

Article

Determinants of Agricultural Infrastructure Construction in China: Based on the “Participation of Beneficiary Groups” Perspective

Mengting Liu  and Yueqing Ji *

College of Economics and Management, Nanjing Agricultural University, Nanjing 210095, China;
2017806095@njau.edu.cn

* Correspondence: jyq@njau.edu.cn

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Abstract: Agricultural infrastructure is a typical public good, and it plays an important role in rural development. The “participation of beneficiary groups (PBG)” system is encouraged by government to supply village level public goods in China. Based on micro survey data from the village level in Jiangsu Province, this study analyzes the status of agricultural infrastructure construction and the promotion of PBG model and quantitatively analyzes the impact of different factors using an econometric model. The results found that the PBG model of agricultural infrastructure construction only accounted for 22.8% of projects, and the bottleneck was the challenge in raising funds at the village level; the total number of projects and the number of projects in the PBG model significantly increased with collective irrigation, and the farmland lease was found to hinder the promotion of the PBG model. The government should take measures to enhance farmers’ awareness of social trust, continuously improve the governance capacity of the village collectives, improve the role of village self-governance and social forces in agricultural infrastructure construction, and actively guide farmers and private enterprises to participate in agricultural infrastructure construction so that farmers can obtain more practical benefits.

Keywords: agricultural infrastructure; participation of beneficiary groups; farmland transfer; China

1. Introduction

Agricultural capital investment is of great significance to reducing poverty and developing the rural economy. In small-scale farming economies, most agricultural infrastructure is characterized by public investment. Increasing the intensity of public investment and improving the supply level of agricultural infrastructure is a necessary step to achieving agricultural modernization in rural areas. Agricultural infrastructure, as a kind of public good, can drive private investment to compensate for underinvestment and improve agricultural productivity [1]. By reducing the cost of agricultural production and increasing output, agricultural infrastructure can create significant benefits in promoting economic growth, narrowing the gap between the rich and the poor, and promoting the coordinated development of urban and rural areas [2,3].

Since 2001, China has implemented tax and fee reforms, and the superior governments have become the main source of funding for agricultural infrastructure construction. The weakening, or even lack of the role of village collectives and farmers makes it difficult for superior governments to effectively use financial investment to meet the needs of farmers and shoulder all of the tasks from construction to later management. Public participation provides a method for taking the public’s ideas, values, and interests into account when making decisions, resulting in more responsive and democratic governance. Effective public participation depends on clear and comprehensive stipulations to

strengthen the compliance and initiative of farmers [4]. The maintenance of valued public goods often requires the active collaboration of local communities in their planning, management, and sustainable development [5]. To change the low participation of village collectives and farmers in agricultural infrastructure construction, since 2012, the “participation of beneficiary groups (PBG)” model is encouraged by Chinese government. In PBG model, corresponding financial rewards will be provided after farmers have agreed to input their own money and labor. The PBG model follow the procedures of farmers’ agreement, village-level declaration, and county-level approval [6]. The Rural Revitalization Strategic Plan (2018–2022) further highlighted “promoting the PBG model and replacing compensation with awards, encouraging farmers to invest in the construction of agricultural infrastructure, and letting farmers participate more in protection of the agricultural infrastructure” [7].

Currently, agricultural infrastructure construction is financed in three ways in China. The first is full financing by the superior government; the second is full financing by the village; and the last is joint financing by the village and the superior government. The proportion of agricultural infrastructure projects funded entirely by the superior government in low-income villages is relatively large [8]. Zhang et al. also found that the public investment scale of poverty-stricken villages is the lowest, but most public investment projects are completely financed by the superior government. From poor areas to economically developed areas, the proportion of public investment projects financed entirely by the superior government is becoming smaller and smaller, and the funds of agricultural infrastructure projects from other sources are becoming higher and higher. The investment in agricultural infrastructure in China is generally on the rise [9]. The Chinese government investment in roads, living environments, and buildings for cultural activities accounted for 2/3 of the total investment, and the investment in agricultural infrastructure management continued to decrease [10]. Farmers’ willingness to participate in agricultural infrastructure governance is affected by many factors, such as farmers’ risk types and input costs [11], and the higher the per capita net income, the more agricultural infrastructure construction projects will be financed [7].

