

Small farmers' participation in the realization of the value of ecological products: A research review

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Abstract: The theory of two mountains is an important concept of sustainable development and rural revitalization in China. Small farmers' active participation in green development is the key to rural revitalization in China. This paper discusses the internal mechanism of farmers' behavior and the realization of the value of rural ecological products, and its significance for China's green sustainable development. This paper reviews the literature on the participation of small farmers in the field of value realization of ecological products. At present, the main research contents in this field include three parts, including the value realization mechanism of ecological products, the theory of small-scale peasant economy, and the relationship between farmers' behavior and ecological environment protection. On the basis of literature review, this paper proposes the priority research areas and basic research framework of this research topic. On the basis of literature review, this paper proposes the priority research areas and basic research framework of this research topic. First, we can build the theoretical framework of the value realization mechanism of ecological products based on the theories of ecological economics, agricultural economics, and new institutional economics, and explain the logical relationship between the realization of ecological product value and the decision-making of small-scale farmers; Second, we should investigate the behavior mechanism, influencing factors and interest mechanism of small-scale farmers in the typical model of ecological product value realization; Third, through case analysis and quantitative analysis, we can explore the linkage mechanism between the realization of ecological product value, farmers' income increase and ecological environment protection from the perspective of small farmers' participation.

1. Introduction

Green development is the key to rural revitalization and ecological civilization construction in China, which includes the effective treatment of agricultural pollution and the transformation of agricultural production and management mode; It also includes strict protection and rational development of natural ecological resources. In the vast rural areas of China, problems such as non-point source pollution and ecosystem degradation exist objectively, and pollution control and ecological environment protection are urgently needed; At the same time, many rural areas, especially the relatively poor hilly and mountainous areas, still have rich ecological resources, but most of these

areas have not become "golden mountains" [1-2]. How to transform rural ecological advantages into economic advantages through the establishment and improvement of the value realization mechanism of ecological services under the premise of protecting the ecological environment is an urgent problem to be solved in China's poverty alleviation, rural revitalization and ecological civilization construction [3].

The Overall Plan for the Reform of the Ecological Civilization System issued by the central government in 2015 pointed out the basic path to realize the value of ecological services from the perspective of top-level design, including both rational development and strict protection. This involves the reform of rural property rights system, the improvement of market mechanism, the reallocation of elements, the construction of modern agricultural system, the innovation of organizational system, the guidance of the government, the guidance of enterprises, etc. Farmers are the core stakeholders. Farmers are the owners and users of rural natural resources, as well as the main body to implement the rural revitalization strategy [4]. Their behavior decisions determine the effective supply of ecosystem services, as well as the effectiveness of rural pollution control, ecological restoration, and environmental protection strategies. The realization of the value of ecological services and the effectiveness of the above strategies also affect the vital interests of farmers [5]. This is an interactive, circular feedback relationship. If a virtuous circle can be formed between the two, we can achieve a win-win situation of farmers' income increase and ecological environment protection, and achieve green development of agriculture and rural areas. Otherwise, it may lead to the destruction of resources and environment, and ultimately damage the interests of farmers.

Under the basic national conditions of the "big country and small farmers", the family management of small farmers is still the main mode of agricultural management in China at present and for a long time to come [6]. The central government has clearly set the goal of "making decisive progress in rural revitalization and basically realizing agricultural and rural modernization by 2035". Green development is the inherent requirement and basic feature of agricultural and rural modernization [7]. How to promote the effective connection between farmers and modern agriculture, make small farmers become active participants and direct beneficiaries of the green development of agriculture and rural areas, and realize the win-win of farmers' income increase and ecological environment protection, is a problem worthy of in-depth study [8]. Therefore, it is extremely necessary to explore the behavior mechanism of small farmers' participation in the process of realizing the value of ecological services. This has important practical significance for promoting rural revitalization and ecological civilization construction, and has important theoretical value for the cross integration, enrichment and expansion of agricultural economics, ecological economics and new institutional economics.

