation and upgrading and cultivating new drivers, and constantly improves Wenzhou's scientific and technological strength and competitiveness. Since 2006, Wenzhou has issued a number of scientific and technological innovation policies, and has done a lot of work in improving the overall environment for scientific and technological progress, promoting scientific and technological innovation, developing high-tech industries, promoting the adjustment and optimization of industrial structure, and accelerating the reform of scientific research institutions. This paper uses the content analysis method, from the perspective of policy tools, to collect and sort out 74 science and technology innovation policy texts issued by Wenzhou from 2006 to 2022. From the perspective of policy text attribute and policy content, this paper analyzes the characteristics of Wenzhou science and technology innovation policy, summarizes its policy attribute and the use rules of policy tools, and provides reference for local governments to rationally layout science and technology policies and improve the science and technology innovation policy system.

## 2. RESEARCH ON SCIENCE AND TECHNOLOGY INNOVATION POLICY

In 1942, after Schumpeter put forward the concept of "innovation", a wave of innovation research rose in the global theoretical circle. The focus of scientific and technological innovation research has changed from the new classical economic growth theory at the macro level to the innovation activity management at the micro level of enterprises. Acs and Audretsch (1987) [2] discussed the impact of organizational characteristics such as enterprise age and size on technological innovation, proposed the mechanism of promoting technological innovation by internal resources such as explicit knowledge and tacit knowledge, and the dynamic capability construction of acquiring external knowledge and other resources for innovation.

In domestic, with the proposal of the theory of national innovation system, scholars have gradually increased their attention to innovation policy, and innovation policy has gradually become a hot spot in the field of policy research. Science and technology innovation policy tools are specific policy measures adopted by the government and its functional departments to promote science and technology innovation. In recent years, the academic community has studied the types of policy tools, the evolution and optimization of local government's science and technology innovation policies, etc.

### 2.1. Types of science and technology innovation policy tools

Rothwell and Zegveld (1985) [3] divided the policy tools into three types: supply type, environmental type and demand type from the dimension of basic policy tools according to the differences in the function forms of different policy tools. Supply oriented scientific and technological innovation policy tools emphasize supply, including direct policy supply of capital, information, technology, talents, etc; Environmental science and technology innovation policy tools emphasize the creation of a high-quality science and technology innovation policy environment, including policy objectives, financial taxes, laws and regulations; Demand based science and technology innovation policy tools emphasize stimulating scientific and technological innovation, and act on the market through government procurement, outsourcing, trade and other measures. These three types of policy instruments can also be subdivided into several secondary indicators.

Liu Yulin (1993) [4] divided scientific and technological innovation policy tools into four types: education, scientific and technological development strategy, scientific and technological policy and capital. Hu Mingyong and Zhou Jizhong (2001) [5] simplified the scientific and technological innovation policy tools into three types, namely direct funding, tax incentives and public measures. Chen Jin and Wang Feirong (2005) [6], taking into account the characteristics and inherent laws of science and technology innovation policies, divided science and technology innovation policy tools into five categories: government funding, policy procurement, tax incentives, venture capital and SME policies. Zhao Xiaoyuan and Su Jun [7] (2007) improved the basic policy tool dimensions of Rothwell and Zegveld, developed the dimensions of science and technology activity types and fields, and provided a relatively comprehensive research framework for the research on the characteristics of science and technology innovation policy tools.

Zhang Fang, Zou Jun and Ge Yangsheng [8] (2018) also recognized the basic policy tool dimensions of Rothwell and Zegveld, but divided the policy sub tools differently. They believe that the policy tools of supply oriented scientific innovation include financial support and human support; Environmental science and innovation policy tools include R&D and innovation platform construction, intellectual property protection, etc; Demand based scientific innovation policy tools include industrial support and achievement transformation.

## 2.2. Research on the evolution and optimization of local government's science and technology innovation policy

Jiang Yujie [9] (2020) took the Japanese government as the research object, studied the evolution path of its science and technology innovation policy, and found that the Japanese government mainly used environmental and supply oriented policy tools to enhance the initiative innovation desire of innovation subjects, avoid result oriented forcing innovation subjects to innovate passively, and promote the vitality of local science and technology innovation; At the same time, according to the local development stages and specific development conditions, we will dynamically formulate, combine and modify science and technology innovation policy tools. On the basis of improving infrastructure construction and direct talent training, we will focus on government led goal planning and indirect talent training, so as to maintain the vitality of local science and technology innovation.

Li Tianfeng, Zhu Shuicheng, Zhao Ziwei [10] (2021) took a total of 42 scientific and technological innovation policy texts in Shanghai from 2012 to 2021 as the research object, and based on the policy tool framework, counted the use of various tools. At the same time, combined with the effect of policy implementation, it analyzes the effective impact of the use of policy tools at various stages on scientific and technological innovation, summarizes that the government prefers to use supply and environmental policy tools, and pays more and more attention to environmental policy tools. Finally, it puts forward suggestions for improving scientific and technological innovation work.