Farmers and village collective’s participation will provide opportunities to share their views and influence the outcome of the planning, investment, and conservation of public goods [4]. Most scholars believe that the PBG system can effectively reflect the real needs of the villager collective and farmers, significantly increase the quantity and level of public goods in rural areas, and play an important role in the supply of village-level public goods and promote the coordinated development of urban and rural areas [12,13]. At present, the government has insufficient willingness to supply agricultural infrastructure, and the village collective supply capacity is also insufficient. Agricultural infrastructure in most areas can only be provided by farmers themselves in an PBG manner [14]. The promotion and implementation of the PBG system in China is affected by many factors, such as “initiating difficulties, negotiating difficulties, raising difficulties, and advancing difficulties” in the process of village-level public goods. The village size and the characteristics of village cadres and farmers’ cognitive abilities are also important factors influencing the implementation of the PBG system [15–18]. However, these studies are only qualitative, and lack a quantitative analysis about the implementation of the PBG system. Besides, previous studies also lack a comparative analysis between different patterns in PBG and the difficulties faced by the promotion of PBG in agricultural infrastructure construction.

The PBG system has become the most important way for supplying agricultural infrastructure in China. However, with the acceleration of urbanization, the constant off-farm transfer of agricultural labor and the heterogeneity of farmers have increased [19]. The promotion of the PBG system is also facing many challenges. Effectively organizing farmers and forming collective decisions to participate in the construction of agricultural infrastructure have become the key to promoting the PBG system and efficiently supplying agricultural infrastructure construction. Taking Jiangsu Province as an example, this paper describes the situation of agricultural infrastructure construction and the promotion of the PBG model by using survey data from the village-level, and empirically analyzes the factors affecting the number of agricultural infrastructure projects, and the promotion of the PBG model. What are the difficulties in the promotion of PBG? How can this bottleneck be overcome to effectively

promote the PBG? This paper can provide policy suggestions for understanding the role of government investment and village collective investment in agricultural infrastructure construction and improving the promotion of the PBG model.

2. Material and Methods

2.1. Study Area

The Jiangsu province is located in the middle of the Yangtze River Delta (Figure 1). It covers about 1.76 million ha with an average elevation below 50 m. The northern subtropical monsoon climate dominates this region year round, with a mean annual temperature of 17.5 °C and a mean annual rainfall of 1055 mm, all of which are beneficial for agricultural production. Jiangsu has 4.58 million ha of arable land, with 0.057 ha of arable land per capita. The topography in Jiangsu is mainly plains which cover an area of more than 70,000 square km, accounting for more than 70 percent of the province. Economic development is not balanced across the regions of Jiangsu. Southern Jiangsu Province is one of the fastest growing areas of eastern China's economy. With a geographic proximity to the most industrialized city of Shanghai, this region is renowned for its export-oriented, predominantly high-tech manufacturing industry. Besides, agricultural modernization in Jiangsu is at the forefront in China, and the results in the province may be a reference for the whole country.

