Research on the Impact of Environmental Regulation on Agricultural Green Innovation

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Abstract: In the context of the transformation of China's agricultural innovation, green innovation plays an active and important role in saving energy and resources, reducing environmental pollution, and improving ecological quality. Based on this, this article summarizes and analyzes the existing literature, sorts out the relationship between environmental regulation and agricultural green innovation, summarizes the positive role of agricultural environmental regulation in promoting agricultural green innovation investment, and proposes to promote agricultural green innovation and improve environmental regulation efficiency. Related suggestions in order to improve the efficiency of environmental regulation and promote the better development of agriculture.

1. Introduction

Agricultural green development is an inevitable requirement for the structural reform of my country’s agricultural supply side, and it is also an important measure to accelerate agricultural modernization and promote sustainable agricultural development. The country attaches great importance to agricultural green innovation and proposes that the promotion of agricultural green development has a higher impact on agricultural scientific and technological innovation. Therefore, agricultural green innovation is an important breakthrough point for agricultural green development.

With the severe agricultural pollution situation, such as land degradation, climate change, agricultural non-point source pollution, ecological environment construction and rural economic development are facing challenges. On the key points of promoting the rural revitalization strategy, studying the impact of environmental regulations on agricultural green innovation can make outstanding contributions to the integration of rural primary, secondary and tertiary industries, rural technological progress, and farmers’ income increase. Green innovation is not only the traditional measure of innovation performance by economic indicators, but also extends the perspective to factors such as the environment, including the improvement of industrial processing technology, the improvement of service levels, and the innovation of advanced management concepts. By promoting agricultural green innovation, resource utilization efficiency can be reasonably improved, environmental pressure can be reduced, and negative externalities generated by the environment can be reduced to a large extent. However, at this stage, the promotion of agricultural green innovation is also facing the following problems that have not been properly resolved.
Table 1. Discussion on "Agricultural Green Development" in the Central "No. 1 Document" since the 19th National Congress of the Communist Party of China

| Year | Content |
|------|---------|
| 2018 | Promote rural green development and create a new pattern of harmonious coexistence between man and nature |
|      | Strengthen rural pollution control and ecological environmental protection, promote the green development of agriculture and rural areas, and achieve negative growth in the use of fertilizers and pesticides. Develop ecological recycling agriculture. |
| 2019 | Govern outstanding problems in the rural ecological environment and increase the supply of high-quality green agricultural products |
| 2020 | Promote the green development of agriculture and support the construction of the national pioneering area for green development of agriculture. |

Data Source: As per the Central People's Government of the People's Republic of China. http://www.gov.cn/

1.1. The foundation of agricultural green innovation is weak and the innovation environment is not ideal

On the one hand, due to the competitive nature of agriculture, agricultural profit margins are at a low level, and farmers’ income growth is not ideal, resulting in the slow growth of China’s agricultural economy. Low capital investment has also led to a weak foundation for agricultural green innovation. On the other hand, the quality of the domestic agricultural economy is unevenly developed, and the investment in agricultural green innovation is not perfect. The investment in many industrial science and technology ends up in the sea, and the large-scale development is lagging behind, restricting the progress of agricultural green innovation.

1.2. The agricultural green innovation system is not sound, and the investment risk is relatively high

First of all, at the policy level, the government has promoted agricultural green innovation in recent years, but it is still in its infancy in terms of system construction, and the driving ability of green innovation is weak, which restricts the development of agricultural green innovation. Secondly, from the perspective of financing, due to the low agricultural profit rate, which increases the loan risk, many commercial banks have few agricultural-related policies, which makes financing difficult, and many agricultural green innovation projects hinder development due to funding problems. Finally, the ability to avoid risks is low, and agriculture needs to face natural risks. Its force majeure makes agricultural green innovation activities unable to effectively avoid agricultural natural risks. In addition, farmers lack advanced investment concepts, and their capital use and anti-risk ability are not strong. As a result, the quality of agricultural green innovation is low and cannot effectively improve my country's agricultural development.

