ISSN : 0974 - 7435 Volume 10 Issue 12

2014

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(12), 2014 [6357-6364]

# Bioenergy policy research in China —— Based on the content analysis method

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## ABSTRACT

The development of bioenergy industry is vital for the economy development and energy safety in China. In recent years, Chinese government has produced a series of policies and regulations to promote the bioenergy industry, but the relevant research was limited and most existing literatures focused on policies' contents by ways of qualitative or subjective analysis. So, more objective and reliable results are needed in reviewing whether issued policies were suitable for practice and guiding future policymaking. In this paper, quantitative and objective content analysis method was used, and all conclusions were drawn by statistical results of 454 Chinese authoritative bioenergy policies. Accordingly, three main problems were found: excessive number of integrated regulations and plans, inadequate technical assistance and uncoordinated policymaking among ministries. Finally, suggestions were put forward for the bioenergy policies in China.

## KEYWORDS

Bioenergy; Policy; Chinese government; Content analysis method.



## INTRODUCTION

In recent years, with people increasingly concerned about the environment and energy problems, more and more scholars began to pay close attention to energy policy, especially bioenergy policy. Since the 1980s, Chinese government began to support the bioenergy research, which has achieved certain success in the past few decades. But due to the lack of technology, capital, consciousness as well as the relative policy, the development of bioenergy industry in China was not very smoothly and there is still a big gap with the developed countries[1]. On the one hand, the bio-energy industry in China started late, but in recent years, with Chinese government increasing attention to the problems of environmental pollution and energy consumption, bioenergy industry is still making progress in the exploration[2]. On the other hand, as the abundant biomass raw materials in China and the obvious advantages of replacing traditional energy[3], the development of the industry in urgent need to form a complete set of laws, regulations and policies for protection and support.

So far, there is little research on bio-energy policy in China. The existing research is mainly by the method of qualitative analysis, which was difficult to effectively judge the evolution of the related policy trend and foresee the implementation and guidance in practice. Based on the content analysis, which was a quantitative and objective method but rare in this field, this study collected Chinese bioenergy policies issued in last decade (2004-2013) by the authority, Through the quantitative analysis, this study evaluated the policy content and finally made recommendations to further bioenergy policy, which has a certain theoretical and practical significance.

## LITERATURE REVIEW

From the existing literature, many scholars made qualitative analysis based on bioenergy policy and market situation, bio-energy policy problems and suggestions aimed at China are put forward. Fu Zhihua in the study of rural bioenergy policy system construction, put forward the emphasis is on financial support from the government[4]. Jiang Shu compared the industrialization of bio-energy policy at home and abroad, puts forward the Suggestions about trade, resources, production, technology, investment and consumption, etc[5]. Cui Haixing analyzed the different background of bioenergy policy in China, points out the development trend of bioenergy policy including non-staple, non-cultivated land, based on domestic and pay attention to protect the environment[6].

Scholars have mainly through policy and content to analyze bioenergy, ignoring the comprehensive and operability of policy analysis of. Policy analysis is a kind of practical application oriented, focusing on the maneuverability and covers all stages of policy analysis, the process of creating knowledge. Among them, using various methods and models of the quantitative study on the policy, is the core of the policy analysis[7]. Therefore, this study used content analysis method, from the different dimensions of bioenergy policy were collected for analysis, it is concluded that the policy direction and the existing problems.

## METHODS

### Content analysis method

Content analysis is a research method which mainly analyzed all kinds of text materials and record contents. Steps include: a. Collecting a batch of representative samples of the materials; b. Decomposing samples according to the contents; c. Drawing a series of clear definition analysis unit; d. Recording data according to the classifications and standards predetermined[8].

### Dimensions

According to the research purpose and policies' contents, besides policies collection, dividing dimensions is very important as well in the content analysis method. In the longitudinal dimension, the bioenergy policies can be divided into general polices, basic policies and specific policies. However, the transverse dimension is more valuable in contents analysis. According to the characteristics of bioenergy policies we collected, this study mainly selected the policy evolution properties and functional properties in transverse dimension, as shown in Figure 1.