Hu Yuchen and Jiang Yujie [11] (2021) analyzed the science and technology innovation policies issued by Tianjin from 2000 to 2021 from the perspective of policy tools and found that the science and technology innovation policy tools were gradually enriched, but various sub tools were not balanced. They discussed the types, quantity and connotation of policy tools used by local governments to gather limited resources, break through regional development restrictions, and promote scientific and technological innovation, with a view to providing reference for similar local governments in Tianjin to further rationally distribute scientific and technological policies and improve the local scientific and technological innovation system.

Qian Wanyan [12] (2020) made a quantitative text analysis on the content and changes of science and technology innovation policies in Shanghai, Jiangsu, Zhejiang and Anhui in the Yangtze River Delta region, and made a qualitative analysis and comment on the quantitative results of the changes of science and technology innovation policies in the Yangtze River Delta from four aspects: the number of policy texts, the form of policy texts, the focus of policy content, and the synergy of policy issuers, Analyze the institutional logic of technological innovation policy changes in the Yangtze River Delta region.

To sum up, domestic scholars have conducted in-depth research on science and technology innovation policy texts in many regions and cities across the country, mainly focusing on Beijing, Wuhan, Shanghai, Macao, Hong Kong and Shenzhen, the Pearl River Delta, the Yangtze River Delta and other regions, while few in-depth studies have taken Wenzhou as an example. However, there are still some gaps between Wenzhou and a strong city in science and technology innovation in the Yangtze River Delta. Therefore, it is of great significance to study Wenzhou's science and technology innovation policy, dig deeply into the text of science and technology innovation policy, analyze the characteristics of policy content, summarize the policy system and evolution rules, and provide reference for Wenzhou government to improve its science and technology innovation policy.

### 3. THE CONSTRUCTION AND DESIGN OF THE TYPES OF SCIENTIFIC AND TECHNOLOGICAL INNOVATION POLICY TOOLS

#### 3.1. Analysis framework construction of tool type

The existing literature generally adopts Rothwell and Zegveld's tool classification method based on the differences in the function forms of science and technology innovation policies, and divides policy tools into three categories: "supply", "environmental" and "demand". This classification method effectively reduces the dimension of complex policy systems, and clarifies the use ratio of various tools in the policy system. To provide basis for discussion on the rationality and weak links of the policy system. Based on the tool classification methods of Rothwell and Zegveld, this paper has made minor adjustments to the policy sub tools, clarified the objectives and connotation of the policy sub tools, and carried out this research according to the analysis framework of policy tools for scientific and technological innovation in Table 1.

**Table 1.** Analysis framework of S&T innovation policy tools

Tool Type	Sub Tool	Tool Target	Specific Measures
Supply	Capital investment	Provide financial support for technological innovation activities of science and technology innovation entities	(1) Funds related to scientific research and development (2) Funds related to transformation and industrialization of scientific and technological achievements (3) Funds related to the development of key science and technology industries (4) Funds related to patents and intellectual property rights
	Infrastructure	Provide physical and non-physical infrastructure support for scientific innovation entities	(1) Build science and technology parks, industrial parks and other parks (2) Construction of laboratories, engineering technology centers and other scientific research institutions (3) Build overseas innovation incubation center, R&D base and other platforms (4) Build non entity carriers, such as innovation alliances, collaborative organizations, R&D associations, incubation platforms, trading platforms, sharing platforms, etc
	Scientific and technological information	Provide information source channels and information services for science and innovation activities	(1) Build information network, resource platform and information base (2) Organize and participate in international scientific and technological information exchange meeting
	Talent support	Provide multi-level human resources support for science and innovation entities	(1) Introduce high-level talents at home and abroad (2) Cultivate technical talents and innovative teams (3) Strengthening discipline construction in colleges and universities (4) Setting up science and technology courses in primary and secondary schools (5) Enhance teenagers' interest in science and technology
Environmental	Objective Programming	Plan the key areas and development goals of future scientific and technological innovation	(1) Identify key areas and priority technologies (2) Define the development goals and specific contents of future scientific and technological work
	Financial support	Help enterprises to raise funds quickly and support science and innovation enterprises to go public	(1) Support the listing of technology-based enterprises (2) Support enterprise share reform (3) Guide financial institutions to expand enterprise loans (4) Enrich scientific and technological financial products