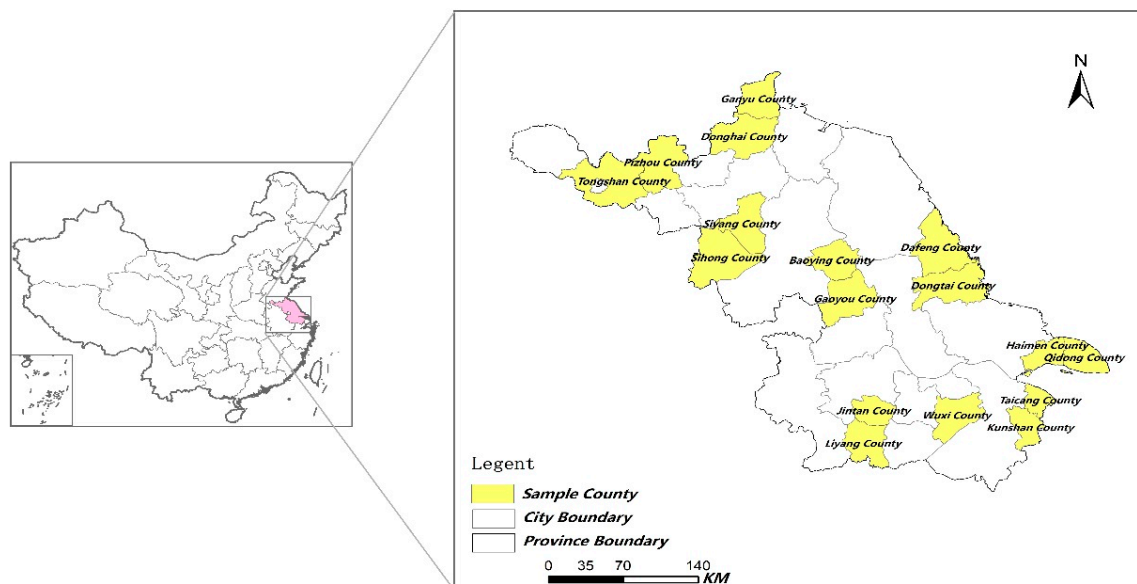


Figure 1. Location of Jiangsu Province and the study area.

The data used in this study were derived from micro survey data from the village level in 2018. Taking Jiangsu as the research object can reflect the problem of agricultural infrastructure management in economically developed areas with severely divided farmers. On the other hand, the differences in the level of non-agricultural economic development across Jiangsu are large, which can be conducive to observing the impact of farmers' non-agricultural employment, land transfer, number of enterprises, and differences in village financial status on the choice of agricultural infrastructure construction models. The sample villages are from 18 counties in nine cities of Jiangsu Province, including eight counties in four cities of the Subei regions: Sihong County and Siyang County of Suqian, Dongtai County and Dafeng County of Yancheng City, Tongshan District (County) and Pizhou District (County) of Xuzhou, Donghai County and Ganyu County of Lianyungang; four counties in two cities of Suzhong regions: Haimen County and Qidong County of Nantong, Baoying County and Gaoyou County of Yangzhou; six counties in three cities of Sunan regions: Jintan County and Shuyang County of Changzhou, Xishan County and Huishan County of Wuxi, and Taicang County and Kunshan County

of Suzhou. To ensure the quality of the questionnaire, the content was revised several times following a pre-investigation. The formal investigation was conducted through face-to-face interviews between the investigator and the farmer. The investigators were composed of postgraduate and doctoral students from Nanjing Agricultural University, and the investigators completed the questionnaires on behalf of the respondents. After the survey, a total of 72 village questionnaires were obtained by centralized testing.

2.2. The Process of PBG

Agricultural infrastructure is a typical public good. Since 2001, China has implemented tax and fee reforms and the superior governments have become the main source of funds for agricultural infrastructure investment. However, investment without the participation of farmers and village collectives would greatly reduce the benefits of agricultural infrastructure. To change this phenomenon in the construction of agricultural infrastructure, since 2012, the National Interim Measures for the Administration of Financial Benefits for the Construction of Village-Level Public Welfare Projects by the system of PBG have been promoted nationwide [6]. The Rural Revitalization Strategic Plan (2018–2022) further highlighted “promoting PBG and replacing compensation with awards, encouraging farmers to invest in the construction of agricultural infrastructure, and letting farmers participate more in protection” [7].

PBG refers to the systematic project of rural tax and fee reform in China. It has eliminated the funds from the superior government that fully fund the construction of agricultural infrastructure (such as farmland and water conservancy infrastructure, road construction, afforestation, and public welfare undertakings for collective production and living needs) and adopted the approach of PBG to fundraising. The process of PBG from bottom to top is the farmers’ negotiation, village-level declaration, the superior government’s approval, and provision of corresponding financial rewards after farmers raise funds and do labor (Figure 2). The approval of the superior government is affected by the government’s target factors of poverty alleviation or development of agricultural production. The government decides whether to approve the application of a certain village, or considers which application to finance in agricultural infrastructure construction.