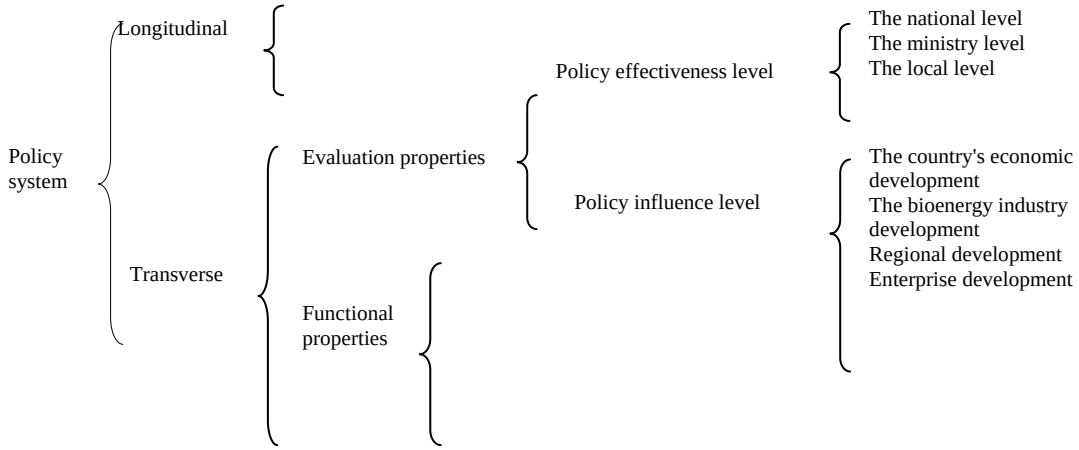


**Figure 1 : Bioenergy policy dimensions**

Evaluation of property is the basic characteristic of policy, including effectiveness level and influence level. Policy effectiveness level includesnational level, ministry level and local level. Policy influence level is the description of policy scope and four properties were selected according to policy collections: national economic development, bioenergy industry development, regional development and enterprise development. Properties and coded instructions are shown in TABLE 1.

**TABLE 1 : Category of bioenergy policy evaluation properties**

| Dimensions | Levels | Properties | Coded instructions |
|---|---|---|---|
| Evaluation properties | Effectiveness level | National level | Party's policies and resolutions, course; Legislation of National People's Congress, and resolution; The state council general office of the state council issued policy |
| | | Ministry level | Released by the ministries of administrative decision and administrative or local rules |
| | | Local level | Local rules and regulations, local regulations, local administrative measures |
| | Influence level | National economic development | Policies facing the whole country, to promote the development of the national economy and the bioenergy industry, measures, resolution, important documents, etc. |
| | | Bioenergy industry development | Policies facing the whole country, in order to promote the healthy development of bioenergy industry by the adjustment of the whole industry, the planning priorities, set production goals and related measures |
| | | Regional development | Policy geared to the needs of certain areas, root area situation, characteristics and especially for the development of bioenergy policies and measures in the region, in order to promote regional economic development |
| | | Enterprise development | The implementation of the policy object focused on bioenergy companies, including technology, capital, subsidies and other support policies and production requirements |

**Source: Fan D. Public Policy. Beijing: National School of Administration Press, 2005[9]; Organized and classified according to the bioenergy policies' contents collected in this study**

The functional properties describe the function of the policy. Through the analysis of the existing policies and relevant literature, bioenergy policies contain five types of functional properties: integrated regulations and plans; industrial building; technical assistance; financial support; subsidies and tax support. The properties and coded instructions are shown in TABLE 2.

**TABLE 2 : Category of bioenergy policy functional properties**

| Dimensions | Properties | Coded instructions |
|---|---|---|
| Functional properties | Integrated regulations and plans | Deploy national bioenergy industry development, government departments at or above the provincial level or specific bioenergy development and comprehensive policy, take the form of comprehensive work plan, planning, opinions. |
| | Industrial building | Including the upgrade of industry structure adjustment scheme, control the development of high energy consumption, high emission industries, eliminate backward production capacity, the policy of industry standards, etc. |
| | Technical assistance | Including personnel training, technical training, bioenergy infrastructure construction, set up industry research base, bioenergy laboratory, etc. |
| | Financial support | Including government bioenergy projects, enterprises of direct investment, private capital investment and enterprise financing incentives. |
| | Subsidies and taxsupport | Bioenergy products price incentives and subsidies, including limiting of proportion of electricity price, forced to buy corporate tax relief policies and measures. |

**Source: Organized and classified according to the bioenergy policies' contents collected in this study**

## Policies collection

NDRC (National Development and Reform Commission) is an authority in policies developing and introducing. The relevant state laws and regulations, development planning and biomass administrative resolution information were posted on its website. In this paper, policies were collected from the NDRC official website. If policies introduced by governments at and above the county level were published in the official website, they were also regarded as authoritative bioenergy policies. This research collected 454 bioenergy policies from the NDRC official website and the specific frequency distribution are shown in TABLE 3. In order to guarantee the effectiveness and reliability of the content analysis, we did some preliminary research. The team included four research members. According to the same dimension, researchers independently analyzed all the policies we collected and classified by their own judgments.