	Tax preference	Reduce the tax burden of science and innovation entities	(1) Exemption and exemption of income tax and other taxes for scientific and technological enterprises, products and individuals (2) Pre tax additional deduction of R&D expenses (3) Pre tax deduction of depreciation expense of R&D equipment
	Regulatory control	Standardize the behavior of science and technology innovation subjects	Formulate regulations and management measures related to science and innovation in accordance with national laws and regulations and in combination with the specific conditions of city
	Intellectual property right	Strengthen intellectual property protection and create a good innovation environment	(1) Subsidy for invention patent authorization (2) Award for patent industrialization (3) Technology transaction subsidy (4) Subsidy for knowledge rights protection center
	Public service	Provide public basic services for science and innovation subjects	(1) Policy consultation and training (2) Provide administrative services such as registration, accreditation and grading (3) Help enterprises build overseas development strategies (4) Establish a green channel for high-tech enterprise product export
Demand	Government procurement	Expand the market of science and innovation products	(1) Give priority to purchasing products in the independent innovation catalog (2) Establish government acquisition and ordering system
	Service outsourcing	Improve the enthusiasm of scientific innovation research and development	Governments and institutions at all levels entrust R&D plans to enterprises or scientific research institutions
	Market regulation	Standardize market behavior and ensure market order	The government implements control measures against the introduction or restriction of import and export technologies and products
	Overseas institutions	Help science and innovation entities expand overseas markets	Support science and technology enterprises to set up overseas branches in various ways

### 3.2. Selection of research objects

Since the introduction of the Outline of the National Medium and Long term Science and Technology Development Plan (2006-2020) in 2006, the long-term goal of building an innovative country in China has been further clarified. China has stepped into the stage of independent innovation in science and technology, and the vitality of science and technology innovation policies issued by various regions has been fully burst. This paper sorts out the text of science and technology innovation policies in Wenzhou from 2006 to 2022, Specific sorting steps: 1. Carry out an advanced search on the "Peking University magic weapon" laws and regulations information database, use the words "science and technology", "innovation" and other words as keywords, select Wenzhou City, Zhejiang Province as the region, and the time range is 2006-22. The policy issuing departments mainly include Wenzhou Municipal People's Government, the Municipal Party Committee, the Development and Reform Commission, the Science and Technology Bureau, the Finance Bureau, the Science and Technology Park Management Committee of the High tech Industrial Development Zone, etc. 2. Search on the official website of the government of the main department of science and technology innovation policy release in Wenzhou, and complement the database of "Peking University's magic weapon" to ensure the comprehensiveness of the policy text. Through the collection and collation of the "magic weapon of Peking University" and the official website of Wenzhou Municipal Government, 74 policy documents of various kinds, such as laws, plans, methods, notices and opinions, which are closely related to the science and technology innovation policies of Wenzhou City, were obtained and taken as the research object of this paper and numbered.

### 3.3. Data encoding

Each article of 74 selected policies related to science and technology innovation in Wenzhou from 2006 to 2002 is coded according to the category of policy tools. Specific coding method: take policy terms as the basic unit, assign codes according to "policy number - specific terms" or "policy number - chapter - specific terms", and classify the basic units of codes into corresponding categories according to the analysis framework of science and technology innovation policy tools as the basis for statistical analysis.