The villagers’ demand for agricultural infrastructure, as well as the difficulty of village organization to raise funds and labor, or the possibility of seeking alternative funds will have an incentivizing effect on the village cadres, thus affecting whether the villages will report to the superior government. The villagers’ agreement and raising of funds and giving of labor are affected by the villagers’ willingness (demand factors), including the heterogeneity of the farmer’s group—that is, whether the beneficiary groups of the agricultural infrastructure are the same—and whether the participation costs of each beneficiary group are the same, and so forth. It determines whether villagers can form a collective decision to raise funds and labor. The villages with few farmers, a low proportion of farmers engaged in agricultural production and high farmland transfer, have a high homogeneity of farmers, which is conducive to the formation of collective decision-making for raising funds and labor. For example, the proportion of collective irrigation can reflect the degree of homogeneity of the interests of the user groups. The greater the proportion, the more farmers need irrigation, which is conducive to the collective action of building irrigation facilities.

When the village applies to the superior government for agricultural infrastructure projects, it is necessary to fully consider the heterogeneity of the farmers, that is, whether there is the same agricultural infrastructure demand and whether the beneficiary groups of the agricultural infrastructure are the same. Secondly, in the process of organizing farmers to raise funds and labor, the heterogeneity of the groups affecting collective decision-making is a factor that needs to be focused on, such as whether the participation costs of different farmers are the same; those transfer-out land households and transfer-in land households experience different benefits after the completion of the agricultural infrastructure. In the long run, farmers who have transferred out of the land will get higher rent due to the construction of the agricultural infrastructure. After the expiration of the circulation contract, the benefits brought by the infrastructure cannot be enjoyed by farmers who have transferred into the

land. Thus, the proportion of collective irrigation can reflect the degree of homogeneity of the interests of the user groups. The greater the proportion, the more farmers need irrigation, which is conducive to the construction of this collective action of irrigation facilities. These factors challenge the collective decision-making of farmers in the PBG system to raise funds.

Therefore, this study proposes the following hypothesis: factors that are conducive to the formation of collective decision-making, namely, a small number of farmers, a high proportion of agricultural operations, and the practice of collective action (collective irrigation, etc.), will facilitate the promotion of the PBG model.

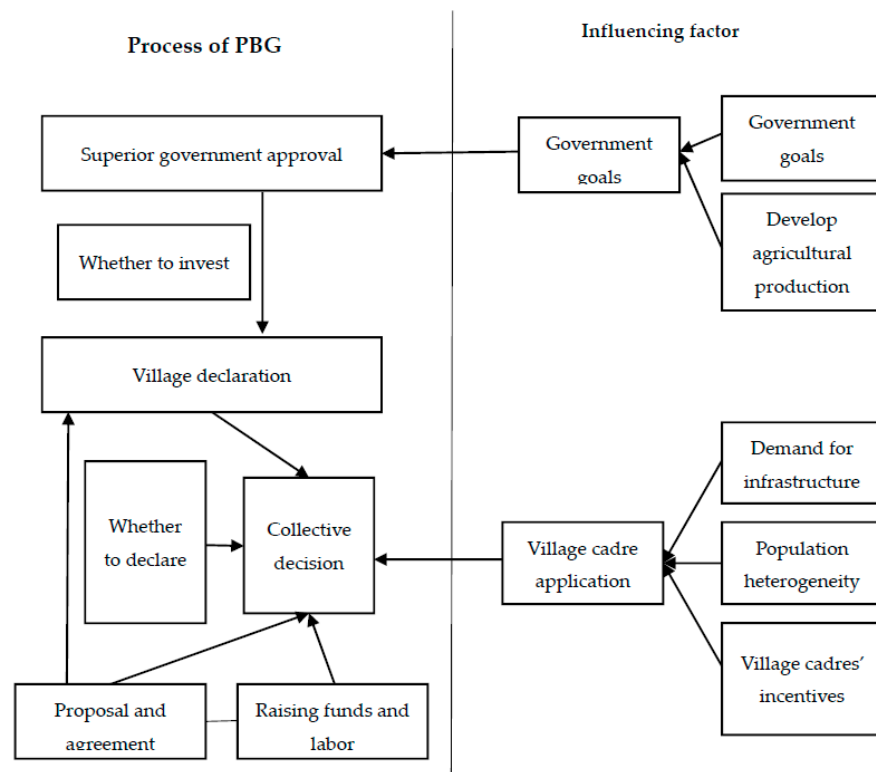


Figure 2. Analysis of the process and influencing factors in PBG.