**TABLE 3 : Statistics of bioenergy policy evaluation and functional properties in China**

| Dimensions | Levels | Number | Properties | Frequency |
|---|---|---|---|---|
| Evaluation properties | Policy Effectiveness level | A1 | National level | 40 |
| | | A2 | Ministerial level | 121 |
| | | A3 | Local government level | 293 |
| | Policy Influence level | B1 | National economic development | 21 |
| | | B2 | Industry development | 127 |
| | | B3 | Regional development | 269 |
| | | B4 | Enterprise development | 37 |
| Functional properties | | C1 | Integrated regulations and plans | 257 |
| | | C2 | Industrial building | 91 |
| | | C3 | Technical support | 32 |
| | | C4 | Financial support | 54 |

| | | |
|---|---|---|
| C5 | Subsidies and tax support | 20 |

## Statistical description and analysis

According to the bioenergy policies collected from NDRC official website, 454 policies announced over the past decade were selected in this study. At the policy effectiveness, the number increased with the decrease of policy effectiveness: national level policies accounted for 8.8%; ministerial level was 26.7%; local government level was 64.5%. As policy influence scope, the largest number was regional development, 58.3% of the total, followed by: 28.6% of the bioenergy industry development; 8.2% of the enterprise development; 4.7% of the country's economic development. As the policy function, the quantity was quite different: the number of integrated regulations and plans was up to 55.6%, followed by: industry building by 20.5%, financial support by 11.9%, technical assistance to 7.3%, subsidies and tax support by 4.5%.

The relationship between the policy effectiveness and policy influence scope was shown in Figure 2. According to the policy influence scope, bioenergy policies were divided into four categories, and the maximum was promoting regional development, more than 90% of which were introduced by local governments. The second part was the policies on promoting industrial development and more than 69.8% were developed by the ministries and only 30.2% by central government and local governments. Besides, the polices on promoting enterprises and national economic development occupied a relatively small number of all, which were mainly developed by the matched power hierarchy respectively, local governments and central government.

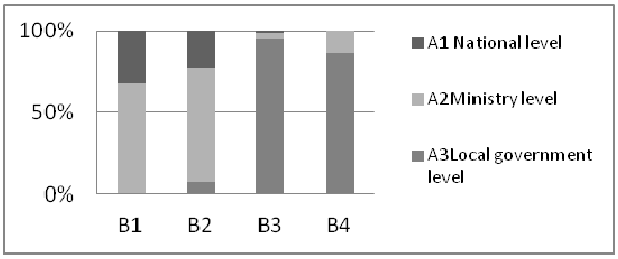


**Figure 2 : The distribution of bioenergy policy influence level and effectiveness level**

The relationship between the bioenergy policy function and effectiveness was shown in Figure 3. From the results, over 60% was integrated regulations and plans in the level of local, which was a relatively low effectiveness level. Besides, all of the other policies, including industry building, technical assistance, finial support, subsidies and tax support, accounted for less than 40%.

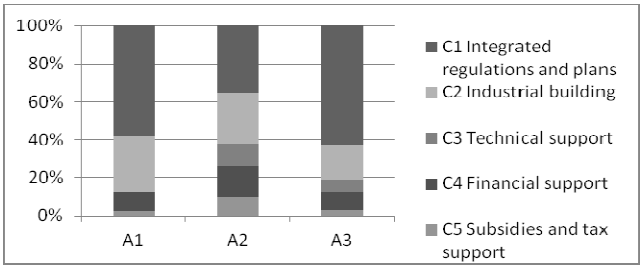


**Figure 3 : The distribution of bioenergy policy effectiveness and function**

**TABLE 4 : The cooperation of bioenergy policymaking among ministries**

| Departments | Frequency |
|---|---|

| | Independent policymaking | Joint policymaking | Percentage |
|---|---|---|---|
| Development and Reform Commission | 89 | 21 | 55.3% |
| Ministry of Finance | 1 | 14 | 7.5% |
| Ministry of Agriculture | 3 | 3 | 3.0% |
| Ministry of Construction | 1 | 2 | 1.5% |
| Ministry of Commerce | 0 | 2 | 1.0% |
| Ministry of Industry and Technology | 0 | 1 | 0.5% |

The cooperation of policymaking among ministries was shown in TABLE 4, which showed the situation whether the policies were introduced by one ministry or different ministries together. According to the statistics, policies introduced by NDRC accounted for the greatest part (55.3%), followed by Ministry of Finance(7.5%), Ministry of Agriculture(3.0%), Ministry of Construction(1.5%), Ministry of Commerce(1.0%) and Ministry of Industry and Technology(0.5%).

## CONCLUSION

### The distribution of the policy effectiveness

Seen from TABLE 3, the distribution of the policy effectiveness was reasonable. The reasons are as follows: in general, with the effectiveness of policies reducing, polices' contents should be more specific and detailed, so the number are increasing accordingly. Specifically, national policies focus on the overall operation of the country; ministerial policies concern the development of economy and the direction of various industries; local policies are more targeted and specific relatively, according to characteristics and economic conditions in their jurisdictions. As a result, the distribution of the policy effectiveness was reasonable.