**Table 2.** Statistics of Wenzhou Science and Technology Innovation Policies from 2006 to 2022

Tool Type	Sub Tools	Code No
Supply based policy tools	Talent support	2-9,3-1-4,8-7,10-4-1,10-4-2,10-4-3,10-4-4,10-10-5,11-2-4,12-4,13-27,14-4-3,14-5-6,15-1-4,15-1-7,16-10,20-13,20-14,20-15,22-6,22-10,22-11,23-14,23-18,23-19,24-1,24-2,24-3,24-4,24-5,24-6,24-7,27-14,28-21,28-24,35-2-1,36-8,39-9-1,39-9-2,39-9-3,40-7,40-8,40-9,43-3-4,43-4-2,43-4-3,43-4-6,45-3,45-22,45-24,46-2-2-1,46-2-2-2,46-2-2-3,52-8,52-14,52-15,52-16,53-3-4,54-5,54-6,54-7,54-8,56-16,56-17,56-18,56-24,57-5-4,60-6,62-3-3,64-2-8,71,72-15,72,16,73-4-1 (1) ,74-21,75
	Infrastructure	1-5,1-14,1-15,1-16,1-17,1-18,1-19,1-20,1-21,1-22,2-8,3-1-1,3-2-1,3-2-2,3-3-3,5-6,5-7,5-11,6-1-6,6-2-8,8-1,8-2,8-5,8-8,10-2-1,10-2-2,10-2-3,10-3-2,10-3-4,10-5-1,10-5-2,10-5-3,10-8-1,11-2-1,12-1,12-10,12-11,13-3,13-4,13-5,13-6,13-7,13-8,13-11,14-3-1,14-3-2,14-3-3,14-3-4,14-4-1,14-4-2,14-5-1,14-5-2,14-5-3,14-5-4,14-5-5,15-1-5,15-2-1,15-2-2,15-2-3,15-2-4,15-3-3,16-1,16-3,16-4,16-6,20-1,20-2,20-3,20-4,20-8,20-12,22-1,22-12,23-2,23-3,23-12,23-13,24-30,24-31,24-32,24-33,24-34,24-35,24-36,24-37,25-1,25-2,25-5,25-7,26-5,26-6,27-1,27-2,27-3,27-11,28-2,28-3,28-4,28-8 (2) ,28-22,28-23,28-25,31-1,32-3,32-4,32-5,33-2-3,33-2-1,33-2-2,33-2-3,35-1-1,35-1-2,35-1-3,35-1-4,35-4-1,36-1,39-1-1,39-1-2,39-1-3,39-1-4,39-1-5,39-3-1,39-3-2,39-3-3,39-5-3,39-7-2,39-7-3,40-3,40-4,40-5,40-6,40-12,40-13,43-3-1,43-4-4,43-4-5,45-7,45-15,46-2-1-1,46-2-1-2,46-2-1-3,46-2-6-1,46-3-3-1,50-1-1,50-1-2,51-4-1,51-4-3- (1) ,52-10,52-11,53-2-2,53-3-1,53-3-2,53-3-3,54-1,54-2,54-3,54-4,56-8,56-9,56-10,56-11,56-23,57-4-1,57-4-2,57-4-5,60-1,60-2,60-3,60-7,62-3-2,62-4-4,63-3,64-2-7,64-3-6,70,72-4,72-9,72-10,72-11,73-1-2,73-1-5,73-3-1,73-3-2,73-3-4,73-4-2,74-5,74-13,74-14,74-15,74-16,74-17,74-23,74-24
	Capital investment	1-1,1-2,1-3,1-4,1-6,1-7,2-1,2-2,2-3,2-4,2-5,2-6,3-1-5,5-1,5-2,5-3,5-4,5-5,5-10-11-3,13-1,13-2,13-10,13-12,13-13,13-15,13-16,13-17,13-18,13-19,13-20,13-21,22-3,22-4,22-5,22-7,22-8,22-9,22-13,22-14,22-15,23-1,23-8,23-10,23-11,,24-8,24-9,24-10,25-3,25-4,27-7,27-8,27-10,27-12,27-13,27-15,28-1,28-5,28-9,28-10,28-18,32-1,32-7,32-9,32-10,37-2,40-18,40-19,40-20,43-4-1,43-4-7,45-1,45-5,45-14,45-16,45-17,45-20,46-2-6-3,46-3-3-2,50-3-4,52-6,52-7,52-9,52-18,54-9,54-13,54-14,54-15,54-20,56-12,56-13,56-15,57-3-1,57-3-2,57-3-3,57-3-4,61-5,62-4-2,64-3-4,66,67,68-13,69,73-4-3 (1) ,74-6,74-7,74-20,74-25
	Information support	2-7,3-1-6,3-1-7,8-4,10-3-3,10-9-1,10-10-2,12-7,15-3-1,16-2,25-9,25-10,26-13,31-3,35-4-2,39-4-1,39-4-2,40-22,40-23,43-3-2,43-3-3,45-11,46-2-5-1,46-2-7-1,46-2-8-2,46-2-8-3,50-3-3,52-12,54-12,56-19,56-20,56-21,73-3-3,73-1-4,74-8
Environ mental policy tools	goal programming	3-1-2,3-1-3,3-1-8,8-3,10-3-1,10-6-1,10-6-2,10-6-3,10-8-2,10-8-3,10-8-4,10-9-3,11-2-2,11-2-3,12-2,12-3,12-5,12-8,12-9,13-9,16-6-3,15-1-1,15-1-2,15-1-3,15-1-8,16-5,20-5,20-6,20-7,20-9,20-10,20-16,20-17,20-18,23-4,23-5,23-7,23-20,26-1,26-2,26-3,26-4,27-4,27-5,27-6,28-6,28-7,33-1-1,33-1-2,33-2-4,35-3-4,37-1,39-2-1,39-2-2,39-5-1,40-1,40-2,43-2-1,43-2-2,43-2-3,45-6,45-19,46-1,46-2-3,46-2-3-2,46-2-3-3,50-2-1,50-2-2,50-3-1,50-3-2,51-4-2,52-3,52-4,52-5,56-6,56-7,57-5-3
	Financial support	2-10(3),10-10-3 13-21,13-22,13-23,13-25,13-26 14-4-4,14-6-4 15-1-6,15-3-2 16-7 20-19 23-15,23-16,23-17 24-13,24-14,24-15 25-6,25-11 26-12,28-11,28-12,28-13,28-14,28-19,28-20,32-2,35-3-1,35-3-2,36-12,39-8-1,39-8-2,39-8-3,40-14,40-15,40-16,40-17,43-3-5,45-8,46-2-6-3,51-4-3- (2) ,52-17,52-19,53-2-3,54-16,54-21,54-22,57-5-6,62-4-3,64-3-5,73-4-3 (2)
	Tax incentives	2-10(1),26-8,28-17,32-6,40-21,55-2-1,55-2-2,55-2-3,55-2-4,55-3,57-4-3,57-5-2,64-3-1,73-4-3 (3)
	intellectual property right	10-10-4,13-14,16-9,28-26,28-27,28-28,28-29,32-8,33-3-1,33-3-2,33-3-4,35-3-3,39-6-1,39-6-2,39-6-3,43-3-6,45-4,45-10,46-3-4-1,46-3-4-2,46-3-4-3,51-4-3- (3) ,52-23,53-2-4,54-25,57-5-7,60-5,64-2-6,72-14,73-3,73-4-1 (2) ,74-10
	Regulatory control	1-8,1-9,1-10,1-11,1-12,1-13,1-23,1-24-1,25,4-7-9,8-8,9-8,10-9,10-7-1,10-7-3,10-10-1,10-11-1,10-11-2,20-11-4,12-6,14-6-2,17,18,19,21,22-16,26-9,26-11,29,30,34,38,40-24,40-25,41,42,44,45-12,45-13,46-3-5-1,47,48,49,52-20,54-23,57-4-6,58,59,65,72-17,73-4-4,74-19
public service	2-10(2),5-8,8-6,10-3-5,10-7-2,14-6-5,15-3-4,16-8,20-11,23-6,24-12,24-16,24-17,24-18,24-19,24-20,24-21,24-22,26-7,28-8 (1) ,31-2,31-4,33-3-3,37-3,39-4-3,40-10,40-11,45-9,45-18,45-21,45-23,46-2-5-2,46-2-8-1,46-4-3-3,50-1-3,50-2-3,53-2-5,54-18,54-24,56-14,57-5-8,74-18	
Demand based policy tools	Service outsourcing	
	Trade control	
	government procurement	5-9,54-11,63-3-5
	Overseas institutions	5-10,10-9-2,14-6-1,23-9,25-8,28-16,39-5-2,39-5-4,39-5-5,45-2,52-1

