

Internet + Agricultural Policy: Based on the Evolutionary Mechanisms of the Dissipative Structure Research

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Abstract

Internet technology has penetrated into traditional agriculture and provided new ideas for agricultural development. Based on the existence and evolutionary ideas, this paper links external and internal farmers and government organizations to spread the network, establishes the application mechanism and diffusion mechanism analysis system of Internet + agricultural policy, and discusses the impact of Internet policy policies on farmers and rural industrial structure. The conclusions of the study show that the Internet + agricultural policy has accelerated the development of farmers' mastery of technology and policies, and increased the density of rural Internet, thus effectively promoting the orderly development of the rural economy. The Internet+Agricultural Policy establishes a new rural industrial structure system by breaking the initial state of resource allocation, and at the same time shortens the time for adjusting the rural industrial structure.

Keywords

Internet + agricultural policy; Evolution mechanism; Information entropy.

1. INTRODUCTION

With the proliferation and the applications of the network technology, the Internet is to accelerate the penetration of all areas of traditional agriculture. Since the internet is used in the mechanism of agricultural systems, agricultural development provides new possibilities, but also provides a new space for research in the field. Since the 18th National Congress, General Secretary Xi, starting from the Foreground of China's Development, emphasize repeatedly that the main direction of the reform and improvement of agricultural policy is to develop comprehensive agricultural benefits, which needs to give more support and attention to farmers supporting agriculture. Researching on the role of agricultural policies in the rural systems in the Internet + era is a new orientation for farmers in agricultural production.

The development of agricultural modernization, the reform of the supply side of agriculture and establishing a new type of agricultural management must strengthen the adjustment of agricultural structure on the basis of perfecting agricultural policy. Therefore, in the era of Internet +, this article deeply integrates the Internet with traditional agriculture and the research innovative agriculture development ecology, which is consistent with national conditions and helpful to promote the development of agricultural production, thus to promote the development of the rural science and technology and to regulate the rural production relations. This article not only tries to integrate the innovative agricultural policy and agricultural structure system of Internet+ agriculture, but also to establish a rural policy transmission mechanism for Internet +, and to design the network application and the diffusion

dynamic system model in agricultural production field, commenting on the Internet + agricultural policy on agricultural industrial structure and farmers' function mechanism and providing the reasonable suggestions for the supply-side reform of China's agricultural field.

2. THE INTEGRATION ROLE OF INTERNET + AGRICULTURAL POLICY IN AGRICULTURAL SYSTEM

In November 2012, Yu Yang, chairman and CEO first proposed the concept of "Internet plus". When attending the first world Internet conference in 2014, Li Keqiang called Internet plus a "new engine" for improving the quality and efficiency of China's economy. The Internet + is to use information and communication technology and the Internet platform to deeply integrate the Internet with the traditional industries and create a new development ecology. It represents a new social form. Liu Xuemin (2015) explained the important significance of combining the development of the agriculture and the Internet technology with the new situation [1]. Liu Shuai, Tian Shuai, Yu Xiaoyang (2015) believed that the Internet + agriculture realizes the realization of agricultural ecological supplying chain, which can solve the asymmetry of market price and supply and demand information of agricultural products[2]. Yang Jirui, Xue Xiao, Wang Rui (2016) believed that "Internet plus" can effectively solve the dilemma of traditional agricultural investment and financing, and expand agricultural circulation channels by expanding traditional agricultural operation and service mode [3].

Above all, at present, the research of the Internet in economics circle is mainly about its function to the structure and policy of industry. The connotation of "Internet plus" is to extract the core characteristics of the Internet, namely, to develop information, upgrade and fully integrate industry, commerce, finance and the other services. Policy is the embodiment of the will of the government, which is a series of maneuverable activities adopted by the government to achieve a certain set goal. The main goal of agricultural policy is to coordinate science and technology policy and industrial policy, and to channel resources into the government's agricultural economic activities through policy tools, so as to promote the effective development of agricultural economic activities through policy tools, to promote the effective development of agricultural science and technology and effectively achieve the goal of national construction. Therefore, the research on the integrated role of Internet + agricultural policy in agricultural system is to take Internet technology as the core technology, strengthen rural network education, train a large number of farmers with the new technology, and accelerate the change of agricultural industrial structure through the application and diffusion of the Internet.