### Relationship between bioenergy policy effectiveness level and influence level

As Figure 2 shown, the policy effectiveness level matched the influence level generally. According to the policy theory, every public policy has a certain scope of the management. Specifically, policies in high effectiveness level focused on a relatively large scope and general issues of the bioenergy industry, while the relatively low effectiveness level mainly referred to the small social influence field and specific problems of the biomass energy industry.

### Unreasonable policy structure

Seen from bioenergy policy function attributes, the policy structure was unreasonable. As the statistics in TABLE 3, the number of integrated regulations and plans was more than the sum of other four policies. Integrated bioenergy regulations and plans were mainly comprehensive programs, industrial strategies or guidance, which guide the development direction of industries. While other kinds of policies need to be more specific and targeted, so the number of integrated regulations and plans should be less than others. Besides, in general, when the effectiveness level reduces, the policies should include more specific and actionable regulations and measures. But in Figure 3,the integrated bioenergy regulations and plans accounted a largest part in local policies and others were relatively inadequate, which meant the policy structure was imbalance.

### Inadequate technical assistance

Although the minimum number of biomass energy policy was the type of subsidies and tax support, financial support, which also played another economic role to promote the development of industry. Besides, many policies have proposed specific measures and implementation methods of tax incentives and the price subsidies, which only need to make timely adjustments in accordance with the development and operation of bioenergy industry. But according to statistical results in TABLE 3, the technical assistance only accounted for 7.3%. Some comprehensive polices proposed the importance of

technology. For example, “The National Technology Infrastructure Construction Planning (2012-2030)” illustrated a number of needed scientific research facilities should be formed for the wind, solar, biomass, geothermal energy and other renewable energy, aiming at strengthening independent research and development capacity for sustainable development and promoting renewable industry. But there are still no relevant supporting policies to specify how to implement the program.

**Uncoordinated policymaking among ministries**

The coordination problems mainly appeared in ministerial policies. As the figures shown in TABLE 4, more than a half bioenergy policies were issued by the NDRC, but most of them were introduced independently, and joint policies was in a very low volume. Besides, with the development of economy in China, more and more financial measures have been used to promote the the prosperity of various industries, which made Ministry of Finance take part in policymaking increasingly. Moreover, as bioenergy industry continues to mature, more professional and targeted policies should be formulated by the Ministry of Agriculture, the Ministry of Construction and other closely related to bio-energy industry departments. However, they just accounted for a very low proportion in all the policies, which should be improved.

## SUGGESTION

More specified and targeted measures should be introduced in bio-energy policies. Although during the past decade, Chinese government has issued a series of policies on bioenergy industry. But seen from functional properties, a great number of policies are comprehensive planning or guidelines. Specific objectives and regulations should be increased in policies in aspects of encouraging enterprises to participate in market competition, technology R&D, capital investment and etc.

Local governments are supposed to focus on specific policies and measures in their regions. Integrated regulations and plans were in a high proportion in the level of local polices, which lacked practicability and maneuverability relatively. From the point of policy system, policies can be divided to general policies, the basic policies and specific policies, and all of them are indispensible. In addition, the characteristics are different in every region, especially in bioenergy industry, which is highly dependent on raw material and had to be close to the production areas. Therefore, local governments should be aware of the development of bio-energy clearly and grasp specific market conditions and companies’ operation. Combining with the regional features and based on the national strategies, local government should add up technical support, funding support, market operations and other specific guidelines and measures instead of only industrial development plans or goals.

The technical assistance of bio-energy should be improved. Technology is the core of the bio-energy, according to “National Medium- and Long-term Program for Scientific and Technological Development ”launched by General Office of the State Council, bioenergy was given high priority to development, but no followed any supporting policies or detailed measures. So ministries are supposed to develop specific technical supporting measure in cooperation with local government, including the fields of personnel training, technology transfer, R & D funds, and infrastructure. Besides, as bioenergy technology in China has not yet reached the international advanced level, governments should also increase international communication and cooperation to introduce the foreign technologies and equipments to domestic enterprises.

The coordination among policymaking departments should be enhanced. Above all, the central government needs to play a leading role in formulating a unified bioenergy administrative system and specify requirements of policymaking. Besides, central government should establish a supervision mechanism and coordinate the relationships among different departments to join policy force. On the one hand, there would be no redundant policy to lead waste. On the other hand, the policy can be more complete and leave no "gaps".

## ACKNOWLEDGMENT

This paper is supported by "the Fundamental Research Fund for the Central University (JGTD2014-03)" and "National Social Science Fund of China (13CJY090)".

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