## 4. TEXT ATTRIBUTE STATISTICS OF WENZHOU SCIENCE AND TECHNOLOGY INNOVATION POLICY

### 4.1. Quantitative analysis of the policies

Since 2006, Wenzhou has attached great importance to the work of scientific and technological innovation. The density of scientific and technological innovation policy formulation and release has been increasing, and the number of policy texts has shown an increasing trend. In particular, the number of policies issued in 2018-2022 has reached 31, which is in sharp contrast to the number of individuals in the primary stage of independent innovation in 2006-2008. The historical growth of the number of scientific and technological innovation policies in Wenzhou is related to national politics. The adjustment of economic policy shows a high degree of consistency. The statistics of the number of policies are shown in Table 3.

**Table 3.** Statistics of Time Distribution of Wenzhou Science and Technology Innovation Policies from 2006 to 2022

	<b>Time Axis</b>	<b>Quantity</b>	<b>Proportion</b>
<b>Number of texts</b>	Phase I (2006-2008)	8	10.8%
	Phase II (2009-2011)	7	9.5%
	Phase III (2012-2014)	12	16.2%
	Phase IV (2015-2017)	16	21.6%
	Phase V (2018-2022)	31	41.9%
	Total	74	100%

### 4.2. Analysis on Types of Policy Effectiveness

**Table 4.** Statistical Table of Text Forms of Wenzhou Science and Technology Innovation Policies from 2006 to 2022

	<b>Text form</b>	<b>Specific type</b>	<b>Quantity</b>	<b>Proportion</b>
<b>Type of Text effectiveness</b>	Management method	Measures, implementation plans, action plans, management methods, implementation methods, evaluation methods	28	37.8%
	Guidance	Implementation comments and guidance	25	33.8%
	Development planning	Planning, plan and outline	13	17.6%
	Detailed rules notification	Implementation rules and notices	5	6.8%
	Normative	Regulations and codes of conduct	0	0
	Regulatory	regulations	3	4.1%
	Total		74	100%

There are six different types of policies, namely, management method type, guidance type, development planning type, detailed rules notification type, standard regulation type and regulation type. Among the scientific and technological innovation policy texts released by Wenzhou, "management method" and guidance type "opinion" are the main ones. The number of management method type texts accounts for 41.2%, and the number of guidance type policy

texts accounts for 33.8%, These two text types have a large gap with the other four forms. It can be seen that the text of science and technology innovation policy in Wenzhou has the characteristics of authority, enforceability and operability. It is particularly noteworthy that among the 68 policy texts related to Wenzhou's scientific and technological innovation, there are a large number of "trial" and "temporary" policy texts, reaching 23, accounting for 33.8% of the total. This shows that Wenzhou municipal government departments have a strong sense of innovation in the formulation of scientific and technological innovation policies, are brave to explore, and dare to take the lead in key areas and outstanding problems. The statistics of text types of science and technology innovation policies in Wenzhou are shown in Table 4.