2. Research status and progress

The academic research trends related to the research content of this topic can be summarized in three following aspects.

2.1 The mechanism of ecological value realization

Ecological products refer to the materials and services provided by natural systems for human beings without damaging the stability and integrity of ecosystems (MA, 2005). As ecological products have the characteristics of public goods or externalities, imperfect property rights system and information asymmetry will lead to market failure (Tietenberg, 2006). A certain payment mechanism must be established to internalize this externality or non-market value (Pagiola and Platais, 2007). For example, Shen Manhong (2016) proposed that "for natural resources, we should not only

investigate their economic value, but also their ecological value; for environmental resources and climate resources, we should give them price signals according to their scarcity, and implement paid use and trading" [9]. Huang Zuhui and Jiang Xia (2017) pointed out that the prerequisite for whether "green water and green mountains" can become "golden mountains and silver mountains" of property rights owners is that "green water and green mountains" can become tradable market products, and the construction of corresponding property rights system, trading system and regulatory system is the key to the realization of the value of ecological products. Therefore, the ecological compensation system and ecological payment mechanism are the focus of academic attention. It is generally believed that the externalities of ecological products can be internalized through government, market and independent governance [10-11]. Its main theoretical basis is Pigou tax (Pigou, 1920), Coase theorem (Coase, 1960) and Ostrom's independent governance thought (1990). In general, the relevant research on the value of ecological products at home and abroad focuses on the evaluation of ecosystem services, value accounting, and the establishment and improvement of ecological compensation and ecological payment systems from the perspective of government leadership [12]. There is a lack of corresponding empirical research in economics, especially from the perspective of agricultural operators, the supply of ecological products, value realization and benefit sharing are seldom considered [13].

2.2 Theory of small-scale farmer economy

Classical theories include "weak small farmers" represented by Marx; "Rational small farmers" represented by Schultz; "Living small farmers" represented by Chayanov; Huang Zongzhi as the representative of the "utility farmers". These theories have explanatory power to the behavior motivation of small farmers, but they also have limitations of the times. Later, there were views such as "socialized small farmers", "market-oriented or being market-oriented small farmers" (Xu Yong et al., 2005; Cao Chun et al., 2009), discussing the characteristics of China's small farmer economy in the process of modernization [14]. For example, He Xuefeng (2013) believed that the rural management structure of "elderly agriculture middle farmers" was the core of "Chinese small-scale peasant economy". Small farmer economy has its limitations. He Xiurong (2009) believed that the super small farm scale was largely the reason for the poor effect of China's modern agricultural construction [15]. However, small-scale agricultural economy also has its characteristics and advantages. "The endogenous power of dynamic opening determines its tenacity and tenacious vitality" (Wen Rui and Fan Bo, 2013); "It is of great significance for China's human capital accumulation and food security; the social security function has reduced the cost of China's industrialization" (Yao Yang, 2017); "There is a tradition of intensive cultivation and comprehensive utilization of limited resources to the extreme" (Du Ying, 2018). Scholars have different views on the future of small farmers in China [16]. For example, He Xiurong (2009) believed that the leasing company farms based on enterprises and the company farms based on agricultural land shareholding system would become important forms of agricultural micro-organizations in China in the future; Huang Zongzhi (2013) believed that a real family farm of moderate scale and "small and fine", which has been widely developed in China in the past three decades, is the correct development path for China's agriculture [17]. He Xuefeng (2015) pointed out that "agricultural modernization and small-scale peasant economy should not be mutually exclusive; we should fully respect the effective gradual progress of the basic laws of agricultural production under the premise of upholding the position of small-scale farmers". The above discussion provides a basic theoretical framework for studying the attributes, characteristics and development direction of China's small-scale agricultural economy.