1.3. Lack of innovative talents and weak awareness of green innovation

First of all, the awareness of small farmers affects agricultural innovation. Most farmers remain resistant to the impact of ideological concepts. Because China's agriculture is mostly family-based and self-sufficient lifestyles, they dare not to innovate and develop. They have the idea of pursuing a more prosperous life. less. Secondly, in the long-term agricultural economic development process, the massive outflow of population has made many promising young people unwilling to stay in the countryside, making the problem of rural hollowing out increasingly serious, thus leading to the lack of genuine grassroots innovative talents in agricultural green innovation, and agricultural green development has always been stagnant. Not move forward.
2. Several factors affecting agricultural environmental regulation

2.1. Policy factors
In the process of advancing sustainable development, China has always paid close attention to agricultural ecological and environmental issues, and has successively formulated or revised many laws and regulations, clarifying the aspects of crop straw burning, the use of agricultural chemical elements, soil erosion, and cultivated land protection. Provisions. Especially since the 18th National Congress of the Communist Party of China, every year the central "No. 1 Document" has related discourses; since 2016, the concept of agricultural green development and restoration of the ecological environment has been introduced. In 2019-2020, the increase in green The supply of agricultural products and the development of circular agriculture. Although the country has regulations on agricultural environmental regulations, under the limit of 1.8 billion acres of arable land in China's agriculture, under the goal of increasing food production and farmers' income, the regulatory measures for agricultural pollution prevention and control may not achieve the expected results of the policy.

2.2. Agricultural pollution factors
With the promotion of agricultural technology, the pollution that comes with it is widespread in the agricultural industry. Modern agricultural pollution can be divided into point source pollution and non-point source pollution. The agricultural non-point source pollution can be reflected in the following aspects, such as fertilizers and pesticides pollution, solid waste pollution, plateyodon incineration pollution. The degree of agricultural pollution directly affects local policy formulation and implementation. It is precisely because of the regional differences in agricultural non-point source pollution that there are certain differences in the implementation of specific environmental regulations.[1]

| Year | Fertilizer | Agricultural Plastic Film | Mulch Film | Pesticide |
|------|------------|---------------------------|------------|-----------|
| 2017 | 5859.4     | 252.8                     | 143.7      | 165.5     |
| 2018 | 5653.4     | 246.7                     | 140.9      | 150.4     |
| 2019 | 5403.6     | 240.8                     | 137.9      | 139.2     |

(Unit: 10,000 tons)

Note: The data come from Rural Statistical Yearbook during 2017-2019.

2.3. Voluntary factors
Voluntary factors refer to plans, agreements, or commitments proposed by governments, industry associations, etc., that farmers or agricultural enterprises voluntarily choose to participate in, and whose purpose is to promote environmental protection. [2]Voluntary environmental regulations can fully mobilize the subjective initiative of participants, and can also form a good supplementary effect on the regulatory policies formulated by the government. With the improvement of rural environmental protection awareness, consumers' demand for green agricultural products has increased, making farmers and agricultural enterprises more willing to adopt more environmentally friendly measures in the process of planting, harvesting, and processing.

3. The positive role of agricultural environmental regulations in promoting agricultural green innovation investment

3.1. From a national level
Agricultural environmental regulation can promote agricultural green innovation investment, and at the same time, agricultural green innovation investment can also effectively improve the efficiency of agricultural environmental regulation. It has a positive impact on the construction of new rural areas and the realization of rural revitalization. Agricultural green innovation investment can adjust the structure of agricultural products, increase the added value of agricultural products, and promote rural
economic development. With the development of the rural economy and the state's emphasis on the ecological environment in rural areas, the formulation and implementation of policies related to the ecological environment can boost the improvement of the agricultural environment.[3]

3.2. From an industrial perspective
Environmental regulations can promote agricultural green innovation investment and inject innovation vitality into enterprises. The "Porter Hypothesis" points out that appropriate environmental regulations can encourage enterprises to carry out more innovative activities, and these innovations will increase the productivity of enterprises, increase the profitability of enterprises in the market, offset part of the costs of environmental regulations, and generate "innovation compensation".[4] "Effect" is conducive to the development of corporate competitiveness. In areas with strict environmental regulations, agricultural companies are more willing to carry out green innovation; in areas with relatively loose environmental regulations, agricultural companies use funds to expand production, and profits can offset the losses caused by environmental regulations. For agricultural enterprises, environmental regulation policies can promote their innovative development and enhance their core competitiveness.