#### 4.3. Statistics of issuing institutions

From the perspective of issuing institutions, the issuing units include Wenzhou Municipal Party Committee, Wenzhou Municipal Government Office, Wenzhou Science and Technology Bureau, Finance Bureau, Human Resources and Social Security Bureau, Local Taxation Bureau and more than 10 departments. Among them, Wenzhou Municipal Government Office has the largest number of policy documents formulated and issued, with a total of 43 policies, 31 of which were issued independently, accounting for about 42% of the issued policies; The second is Wenzhou Science and Technology Bureau, which issued 21 policies in total, including 13 independent documents, accounting for about 18% of the number of policies; The management committee of Wenzhou South Zhejiang Coastal Advanced Equipment Industry Cluster, the management committee of Wenzhou South Zhejiang Science and Technology City, the leading group office for building a strong science and technology city of Wenzhou Municipal Party Committee, and Wenzhou Self-created Office have issued policies related to scientific and technological innovation, which shows that Wenzhou is trying to mobilize all forces to promote the improvement of scientific and technological innovation. See Table 6 for the details of statistical data of specific issuing institutions.

**Table 5.** Statistics of Wenzhou Science and Technology Innovation Policy Issuing Institutions from 2006 to 2022

	<b>Department</b>	<b>Number</b>	<b>Proportion</b>
<b>Text issuing subject</b>	Wenzhou Municipal Party Committee	2	2.70%
	Wenzhou Municipal Government Office	31	41.89%
	Wenzhou Science and Technology Bureau	13	17.57%
	Other departments	7	9.46%
	Joint promulgation	21	28.38%
	Total	74	100.00%

#### 4.4. Statistics on the distribution of policy instruments

According to the constructed framework of science and technology innovation policy tools, the frequency statistics and analysis of 691 policy clauses in 74 selected texts related to science and technology innovation in Wenzhou from 2006 to 2002 are conducted. The statistical results are shown in Table 6.



**Table 6.** Statistical Table of Types of Technological Innovation Policy Tools in Wenzhou from 2006 to 2022

Tool Type	Sub Tools	Quantity	Subtotal	Proportion	Subtotal
Supply	Talent support	75	409	10.85%	59.19%
	Infrastructure	192		27.79%	
	Capital investment	107		15.48%	
	Information support	35		5.07%	
Environmental	Goal programming	74	268	10.71%	38.78%
	Financial support	53		7.67%	
	Tax incentives	14		2.03%	
	Intellectual property right	32		4.63%	
	Regulatory control	53		7.67%	
	Public service	42		6.08%	
Demand	Service outsourcing	0	14	0.00%	2.03%
	Trade control	0		0.00%	
	government procurement	3		0.43%	
	Overseas institutions	11		1.59%	
Total		691		100.00%	

## 5. ANALYSIS ON THE CONTENT CHARACTERISTICS OF WENZHOU SCIENCE AND TECHNOLOGY INNOVATION POLICY

### 5.1. On the whole

According to the analysis results of 74 scientific and technological innovation policy tools in Wenzhou, supply type, environmental type and demand type policy tools are distributed and have a certain proportion. However, the Wenzhou government uses more supply type and environmental type policy tools, with supply type accounting for the largest proportion of 59.19%, followed by environmental type of 38.78%, and demand type of 2.03%. The highest proportion of supply oriented policy tools indicates that Wenzhou Municipal Government prefers to adopt policies that directly promote the development of scientific and technological innovation, and the government directly supports the effective development of scientific and technological innovation activities in terms of providing infrastructure construction, funds, talents and information services. Environmental policy tools reflect that Wenzhou Municipal Government has created a policy environment conducive to scientific and technological innovation through the guidance of "goal planning", "financial support", "tax support" and other aspects. Wenzhou Municipal Government has seriously insufficient attention to demand based policy tools, accounting for only 2.03%. Too little "intervention" may weaken the overall effectiveness of the three functional science and technology innovation policy tools to a certain extent.

### 5.2. Supply oriented policy

Through data statistics, we can find that supply oriented policies are used most frequently, covering all aspects of the supply side, In the application of its secondary indicators, "infrastructure" is the most important, accounting for 27.79%, which specifically shows that Wenzhou pays close attention to the construction of real infrastructure such as high-energy innovation platforms, innovation research institutes, industrial bases, science and innovation

corridors, mass innovation spaces, incubators, science and innovation parks, and the construction of non-real carriers such as innovation alliances, collaborative organizations, and incubation platforms, as well as the improvement of the environment around the physical infrastructure. The geographical location and conditions of "seven rivers, two mountains and one field" determine that Wenzhou's land resources are relatively scarce. The high price of land is one of the reasons for the high cost of enterprises. The government adopts infrastructure policy tools to reduce enterprise costs and effectively remove obstacles in the process of enterprise innovation and research and development.