2.3 The relationship between farmer behavior and ecological environment

China's rural areas are rich in ecological resources, but there are also problems of excessive consumption of resources and serious agricultural pollution. Relevant studies attribute it to the defects of small-scale farming in solving external environmental problems (Wang Yuesheng, 1999). Van der Pleuger (2008) had a different opinion. He pointed out that when the modern development mode swept all corners of the world, small-scale farmers and small-scale agriculture not only did not die out, but also appeared the trend of small-scale farming [18]. The reason was that small-scale farmers relied on the coordinated production of human and nature, and small-scale agriculture has the characteristics of respecting nature, life and health. For example, the practice of "nest market" has preserved good traditional farming and ecological environment in the countryside around Beijing, organized farmers to produce agricultural products in a local and natural way, re-endowed agriculture and rural areas with value, and given small-scale farmers the dominant position in production, realizing multi-dimensional values such as food safety, farmers' income increase, land health, and natural environment sustainability (Xu Huijiao et al., 2017). The research group of the Rural Economy Research Center of the Ministry of Agriculture (2017) also pointed out that "small-scale farmers' production is closely related to the ecological environment [19]. It is a production mode conducive to the sustainable use of natural resources, protects biodiversity, and conforms to the trend of green production and consumption." The above discussion reflects that the current resource and environmental problems in agricultural and rural areas do not originate from the small-scale peasant system itself. As a unique way of production and life in China's rural areas, small-scale farming has multiple values in stabilizing rural employment, inheriting farming culture, shaping rural social structure, and protecting rural ecological environment [20-21].

2.4 Literature summary

To sum up, the theoretical circle has achieved fruitful results in the above research fields, but there are also obvious shortcomings. First, theoretical research and empirical analysis on the value realization mechanism of ecological products are still relatively lacking. There is a lack of bottom-up research perspective, and it is also less included in the research framework of green development of rural agriculture, construction of modern agricultural system and rural revitalization. In particular, it is less likely to consider the supply of ecological products, value realization and benefit sharing from the perspective of small farmers' participation. Second, the research on small-scale peasant economy and small-scale peasant production behavior focuses on overcoming the limitations of small-scale farmers, and seldom considers the role and characteristics of small-scale peasant system in the process of coordinated development of human and nature. At present, the "big country and small farmers" are still the basic national conditions and agricultural conditions of our country. While developing various forms of moderate scale operation, small farmers should step into the track of modern agricultural development gradually through policy support and endogenous mechanism, and transform from traditional small farmers to modern small farmers, so that they can share the fruits of reform and development. Small farmers' participation in the process of realizing the value of ecological products is not only a process of endogenous green development of rural agriculture, but also a process of transformation from traditional small farmers to modern small farmers, and an organic connection with modern agriculture [22]. In short, in the process of realizing the value of ecological products, how to give value to agriculture and rural areas, and let farmers become the main force of rural green development and benefit sharing, rather than the bystander? This is of great significance for the joint construction and sharing of green economy, the inclusive growth of rural economy, the development of modern agriculture and the construction of ecological civilization [23]. However, relevant research has not yet answered the above questions. This is the research content that this topic focuses on.

3. Research difficulties, priority research areas and methods

3.1 Research difficulties

First, objectively and scientifically construct the theoretical framework of the value realization mechanism of ecological services. The behavior mechanism, influencing factors, participation path and interest mechanism of individual decision-making and collective action of small farmers are discussed. Second, select typical cases of ecological service value realization and conduct in-depth research. Therefore, we can objectively and scientifically study the attributes, characteristics, value evaluation methods, development principles, value realization paths of different types of ecological services, as well as the participation behavior mechanism of small farmers. Third, select representative survey case points to obtain detailed and objective data; Select appropriate analysis methods, conduct accurate research and design, establish a robust measurement model, and make scientific and reasonable explanations for the research results. Fourth, on the basis of theoretical research and empirical analysis, how to explore the linkage mechanism between the realization of ecological service value and farmers' income increase, the improvement of modern agricultural system, agricultural and rural green development and rural revitalization.