2.3. Method

2.3.1. Model Construction

This study used the Tobit model [20] to conduct a quantitative analysis of the proportion of the PBG model to examine the influencing factors. The regression equation is as follows:

$$r = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9 + \beta_{10} x_{10} + \beta_{11} x_{11} + \beta_{12} x_{12} + \beta_{13} x_{13} + \beta_{14} x_{14} + \beta_{15} x_{15} + \varepsilon$$

Villages can adopt the PBG model when constructing agricultural infrastructure, or they can adopt other models. Whether they choose PBG will depend not only on the feasibility of the model, but also on the feasibility and convenience of other models. In addition to examining the promotion of the PBG model in agricultural infrastructure construction, a regression analysis was conducted on the total number of agricultural infrastructure investment projects and the number of projects in different models. The regression equation is as follows:

$$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9 + \beta_{10} x_{10} + \beta_{11} x_{11} + \beta_{12} x_{12} + \beta_{13} x_{13} + \beta_{14} x_{14} + \beta_{15} x_{15} + \varepsilon$$

2.3.2. Variable Selection

Villages can adopt the PBG model when constructing agricultural infrastructure, or they can adopt other models. Whether they choose a one-on-one model will depend not only on the feasibility of the model, but also on the feasibility and convenience of other models. In addition to examining the promotion of the PBG model in the construction of agricultural infrastructure, the village infrastructure construction itself is also a variable of our concern. Therefore, this study uses the total number of agricultural infrastructure investment projects and the number of projects classified by the model as the influencing factors of the empirical analysis of the explanatory variables.

Many factors affect the construction of agricultural infrastructure. To facilitate the research, this paper divides them into four categories (Table 1): village farmland, village economic development, farmers and land transfers, and village cadres and village location characteristics.

Table 1. Descriptive statistics for variables.

Variable	Obs	Mean	Mix	Max
Dependent Variable				
PBG (village proposal, village committee and the government jointly funded) model in the village project	72	0.24	0.00	1.00
Number of infrastructure investment projects	72	4.93	1.00	17.00
Number of projects proposed by the village proposal, village committee and superiors jointly funded (PBG)	72	1.34	0.00	17.00
Number of projects proposed by the village and fully funded by the superior government	72	1.62	0.00	10.00
Number of projects proposed and funded by the superior government	72	0.88	0.00	5.14
Number of projects proposed and funded by the superior government, where the village participates in the fundraising	72	0.57	0.00	6.00
The number of projects proposed and funded by the village	72	0.52	0.00	6.00
Independent variable				
Village farmland characteristics				
Village cultivated area (1000 mu)	72	8.58	0.60	23.700
Paddy field ratio	72	0.48	0.00	1.00
Collective irrigation ratio	72	0.69	0.00	1.00
Village economic development				
Farmers income level (1000 RMB)	72	9.76	5.000	36.265
Number of companies	72	14.15	0.00	200.00
Whether to charge a fixed infrastructure construction fee per year (1 = yes, 0 = no)	72	0.06	0.00	0.67
Farmers and their land transfer				
Number of farmers (100 households)	72	6.60	1.19	20.50
Share of non-agricultural households	72	0.32	0.00	1.00
Share of farmland area leased individually	72	0.11	0.00	0.51
Share of farmland area leased jointly	72	0.43	0.00	1.00

Table 1. Cont.

Variable	Obs	Mean	Mix	Max
Village cadre and village location characteristics				
Cadres above the department level outside the village	72	5.89	0.00	31.00
Whether the village director and the village secretary are the same person (1 = yes, 0 = no)	72	0.33	0.00	1.00
The education period of the village secretary (year)	72	13.49	9.00	20.00
Village secretary's tenure (year)	72	6.15	0.00	30.00
Distance from county seat (km)	72	2.70	0.5	60

Note: The author compiled and calculated these data according to the survey data.

Village farming conditions. This mainly includes the area of cultivated land in the village, the proportion of paddy fields, and the proportion of collective irrigation land. The cultivated land status of the village can be classified as the target factor of the superior government and the demand factor of the farmers. The government encourages agricultural production and invests more actively in the construction of agricultural infrastructure projects in rural areas with a large cultivated land area, a large paddy field planting area, or a high proportion of collective irrigation. Rural areas with a large arable land area, a large proportion of paddy fields, or a large proportion of collective irrigation have great demand for agricultural infrastructure, especially irrigation facilities, and will be more active in applying for infrastructure construction. The collective irrigation ratio can reflect the interests of user groups; a greater proportion means that more farmers need irrigation, which is conducive to the organization of collective decision-making and thus to the development of collective action for irrigation facilities.