The number of policies on "capital investment" accounted for 15.48%, indicating that the government is willing to support enterprises with "real gold and silver" to increase R&D investment and provide financial support for scientific and technological innovation activities, which is specifically reflected in supporting fund autonomy and incentives in project recruitment, enterprise cultivation, technology breakthrough, new product R&D, enterprise innovation platform, industrial collaborative innovation, etc. The government has 107 policies to provide financial support for innovation entities, ranking second in all sub instrument types. The capital investment policy is very effective for the start-up small, medium-sized and micro enterprises. The government's early capital investment has, to a certain extent, absolutely ensured the survival of enterprises. However, some scholars believe that too much capital subsidy policy may disrupt the normal market order, allowing innovation subjects to change their original intentions and make choices in the direction of increasing their own interests. They may change their development direction to meet the direction of government subsidies, or they may forge materials to obtain government subsidies.

The number of "talent support" sub tool policies accounted for 10.85%. Scientific and technological talents are the core resources to realize scientific and technological innovation, "Talent support" is divided into direct talent cultivation and indirect talent cultivation. Direct talent cultivation includes the introduction of high-level innovation teams at home and abroad, high-end innovation talents, young scientific and technological talents, providing them with cash incentives, improving housing rental and sales, children's education and other measures. "The policy tool is mainly the direct talent strategy, which can fill the talent gap more quickly. Indirect talent cultivation includes strengthening discipline construction in colleges and universities, offering science and technology courses in primary and secondary schools, organizing science and technology activities, etc. Indirect talent cultivation strategies ensure the sustainable supply of talents, and cultivate backup forces for scientific and technological innovation. Indirect talent strategy is less used in Wenzhou. Talent strategy is one of the most important measures to solve the innovation chain. It is also a relatively weak link in Wenzhou.

Relatively speaking, the number of "information support" sub tool policies is small, accounting for only 5.07% of the number of policies. Information support "promotes the construction and improvement of scientific and technological resources and innovation information platforms; it also includes increasing the ways to provide services for innovation activities, such as product exhibitions, trade fairs, academic seminars, international expositions and other information exchange networks.

### **5.3. Environmental policy**

The types of environmental policy tools are more diversified, The government supports the creation of a good scientific and technological innovation environment by building six policy tools, including "target planning", "financial support", "tax incentives", "intellectual property rights", "regulatory control" and "public services", to indirectly guide enterprises to take the path of innovative development, so as to achieve long-term sustainable scientific and technological innovation. According to the data, among the environmental policy tools in Wenzhou, "target planning" and "regulatory control" "The sub tools have been used in

formulating scientific and technological plans, setting regulatory measures, and standardizing the operation of projects, accounting for about 18.4% in total. They are the two most widely used sub tools among environmental policy tools, playing a role in breaking the old and establishing the new, and optimizing the institutional environment.

The "financial support" and "tax incentive" sub tools to meet the capital needs of enterprises in the process of innovation accounted for 7.67% and 2.03% respectively. Wenzhou was approved as a pilot area for financial reform in 2012. The government improved the financing environment and development space for different innovation entities, such as SMEs and mass innovation space, by continuously innovating the financial service model, optimizing the capital market, and providing necessary support for scientific and technological innovation activities; Wenzhou "tax incentive "The number of policies is very small, which is also related to the characteristics of tax policies. In terms of tax legislation and tax policy formulation, we have always emphasized the centralization of tax power, the unification of tax administration, and the prefecture level cities have no right to formulate tax policies. In addition, tax incentive policies should be kept as long-term and continuous as possible, and excessive tax policies should be avoided as far as possible to interfere with market economic activities and increase the collection and management costs of tax authorities. However, tax preferences involve There are a large number of enterprises in Wenzhou, which are recognized as high-tech enterprises and provincial-level technology-based small and medium-sized enterprises. There are more than 3000 high-tech enterprises in Wenzhou and more than 12000 provincial-level technology-based small and medium-sized enterprises, which can enjoy preferential tax policies. It can be seen that the research on policy tools should not only focus on the quantity distribution, but also on the influence of policy tools.

The policy strength of the "sub tool of intellectual property" is not high, accounting for 4.63%. The application of tools in the field of intellectual property is less, which may cause hidden dangers and high risks to scientific and technological innovation activities. The proportion of the "public service" sub tool is 6.08%, which includes legal consulting, agency, notarization, identification and other third-party professional service institutions that provide direct services for innovation activities, as well as administrative services such as the construction of government service platforms within the government. " Public service "has the functions of accelerating the output of scientific and technological innovation achievements, promoting the transformation of scientific and technological innovation achievements, and improving the scientific and technological innovation system. The government creates an innovative environment for efficient allocation of resources by formulating corresponding public service specifications.