The Internet + agricultural policy can effectively improve the level of infrastructure construction in the field of agricultural production and consumption information, and accelerate the construction of rural Internet infrastructure. Its realization way is: the government through the Internet not only store a large number of valuable agricultural information, but also establish a unified, as the same time, open the convenient information system, build and improve relevant policies and regulations, strengthen the government, the development of agricultural technology level, reasonable arrangement of industrial structure and mode of production, through the concerted action between departments, deconstruction and reorganization of the traditional agricultural production relations, which to ensure the stability of agricultural production system. Internet innovation of agricultural policies is to make agriculture creativity, new technologies, new products in the social system through the Internet technology, the main role in the process of information from a few people spread to most people, to break the information asymmetry, reduce the transaction cost, to promote the deepening of division of agriculture and to improve the labor productivity, in resulting of accelerating the transformation and upgrading of industrial structure in rural areas.

3. ANALYSIS OF INTEGRATION MECHANISM OF INTERNET + AGRICULTURAL POLICY IN AGRICULTURAL SYSTEM

In recent years, scholars have begun to use the dissipative structure theory of dynamics to solve practical economic problems. The more classic ones are: Wu Xiongzhou, Yang Zhao (2011) showed that agricultural comprehensive production system has the basic conditions of dissipative structure and the self-organizing function [4]. He Yiming, Luo Biliang, Gao Shaohui (2014) used the empirical method of historical metrology, combined with the theory of "information cost caused by resource attribute" and "rent dissipation caused by public domain", and found that whether the country implements agricultural regulation mainly depends on the calculation results of its costs and benefits[5]. Zhang Haitao (2015) analyzed the evolutionary logic and evolutionary model of the information ecological chain of business network, and analyzed the competition and cooperation relations of each subject of the ecological chain by using the dissipative structure and the idea of evolutionary game [6]. Qu Zongxiang (2016) points out that the policy end system formation and dissipative structure theory has a strong power, in particular, the alliance members "conflict" to "overt conflict", conflicts of interest and strength constantly narrowed down and weakening, with the role of social public opinion and policy evaluation can provide policy end system of power output with the guarantee of sustainability [7].

It is observed that although scholars have realized that the dissipative structure theory which is used to demonstrate the Internet on the property and provide affordable services industry system has played an important contribution, especially to explain the formation of the self-organizing ability of agricultural system problems, but so far are not covered by the literature on the Internet in the system, can achieve the utility of agricultural policy. In this paper, in order to further explain the mechanism of action of the Internet on the rural industry system, emphasize the role in promoting the economic development of the Internet for agriculture, combined with dissipative structure theory, using evolutionary analysis method, and the Internet relationships with industry system integration, to analyze Internet + agricultural policy to agricultural structure and the mechanism of action of farmers produced.

3.1. Application Mechanism Based on Internet + Agricultural Policy

In terms of the application of agricultural innovation and technology, the goal of the government to formulate policy tools should not only increase the contribution rate of agricultural science and technology progress, but also be conducive to the cultivation of rural practical talents, organize and cultivate farmers, take the market as the orientation, apply network system, and play the leading and exemplary role of scientific and technological talents in a broader scope.

As the reform of China's economic system in depth, farmers are independent of each other in behavior, and they influence and interact with each other. The individual farmers under the action of agricultural policy are regarded as particles to investigate the set of agricultural dynamic system.