Economic development of the village. The economic development of the village reflects, to some extent, the needs of the village as a whole and the villagers' demand for agricultural infrastructure, including the income level of the villagers, the number of village enterprises, and whether a fixed amount of infrastructure construction fees is charged annually. The income level of the villagers will affect the source of funds in the construction of agricultural infrastructure and the amount of funds available for the villagers to raise funds. The number of enterprises affects the collective economic situation of the village. Collecting a fixed fee for infrastructure construction costs per year will have an impact on raising funds and labor for villagers in the PBG model.

Characteristics of farmers and land transfers. The characteristics of farmers and land transfer include the number of farmers in the village, the proportion of villagers that do not work in agriculture, the proportion of land worked by a group of farmers (three or more households), and the proportion of farmland that is scattered (multiple plots per farming household). The number of farmers will affect the collective decision-making in the process of agricultural infrastructure construction. At the same time, the proportion of villagers that do not work in agriculture reflects the influence of village farmers' heterogeneity on infrastructure construction. The area worked under joint land transfer is high, and such households are reluctant to invest in the construction of infrastructure. The land use rights contract stipulates the circulation period, and the large-circulation households may not be willing to invest in the construction of agricultural infrastructure because the transfer household will not enjoy the benefits of the agricultural infrastructure when the land use rights contract is terminated.

Characteristics of village cadres and villages. The characteristics of the village cadres mainly include whether one person serves as both the village director and the village secretary, the cadres of the department level and above outside the village, the education of the village secretary, and the years of service of the village secretary. The characteristics of village cadres affect the organizational ability, fundraising ability, and organizational willingness of village cadres to apply for agricultural infrastructure construction projects. The distance between the village and the county reflects the level of economic development of the village to a certain extent. The government's policy goal of reducing

poverty and narrowing the gap between the rich and the poor may place agricultural infrastructure construction projects in villages that are far from the county.

3. Results

3.1. Basic Situation of Agricultural Infrastructure Construction

Table 2 provides the proposals, declarations, and management of agricultural infrastructure investment projects in the sample area. Most of the infrastructure investment projects (174) were proposed by the village committees, accounting for 68.45% of the surveyed projects; 80 projects were proposed by township or superior government departments, accounting for 31.55% of the total number of randomly inspected projects. The village collective declares the agricultural infrastructure according to the needs of the farmers in the village, or actively strives for national financial support for the agriculture policy to declare the investment in agricultural infrastructure. It is currently a widely implemented application mode of agricultural public investment in China. The village collective first proposes that the agricultural infrastructure that needs to be built, and then declares it to the superior government. Among the 254 valid samples, 190 items were reported by the village collective, accounting for 74.81%; and 44 items were obtained from the superior government application, or the superior government took the initiative to build. There were also 20 agricultural infrastructure projects that did not need to be declared. Among the 254 valid samples, 134 agricultural infrastructure projects were directly managed by the township government and higher government agencies in the construction process, accounting for 52.76%; 98 projects were managed by the village committees, and 16 projects were managed by the village committees and superior government. Another six projects were managed by village groups or farmers.

Table 2. Proposal, declaration, and management of agricultural infrastructure investment projects.

Variables	Number of Items	Project Share (%)
Project proponent		
Village committees	174	68.45
Township or higher governments	80	31.55
Project declaration		
Village committees	190	74.81
Application by the superior government or active	44	17.32
construction		
No need to declare	20	7.87
Direct manager of project implementation		
Township and above governments	134	52.76
Village committee	98	38.58
Village committees and superior management	16	6.30
Villager group or farmer	6	2.36

There are three sources of funding for rural public investment. One is investment by the superior government, the second is complete investment by the village committee, and the last is joint investment by the village collective and the superior government. Table 3 shows the capital contribution of some infrastructure investments in the sample village from 2012 to 2017. There were four kinds of investment methods in 254 agricultural infrastructure construction projects, of which 85 projects were jointly funded by the village committee and the superior government, accounting for 33.46%; a total of 135 projects were financed by superior governments, accounting for 53.16% of the total number of projects; 28 projects were funded by the village committee and fundraising by the villagers, accounting for 11.02%; and six projects were funded by other methods, such as private investment. At present, Chinese agricultural infrastructure investment mainly comes from superior governments. A small number of village collectives with collective income will solve their own needs for agricultural

infrastructure. Due to the large amount of infrastructure investment, very few rural households can afford high expenses.