3.2 Priority research areas and methods

3.2.1 Theory of ecological product value realization

The concept, type and characteristics of ecological products are the first problems to be solved. We can use the theory of ecological economics to define the concepts of "ecological products" and "ecological product value"; Classify ecological products from different dimensions; Discuss the attributes, characteristics, value evaluation methods and development principles of different types of ecological products. Besides, the value realization mechanism of ecological products is another important theoretical issue. To address this issue, firstly, it is necessary to conduct research on the property rights system, and discuss the role of the arrangement of the property rights system in the effective protection, rational utilization and benefit sharing of ecological resources. Secondly, it is necessary to study the trading mechanism and regulation system, discuss the possible realization path of different types of ecological product value, including the interaction between market mechanism and government functions, and reasonable boundaries. Finally, we need to study the benefit mechanism and discuss the impact of the value of ecological products on farmers' income increase and income distribution.

3.2.2 Theory of small farmers' green production behavior

The first thing we should do is to study the characteristics of small farmers. We need to reveal the basic characteristics of small farmers and define their concepts. Then it discusses the value of small farmers, the limitations of small farmers, and the conditions and paths for small farmers to integrate into the modern agricultural system. Secondly, it is the study of small farmers' behavior. Based on the "social ecosystem" analysis framework (Ostrom, 2009), we can build a value realization mechanism model of ecological products in which the final output is determined by the interaction of the property rights system, the trading system and the regulation system, and the joint action of all stakeholders. Among them, it focuses on analyzing the behavior mechanism of small-scale farmers with dual attributes of resource owners and resource utilization, and its influencing factors.

3.2.3 Proposed research methodology

Firstly, collect and sort out the examples of the realization of the value of ecological products in relevant literature, so as to understand the reality, opportunities, difficulties and constraints of their development. Secondly, on the premise of considering the economic and social development, location conditions and resource endowment differences, select typical cases of the realization of the value of ecological products for field research, such as ecological agriculture, rural ecological industry, ecological tourism, ecological compensation projects, etc. Descriptive analysis, comparative analysis and case analysis are carried out on the development status and basic characteristics of new types of ecological products in different regions. This paper proposes a qualitative study on the behavior mechanism and interest mechanism of small farmers' participation in the realization of the value of ecological products by using the grounded theory, finds and summarizes the basic laws among them, and puts forward the original theory.

Logit regression model can be used to analyze the influencing factors of farmers' participation willingness and behavior. From individual characteristics, family characteristics, types of ecological products, characteristics of industrial organizations, characteristics of village economy, characteristics of regional conditions, characteristics of policy support and other variables, select a number of specific and measurable variables to measure the influencing factors of farmers' willingness to participate and behavior characteristics. The tendency score matching method (PSM) can also be used to estimate the overall effect of different types of ecological product value models on farmers' income increase, as well as the differences in farmers' income level, income structure and income distribution caused by participation behavior.

4. Conclusions and Discussion

The development concept of "green water and green mountains are golden mountains and silver mountains" provides a theoretical and policy basis for the transformation of rural ecological advantages and economic advantages under the strategy of rural revitalization in China. Based on this core concept and the characteristic facts of "large country small farmers", this paper proposes the problem of small farmers' participation and benefit sharing in the value realization mechanism of ecological products. This paper reviews and comments on the current major academic achievements. For the lack of research, priority research areas and research methods are proposed. It is suggested to use the theories of new institutional economics, ecological economics, resource and environmental economics to analyze the above issues and establish a basic theoretical framework; Subsequently, the above theoretical assumptions were verified and revised through case analysis and econometric model analysis. Thus, it can provide a forward-looking theoretical basis and practical guidance for the establishment and improvement of the value realization mechanism of ecological services in China, the increase of farmers' income, the coordinated development of rural economy and environment, and the organic connection between small farmers and modern agriculture.

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