70-year Evolution of China's Environmental Policy —Based on the Analysis of Policy Text Using Nvivo 11.0

Jiajie Liu¹, George Du¹, Weina Liu² and Dianwei Zhang²,³,* ¹City University of Macau, CHN ²Hebei Institute of International Business and Economics, CHN ³Beijing Normal University, CHN  *E-mail: 184194952@qq.com

Abstract. Reviewing the development of China's environmental policy is of great significance to China's policy formulation and environmental protection in other developing countries and regions. This research took the environmental policy texts 70 years ago, i.e. from the founding of New China as the research object, and used NVivo 11.0 software to analyze the text encoding. It sorted out and summarized the development process of China's environmental policy: initial stage (1975-1991), difficult stage (1992-2002), exploration stage (2003-2012), and development stage (2013-2018). It shows evolution logic behind value rationality of China's environmental policies, increasing policy suitability, and continuous optimization of policies.

1. Introduction
Since 70 years ago China's founding, environmental changes have made environmental protection a key concern of China. Environmental protection refers to the collective name for various actions that human beings take to solve actual or potential environmental problems, coordinate the relationship between humans and the environment, and ensure the sustainable development of the economy and society [1]. As a country with a large population, China has paid more and more attention to environmental protection in recent years. A series of environmental protection policies have been promulgated, environmental governance systems have been established and improved, and they have provided many lessons for other developing countries. Therefore, it is great significance to carefully review the development of China's environmental policy and explore the laws of environmental policy development. The author took the environmental policy document issued by the country as the research object, applied NVivo 11.0 software, analysed it in detail according to the document's release time, document subject words, and policy discourse, analysed the policy content and its changing process, and understood its specific trend. To gain insight into the policy intent and nature, provide a scientific basis for formulating a sound environmental policy.

2. Research design
2.1. Source of policy text
The policy text is a documentary record generated by policy activities, which not only highlights the policy makers' value orientation, but also records factual problems and countermeasures [2]. In order to ensure the scientificity and completeness of the sample selection, the selection of policy texts in this research were abide by the following principles: 1. Relevance: statistics on policy documents related to ‘environmental protection’ and ‘environmental governance’ and policy documents with similar
keywords. 2. Authority: refers to the texts of laws, regulations and major policies issued by the Central Committee of the Communist Party of China, the State Council and the Ministry of Ecology and Environment of the People's Republic of China. 3. Completeness: the time limit for selecting the texts is from 1949 to 2018, and statistics are based on the environmental policy texts involved during this period.

2.2. Research tools and methods

2.2.1 Research tools
This paper used Nvivo 11.0 qualitative analysis software to analyze the policy text. First, use the software to import relevant text materials, carefully read them, mark them and pre-code them to form Free Nodes. By further organizing the categories of each node, establish a generic relationship and compile it into a structural Tree Nodes, therefore express the interrelationship between qualitative research concepts. Finally, after repeating parent-child node relationship, a relationship model is established after the coding is completed, and visual changes are used to present the text changes. This research followed the three-level coding steps of open coding, axial coding, and selective coding. Based on this, the environmental policy texts in China would be hierarchically coded from 1949 to 2018, build a four-dimensional policy analysis framework of ‘environmental value orientation’, ‘environmental protection content’, ‘organizational form’ and ‘environmental quality measurement’, analyze the explicit and implicit relationships between texts to reveal the specific requirements, implementation bias and changing logic of Chinese environmental policies in different ages.

2.2.2 Research methods
In recent years, more and more scholars have adhered to the qualitative and quantitative research concept and adopted a comprehensive text analysis method to simultaneously perform attribute measurement and discourse analysis on texts in order to enhance the scientificity and objectivity of text research. Based on this method, this study is mainly used qualitative research and adopted a method that focuses on both content measurement and discourse analysis of environmental policy texts. On the one hand, it used a critical discourse analysis method to reveal the relationship between language, power, and ideology behind the text. On the other hand, the content analysis method was used to transform non-quantitative document materials into quantitative data. And based on these data, quantitative analysis and fact judgment and inference are made on the text content.

(1) Critical discourse analysis
Critical discourse analysis examines power relations and ideologies embedded in texts through careful and systematic analysis [3]. This research was based on a critical discourse analysis method, which establishes a coding system for the text of China's environment-related policies from 1949 to 2018. Take time as a clue to make in-depth research on the ‘environmental value orientation’, ‘environmental protection content’, ‘organizational form’ and ‘environmental quality measurement’ four dimensions, sort out the characteristics and changes of each dimension, and interpret the content, structure, and significance of China's environmental policy evolution.