Table 3. Agricultural infrastructure funding.

Investors	Number of Items	% of Projects
Superior government	135	53.16
Village committee and its organized villagers raise funds	28	11.02
Joint funding by the village committee and the superior government	85	33.46
Other methods, such as private funding	6	2.36

It can be seen from Table 4 that the PBG model (project proposed by the village committee and co-invested by the village committee and the superior government) covers 58 projects, accounting for 22.83%; 48 projects belong to the model in which the superior government proposes the project and bears the entire investment, accounting for 18.90%; and 27 projects belong to the model in which the project is proposed by the superior government and jointly funded by the village committee and the superior government, accounting for 10.63% of the total projects. Eighty-seven projects were proposed by the village with the superior government bearing the entire investment, accounting for 34.25% of the total, which is the highest proportion of all agricultural infrastructure construction models; 34 projects were proposed and fully funded by the village, accounting for only 2.76%. Among the 58 projects of the PBG model, 20 projects were funded by the villagers, accounting for 7.87% of the total number of projects reviewed.

Table 4. Classification and proportion of agricultural infrastructure construction models.

Mode	Number of Items	Project Share (%)
The superior government proposes the project and fully funds it	48	18.90
The superior government proposes the project, and the village committee and the superior government jointly invest	27	10.63
The village proposes the project, and the superior government will bear all the investment.	87	34.25
The village proposes the project, and the village committee and the superiors jointly invest	58	22.83
Among them, the village committee fund comes from the villagers to raise funds.	20	7.87
The village proposes the project, and the village (village committee, enterprise or private) bears the whole investment.	34	13.39

3.2. Empirical Results

This section will provide empirical analysis of the factors affecting the proportion of PBG model projects and the number of agricultural infrastructure investment projects using Stata 12.0 software. At the same time, an empirical analysis of the number of projects in five different models is used to explore the choice of farmers for other governance models. The results are as follows (Table 5).

Table 5. Regression results.