We use p_1, p_2, \dots, p_s to represent the initial state of farmers, and use substitution q_1, q_2, \dots, q_s to represent the various policy instruments of the government. The above variables represent the energy of the agricultural system and are usually expressed as follows:

$$H = E_{kin}(p_1, p_2 \cdots p_s) + V_{pot}(q_1, q_2 \cdots q_s) \quad (1)$$

We consider a conservative system, assuming that H is not explicitly time dependent. Among them, the first one represents the momentum of farmers' acceptance of scientific and

technological innovation and national policy, namely kinetic energy, and the second one represents the effect of national policy, namely potential energy.

According to the classical dynamical theorem, Hamilton equation is obtained.

$$\frac{dq_i}{dt} = \frac{\partial H}{\partial p_i}, \quad \frac{dp_i}{dt} = -\frac{\partial H}{\partial q_i} \quad (i=1,2,\dots,s) \quad (2)$$

In this phase space, each state of government mechanics corresponds to a point pt in this space. Consider an arbitrary function f , which varies with time by using the Hamiltonian equation.

$$\frac{df}{dt} = \sum_{i=1}^s \left[\frac{\partial f}{\partial q_i} \frac{dq_i}{dt} + \frac{\partial f}{\partial p_i} \frac{dp_i}{dt} \right] = \sum_{i=1}^s \left[\frac{\partial f}{\partial q_i} \frac{\partial H}{\partial p_i} + \frac{\partial f}{\partial p_i} \frac{\partial H}{\partial q_i} \right] \equiv [f, H] \quad (3)$$

Here $[f, H]$ is the so-called Poisson brackets of F and H , so the condition for f to remain unchanged is $[f, H]=0$.

In phase space, densities of phase space can be expressed as:

$$\rho(q_1, \dots, q_s, p_1, \dots, p_s, t) \quad (4)$$

Since the number of midpoints in the ensemble is arbitrary, ρ can normalize it.

$$\int \rho(q_1, \dots, q_s, p_1, \dots, p_s, t) dq_1 \dots dp_s = 1 \quad (5)$$

From this, we can get Liu Wei's equation.

$$\frac{\partial \rho}{\partial t} = -\sum_{i=1}^s \left[\frac{\partial H}{\partial p_i} \frac{\partial \rho}{\partial q_i} - \frac{\partial H}{\partial q_i} \frac{\partial \rho}{\partial p_i} \right] = [H, \rho] \quad (6)$$

Gibbs' ensemble view holds that the interaction between particles is very strong within the system. In addition to the energy of each particle constituting the energy of the system, the potential energy existing in the interaction between particles is also a part of the energy of the system. According to ensemble theory, we have reasons to assume that agriculture as a system, policy, farmers, individual affects every link of system of agricultural industrial development and changes of national policy ,every farmer corresponds to a Hamiltonian, policy and farmers set or ensemble's behavior choice, influenced by the conditions of agricultural system, such as policy, law, system, etc., are also subject to farmers for agricultural ideas, new technologies, new product's understanding of the initial conditions. In the case that the initial conditions are very clear, the policy formulation and farmers' behaviors will be closely concentrated in a certain area, while in the case that the initial conditions are not clear, the corresponding ensemble will be distributed in a very wide area. According to Fei Xiaotong's theory of differential pattern, "in China's rural social circles, they dare not break away from the group due to the pressure brought by climbing psychology and group norms, coupled with the limitation of individual ability, and always try to keep consistent with the opinions of group leaders and members. Try to be accepted by the group so that you are not left out in the cold.

It can be seen that when agricultural policy has a new development, the country can help farmers to understand the development of agricultural ideas, new technologies and new products through the Internet technology, strengthen the promotion and exchange of information, and increase the propaganda of the government, which can enhance the extent of farmers' willingness to accept new knowledge. The higher the awareness of the population, the greater the coverage density of new knowledge, the better the policy effect.