3.3. At the individual level
The state's regulatory measures for farmers are mainly subsidies and coercive measures. First of all, environmental regulations for farmers are more implemented in the form of subsidies, and subsidies for farmers who use new technologies can promote green innovation in agriculture. Secondly, compulsory measures are carried out by promulgating laws and administrative regulations, such as expressly prohibiting the burning of crop straw. Increased government investment in agricultural innovative infrastructure can also promote the efficiency of agricultural environmental regulations.

4. Several measures to promote agricultural green innovation and improve the efficiency of environmental regulation

4.1. Increase government funding to improve agricultural green innovation capabilities
The improvement of agricultural green innovation ability can start from the following aspects. Firstly, improve the literacy of agricultural laborers. Only with the sense of innovation and the spirit of change can they carry out innovative activities. Secondly, start from the perspective of resources to improve crops, soil, and agricultural materials. Innovation to promote the efficiency of agricultural production. This is inseparable from government financial support, through scientific planning, support for agricultural green innovation projects, and incentives such as tax incentives, financial subsidies or talent rewards to improve agricultural green innovation capabilities and achieve the goal of environmental and ecological improvement.

4.2. Promote agricultural green innovative technologies and strengthen the construction of agricultural infrastructure
On the one hand, the government has increased capital investment to promote the implementation of agricultural green innovation projects; on the other hand, it has strengthened the construction of agricultural infrastructure, especially agricultural production-oriented infrastructure and ecological environment construction, such as protecting arable land, constructing irrigation facilities, promoting agricultural machinery, and protecting natural resources. Only with complete agricultural infrastructure can we better promote agricultural green innovation technologies.

4.3. Mobilize the vitality of enterprises and promote the development of green innovation in agriculture
By supporting local enterprises with agricultural green innovation capabilities and providing them with preferential policies such as technology and funds, they can fully mobilize their innovation enthusiasm; at the same time, enterprises with relevant technologies can be attracted to invest in rural
areas to add new vitality to local development. For enterprises, it is possible to enhance innovation vitality from within the enterprise, actively promote the construction and operation of internal environmental protection facilities, and not be forced to install environmental protection facilities under the pressure of national environmental regulations and policies.

4.4. Formulate environmental regulation policies scientifically to make the policies implementable

The higher the level of agricultural environmental regulation, the more it can promote the ability of agricultural green innovation and improve the efficiency of environmental regulation policies. The government plays a vital role in the formulation of environmental regulations and policies, and the government must attach importance to environmental protection issues. [5] The laws and regulations of environmental regulation are not perfect, and there is a lot of room for improvement. Therefore, it is necessary to improve laws and regulations and establish a complete environmental regulation legal system. At the same time, the central government clarifies the assessment criteria in the assessment of local governments, and examines the local government's policy formulation, implementation and result feedback through a certain degree of performance assessment.

4.5. Establish environmental protection awareness in the hearts of farmers through propaganda

Chinese farmers have low educational level, low utilization rate of production technology, and low environmental protection awareness. Only by strengthening farmers' environmental protection awareness can the efficiency of environmental regulation be improved. By strengthening publicity, such as the government organizing training of agricultural extension personnel, promoting agricultural technology, and conducting scientific training on fertilization and pesticides, reducing the use of chemical fertilizers and pesticides, and gradually fostering environmental awareness.

5. Conclusion

Under the background of China's "14th Five-Year Plan" and the transformation of agricultural innovation, agricultural and rural areas urgently need to make up for shortcomings. By studying the impact of environmental regulation on agricultural green innovation, agricultural environmental regulation policies can promote the improvement of regional agricultural green innovation efficiency, and the promotion of agricultural green innovation technologies can improve the level of environmental regulation. At the same time, the effectiveness of the implementation of environmental laws and policies in various regions is of paramount importance. Reasonable agricultural environmental regulations are an effective way to promote green production efficiency. As China faces the difficult historical task of carbon peaking and carbon neutrality, it can effectively promote the improvement of rural environment, truly realize agricultural development, increase farmers’ income, promote rural revitalization and new rural construction, promote agricultural modernization, and enable farmers to live a better life.

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