(2) Content analysis method
Krippendorff (2004) said that content analysis aims to reduce the raw data into manageable amounts for analysis, defining it as “a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use [4-5]. In this research, the content analysis method was used, and the text content of relevant policies was used as the analysis index. Manually encoding was performed using Nvivo 11.0 software. In this process, the author manually encoded 502 items, and formed 183 free nodes without counting, and the reference point was 502. Through the measurement and analysis of the key words of the nodes, the hotspots and key issues of environmental policy were explored, and the historical changes and important characteristics of environmental policy were explained.
3. Research process

3.1. Screening of policy texts
In order to facilitate research, this article follows the principle of authority and high relevance, and selected 58 representative policy texts from the policy and regulatory texts of the Chinese Ministry of Ecology and Environment's official website, and conducted in-depth coding research. It should be noted that due to the limitation of means and resources, the final selected text is not comprehensive enough. But it is certain that the 58 documents screened basically cover the main policy texts of China's environmental protection development, and can reflect the evolutionary logic of the policies. Since the founding of New China, the number of environmental policy documents issued has experienced fluctuations. This research analyzed the distribution of the number of policy texts over the years, which can help us understand more directly the focus and evolution of China's environmental policy, as shown in Table 1.

Table 1. Distribution of the number of ideas in Chinese environmental policy texts

| Year | Number of Text | Year | Number of Text | Year | Number of Text |
|------|----------------|------|----------------|------|----------------|
| 1975 | 1              | 1999 | 1              | 2009 | 2              |
| 1978 | 1              | 2000 | 1              | 2010 | 2              |
| 1981 | 1              | 2001 | 1              | 2011 | 2              |
| 1984 | 1              | 2002 | 1              | 2012 | 3              |
| 1989 | 1              | 2003 | 2              | 2013 | 3              |
| 1992 | 1              | 2004 | 2              | 2014 | 4              |
| 1994 | 1              | 2005 | 3              | 2015 | 4              |
| 1995 | 1              | 2006 | 2              | 2016 | 4              |
| 1996 | 1              | 2007 | 3              | 2017 | 3              |
| 1998 | 1              | 2008 | 2              | 2018 | 3              |

3.2. Coding of policy content
This research classified the formed free nodes by ‘node-copy-paste’ or ‘node-copy-merge to new node or merge to selected node’ to form the same generic category, and uses more abstract and general concepts to name it. Repeat the parent-child node relationship to form a tree-like node, which can not only express the mutual relationship between concepts, but also enriches the generic class according to its attributes. Construct the conceptual framework of all nodes and form a four-dimensional coding hierarchy of ‘environmental value orientation’, ‘environmental protection content’, ‘organizational form’ and ‘environmental quality measurement’. The following table shows the process of changes in the textual coding of China's environmental policy in four stages, as shown in Table 2.

Table 2. Changes in the hierarchical structure of nodes in different time periods

| Name of Node | 1975-1991 | 1992-2001 | 2002-2011 | 2012-2018 |
|--------------|-----------|-----------|-----------|-----------|
| environmental value orientation | Working guidelines and principles, policy values, and seeking truth from facts | Same as 1975-1991, protection, management | Same as 1992-2001, scientific development concept, industrial structure adjustment, environmental priority | Same as 2002-2011, comprehensive supervision and governance, optimized exploitation, restricted exploitation, prohibited exploitation |
| environmental protection content | Waste water, waste gas, solid waste | Same as 1975-1991, urban environment, sewage, water pollution, soil pollution, air pollution, noise pollution, motor vehicle pollution | Same as 1992-2001, ecological protection, seawater protection, urban environment, acid rain control, smog | Same as 2002-2011, toxic chemicals, radiation environment, rural environment, marine ecological environment |
| organizational form | Publicity, education, training | Same as 1975-1991, supervision, governance, notification | Same as 1992-2001, strict control, publicity | Same as 2002-2011, order to stop, enforce |
4. Research results

4.1. Development history of China's environmental policy

4.1.1 The starting stage (1975-1991)
In the early days of the founding of the People's Republic of China, environmental issues did not become important social issues. The United Nations Conference on the Human Environment held in 1972 set the direction for China and greatly promoted China's progress in environmental protection. In 1975, China adopted ‘Several Provisions on the Protection and Improvement of the Environment’, which is China’s first environmental protection document in the true sense. The first ‘Environmental Protection Law’ was enacted in 1989, making Chinese talents begin to change their minds.