3.2. Diffusion Mechanism Based on Internet + Agricultural Policy

3.2.1 The diffusion mechanism of farmer's production behavior

The action mechanism of Internet + agricultural policy is not only reflected in the process of influencing the state of agricultural system, but also in the evolution trend of agricultural production development. According to the theory of structural evolution economics, while subject to the restriction of structural factors, the behavior subject also has certain initiative, and the economic policy formulation under the evolutionary structure-process analysis method should consider the roles of these two factors. Agricultural market failure is mainly caused by asymmetric information, barriers to knowledge communication, insufficient mobility of scientific researchers and other factors, which will hinder the operation of the entire innovation system and the flow of scientific and technological knowledge, leading to low application efficiency. The mark of a successful agricultural policy is whether it can be spread and accepted by a certain number of farmers.

The chemical potential that affects the operational efficiency of the internal communication network of the community includes internal and external factors such as communication environment conditions, consideration of the interests of the propagator and the recipient, and changes of living habits and culture. In traditional agriculture, technological progress and diffusion are extremely slow, and the level of productivity is quite limited. Therefore, the communication network within the community is a channel for farmers to learn and imitate each other. Based on the current overall technical level of China's agricultural productivity is low, and farmers' cultural level and the present situation of the learning ability is low, the information efficiency is low, not fully accessible, low cohesion, top-down system of government information need to experience a longer path, as the villagers' autonomous organization of the village committee and village cadres play intermediary role, internal information transmission disequilibrium farmers differentiation, leading to the community. The mechanism to maintain functional social networks mainly relies on laws, regulations and the rules and regulations of communication institutions. Most of the policies and affairs implemented from the top down are carried out within the framework of formal organizations and institutions.

3.2.2 Diffusion mechanism of agricultural industrial structure

Rural industrial structure refers to the state of resource allocation in terms of quantity, scale and quality among various industrial departments in rural areas and among various components within the industry. It reflects the position, function and development level of different rural industrial sectors in the national economy and is an important part of the national industrial structure. The level of rural industrial development refers to the way of mutual dependence and interaction between industries. The main factors that rural industrial structure optimizes change are the changing structure of the agriculture technology innovation and agriculture technology. The transformation of rural industrial structure and product structure is always guided by technological innovation and corresponding transformation of technological structure. However, all the previous technological structure changes end up with the industrialization of technological innovation, the transformation and upgrading of traditional industries, and the corresponding optimization of industrial structure, product structure and commodity import and export structure.

We can see that the action mechanism of the Internet + agricultural policy is mainly to utilize the initiative of rural households. Through the diffusion function of the policy in rural households and industrial structure through social network, the application efficiency of science and technology is strengthened, and the rational adjustment of industrial structure is promoted by opening up new opportunities of resource allocation. If the influence of environmental noise is taken into account, agricultural system is also subject to the action of a random force, which comes from the dynamic effect generated by the interaction within agricultural industry. At the same time, it also shows that the Internet + agricultural policy shortens the time to adjust the rural industrial structure by accelerating the transmission of rural policies and technical information.

4. CONCLUSIONS AND RECOMMENDATIONS

Based on the integration mechanism of the Internet + agricultural policy on rural industries and the thought of existence to evolution, this paper connects the external and internal communication networks of rural households and government organizations, establishes an analysis system of the application mechanism and diffusion mechanism of the Internet + agricultural policy, and discusses the impact of the policy on rural households and rural industrial structure. We obtain the following main results: a.The Internet + agricultural policy has accelerated the development of farmers' mastery of technologies and policies, which is conducive to the spread of new technologies and policies.b.The Internet + agricultural policy has increased the density of rural Internet, exerted a huge impact on the attitude and behavior of rural actors, and effectively promoted the orderly development of rural economy. C.By breaking the initial state method of resource allocation, the Internet + agricultural policy can establish a new rural industrial structure system and shorten the time to adjust the rural industrial structure. Therefore, the focus of China's agricultural policy in the future should be on the information and institutional level to form an effective market environment, create a set of intellectual property rights system, and give innovators the motivation to continue to innovate. Improve rural communities by rural the construction of the Internet information, build new harmonious interpersonal relations, increase the spread of agricultural information for agricultural science and technology, strengthen the function of social credibility and effectiveness of external relations, to create effective internal and external communication network operating mechanism, so as to build the scientific, reasonable and complete system of food security.

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