#### **5.4. Demand based policy**

Among the demand based policy tools, there are 11 policies to support the establishment of overseas branches, R&D centers and sales networks, There are three policies that mention "policy procurement", while "service outsourcing" and "trade control" measures are blank. The proportion of demand side policy tools is too low, which weakens the overall effect of scientific and technological innovation policies to a certain extent, affects the outsourcing of R&D projects, which is not conducive to cultivating the strength of civil research institutions, and at the same time, there are deficiencies in the prevention and control of export control risks.

## **6. CONCLUSION AND ENLIGHTENMENT**

From the perspective of policy tools, this paper uses the text analysis method to collate and analyze a total of 691 policy codes based on 74 science and technology innovation policy documents issued by Wenzhou City in 2006-22. The research results show that:

### 6.1. From the dimension of text attribute of science and technology innovation policy

The release time of Wenzhou's science and technology innovation policy can clearly reflect the context of Wenzhou's innovation driven development strategy, which is consistent with Wenzhou's social and economic development. In particular, after 2018, relevant policies have been intensively introduced, which shows the determination of Wenzhou Municipal Government to promote science and technology innovation. The types of effectiveness of science and technology innovation policies issued by Wenzhou show a variety of characteristics, covering a variety of policy texts. The text type is mainly "management methods". The "management methods" for implementing and implementing programs are characterized by operability and enforceability. The "guidance" and "development planning" formulate science and technology innovation policies from a strategic and comprehensive perspective, which are authoritative and binding. It can be seen that Wenzhou's science and technology innovation policy has high effectiveness. As many as 10 departments have participated in the formulation of Wenzhou's science and technology innovation policy, and many departments have jointly issued documents to formulate policies. Among them, Wenzhou Municipal Government Office has the largest number of independent documents and joint documents, followed by Wenzhou Science and Technology Bureau, which has systematized the importance and investment of Wenzhou Municipal Government in science and technology innovation.

### 6.2. From the perspective of science and technology innovation policy content

(1) Policies are unbalanced, and the number of demand based policy tools needs to be improved

Since 2006, various departments of Wenzhou Municipal Government have introduced policies and measures, "Supply environment demand" "Three dimensional comprehensive policy system, the data shows that the driving force of the supply type policy tools at one end is very strong, and the supply type policy accounts for nearly 60%. It can be seen that the government has a clear intention to promote the development of scientific and technological innovation, but the demand type policy tools at the other end are very weak, which is very inconsistent with the mechanism model of the scientific and technological innovation policy tools. In the process of scientific and technological innovation, although various policy tools work together on scientific and technological innovation activities, the force is different. Supply based tools are the driving force, environmental tools indirectly promote scientific and technological innovation activities, and demand based tools drive scientific and technological innovation and product research and development. From a purely quantitative perspective, Wenzhou's demand based policy tools have seriously unbalanced proportions. The sub tools of "service outsourcing" and "trade control" have not been involved, which has greatly weakened the overall effectiveness of scientific and technological innovation policy tools. It is suggested that Wenzhou Municipal Government fill in this gap in the future policy adjustment. At the same time, sub tools such as "government procurement" and "overseas institutions" can also be added to help scientific and technological innovation entities resist market uncertainty.

(2) improvement in the contents of various policy tools

"Financial support", "tax incentives", "intellectual property", "talent support" and other sub tools have coverage, but there is still room for improvement in their content. In studying the specific measures taken by government departments, we rarely find that the content of the "financial support" sub tool is to mobilize credit evaluation institutions, insurance institutions and other intermediary organizations to effectively support scientific and technological innovation enterprises. The content of the "tax incentive" policy is also less related to the enterprise's human resources, investment and financing, and the transformation of scientific and technological achievements. In terms of "intellectual property rights", we need to

constantly increase efforts with the innovation of technology, strengthen the management of intellectual property trials, and standardize the rule of law. In the policy of "talent measures", Wenzhou Municipal Government should, while vigorously introducing domestic and foreign scientific and technological talents, refine talent incentive measures, retain scientific and technological talents, and pay attention to cultivating local technical innovation personnel and talent teams, so as to make contributions to Wenzhou's scientific and technological innovation cause.

## FUNDS

(1) The basic scientific research project of Wenzhou Science and Technology Bureau "Research on Wenzhou Science and Technology Innovation Policy Based on Text Analysis" (R20210040)

(2) Wenzhou Association for Science and Technology Service Science and Technology Innovation Project "Comparative Study on Science and Technology Innovation Policies of Key Cities in Zhejiang Province" (rkx28)

(3) Zhejiang Provincial Philosophy and Social Sciences Planning Project "Research on Rumor Recognition and Communication Intervention Based on Automatic Text Scoring" (23NDJC393YBM)

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