4.1.2 Difficult stage (1992-2001)
After 1992, China began to emphasize environmental development. China revised a number of environmental laws and regulations. In 1998, in order to improve the authority and influence of the environmental protection department, the Environmental Protection Administration of the People’s Republic of China was upgraded to the General Environmental Protection Administration of the People’s Republic of China. However, at this stage, China's environment faced a series of problems. The environment was deteriorating and contradictions were becoming increasingly prominent. In the face of a fast-growing economy, environmental issues had not received much attention, and environmental degradation had not been properly controlled.

4.1.3 Exploration stage (2002-2011)
The Interim Provisions on Promoting Industrial Structure Adjustment and the Decision on Implementing the Scientific Development Concept and Strengthening Environmental Protection issued in 2002 and 2004 demonstrate China's determination to protect and improve the environment. China wanted to show the importance of environmental protection through economic restructuring. The promulgation of these two laws and regulations had promoted the establishment of the priority status of environmental protection, optimized, restricted and banned the development of the region, and insisted on economical, clean and safe development. In 2008, the State Environmental Protection Administration was further upgraded to the Ministry of Environmental Protection to enhance its authority. During this period, the correct environmental protection policy guidelines were re-established, and they gradually moved to a new stage of improving quality and promoting development.
4.1.4 Development stage (2012-2018)
At this stage, China's environmental policy has gradually embarked on the development path of pursuing a unified quality and efficiency. China has continuously improved its environmental policies and regulations, strengthened its environmental governance methods, and formed a central and local monitoring system with a reasonable hierarchy and complete management.

4.2 Value rationality constantly highlights
In the past 70 years, the rich choice of value of China's environmental policy was an increasingly specific and rich dynamic process. The value orientation in different periods reflected the relationship between purpose and means, ultimate purpose and actual interest, purposeful thinking and regular thinking in the process of human society according to the changes in the environment.

4.3 Strengthening policy applicability
Appropriateness is the guarantee of a scientific and rational arrangement of policies. In the 70-year history of China's environmental policy changes, the focus of the policy has been continuously refined, which is more and more in line with the social development of the new era and meets the diverse needs of the government, people and ecology.

5. Conclusion
Through coding processing and objective analysis, China's environmental policy changes have followed the policy research analysis paradigm of elitism and gradualism, and are constantly optimized. It is mainly reflected in two aspects. On the one hand, policy formulation and implementation follow a "top-down" path. On the other hand, the value orientation of China's environmental policy is affected by economic, political, cultural, ecological and other factors. And adaptive adjustment of policy documents is gradually made to achieve realistic demands in different historical periods. China's 70 years of environmental policy measures focus on command and control methods and after-the-fact governance methods, which are direct-government-control-oriented, making it difficult to manage. In the future, there should be various control means to increase voluntary citizen actions and public participation. The measures should evolve from the end of governance to prevention and to the control of the whole process, and emphasize the concept of equal emphasis on pollution prevention and ecological protection.

6. Limitation and further research
There were limitations to this research. This work was based on national policy texts, which are holistic, but some indicator items have not been clearly collected. Future research would be more specific. For example, would provide some baseline data, such as standards for CO₂, SO₂ and dust, or provide some tentative graphs to show the change and progress made in 1975 and from there onwards till 2018.

7. References
[1] He Shuchun 2013 China. On the Harmonious Development of Economic Growth and Environmental Protection. Cooperative Economy and Technology. 24 p4-7
[2] Su De and Xue Han 2018 China. The Logic and Trend of the Ethnic Class (School) Policy in Mainland China in the 40 Years of Reform and Opening Up. National Education Research. 29(06) p12-19
[3] Bloome D and Carter S P 2001 Lists in reading education reform. Theory into Practice. 40(3) p150–157
[4] Krippendorff K 2004 Content analysis. An introduction to its methodology (2nd ed.) (Thousand Oaks: Sage Publications) p18
[5] A. Cornelia Beck, David Campbell and Philip J. Shrives 2010 Content analysis in environmental reporting research: Enrichment and rehearsal of the method in a British–German context. British Accounting Review. 42(3) p207-222.