Variable	The Proportion of Village Projects Following the PBG Model	Total Number of Village Infrastructure Projects	The Number of Projects Proposed by the Village and Jointly Funded with the Superior Government (PBG)	The Number of Projects Proposed by the Village and Fully Funded by the Superior Government	The Number of Projects Proposed and Fully Funded by the Superior Government	The Number of Projects Proposed and Partially Funded by the Superior Government, Where the Village Participates in the Investment	The Number of Projects Proposed and Funded by the Village
Cultivated village area	0.171 (0.144)	−0.426 (0.73)	0.152 (0.505)	−0.281 (0.403)	−0.047 (0.271)	0.197 (0.26)	−0.446 ** (0.208)
Paddy field ratio	−0.280 (0.247)	0.718 (1.18)	−0.352 (0.815)	0.885 (0.65)	−0.627 (0.438)	0.467 (0.42)	0.345 (0.335)
Collective irrigation ratio	0.638 * (0.35)	3.162 ** (1.523)	1.198 (1.053)	2.438 *** (0.84)	−0.252 (0.563)	0.665 (0.541)	−0.887 ** (0.433)
Farmers income level	0.337 (0.231)	−0.052 (1.038)	0.523 (0.718)	−0.250 (0.572)	−0.694 * (0.385)	0.23 (0.369)	0.139 (0.295)
Number of village enterprises	0.003 (0.003)	0.01 (0.015)	−0.003 (0.011)	−0.013 (0.008)	0.009 (0.006)	−0.004 (0.005)	0.020 *** (0.004)
Whether to charge a fixed infrastructure construction fee per year	1.216 ** (0.465)	−0.509 (2.52)	2.506 (1.742)	−1.601 (1.389)	0.086 (0.936)	−0.759 (0.896)	−0.741 (0.716)
Number of farmers	−0.439 ** (0.205)	−0.616 (0.867)	−1.363 ** (0.599)	0.279 (0.478)	0.171 (0.322)	0.005 (0.308)	0.292 (0.246)
Share of non-agricultural households	0.474 (0.309)	−2.796 * (1.513)	0.123 (1.045)	−1.386 * (0.834)	−0.974 * (0.562)	−0.279 (0.538)	−0.280 (0.43)
Share of farmland area leased individually	0.808 (0.741)	0.639 (3.667)	1.431 (2.534)	0.546 (2.021)	−1.525 (1.361)	0.401 (1.304)	−0.214 (1.042)
Share of farmland area leased jointly	−0.861 ** (0.409)	0.231 (1.64)	−0.164 (1.133)	−0.134 (0.904)	0.466 (0.609)	0.126 (0.583)	−0.064 (0.466)
Cadres above the department level outside the village	0.055 *** (0.014)	0.192 * (0.068)	0.172 *** (0.047)	0.033 (0.037)	0.025 (0.025)	−0.017 (0.024)	−0.021 (0.193)
Are the village director and village secretary the same person?	−0.297 * (0.177)	0.738 (0.858)	−0.046 (0.593)	0.461 (0.473)	−0.024 (0.318)	0.019 (0.305)	0.328 (0.244)
Village secretary's education years	−0.030 (0.046)	0.536 ** (0.233)	0.078 (0.161)	0.282 ** (0.128)	0.115 (0.086)	0.126 (0.083)	−0.065 (0.066)
Village secretary's tenure	0.038 ** (0.013)	0.08 (0.068)	0.093 ** (0.047)	−0.026 (0.038)	0.016 (0.025)	0.009 (0.024)	−0.011 (0.194)
Distance between village and county seat	−0.079 (0.111)	0.595 (0.517)	−0.058 (0.357)	0.826 *** (0.285)	0.04 (0.192)	0.097 (0.184)	−0.310 ** (0.147)
Constant term	−2.110 (0.177)	0.537 ** (11.526)	0.55 (7.966)	−2.962 (6.354)	5.658 (4.279)	−5.919 (4.098)	3.211 (3.276)

Note: The standard deviations are in parentheses, and ***, **, and * represent significance levels of 1%, 5% and 10%, respectively.

The proportion of collective irrigation had a positive impact on the PBG model in village projects, and it was significant at the 10% level. The proportion of collective irrigation can reflect the degree of homogeneity of the interests of the user groups. The greater the proportion, the more farmers need irrigation, and they have stronger social trust, which is conducive to the development of collective action for irrigation facilities. It is conducive for the village committee to raise funds and labor for farmers. The annual fee charged by farmers for a fixed amount of infrastructure construction had a significant impact on the PBG model in village projects, and it was significant at the 5% level. A fixed infrastructure construction fee is collected each year, which is helpful to remind farmers to participate in the construction of agricultural infrastructure, and simultaneously provides a source of funding for PBG. The proportion of farming households and the combined transfer of farming households (three households and above) had a negative impact on the proportion of village projects utilizing the PBG model, which was significant at the 5% level. A large number of farmers increases the cost of collective decision-making, which is not conducive to the formation of collective willingness to build facilities or to raise funds for farmers in the PBG model; the higher the proportion of land area jointly transferred by farmers, the less willing they are to contribute to the construction of agricultural infrastructure due to the lack of planting. Farmers transferring into land affected by a contract period are not willing to invest in the construction of agricultural infrastructure for the long-term. The cadres at the department level and above who are based outside the village had a positive impact on the PBG model in the village project, and this was significant at the 1% level. Village cadres will actively recruit those who leave the village to serve as cadres and apply for investment in agricultural infrastructure. Those who work outside are more familiar with the situation in the village and are more willing to invest in the project. The cadres working abroad are more current in their knowledge of national policies, encouraging villages to adopt the PBG model. One person serving in the positions of both village director and village secretary had a negative impact on the proportion of village projects following the PBG model, which was significant at the 10% level. This is due to the heavy workload, especially the village's participation in the capital contribution. It takes time and effort to raise funds for farmers, which reduces the willingness of village cadres to implement the PBG model in the village. The term of office of the village secretary had a positive impact on the proportion of projects following the PBG model, and this was significant at the 5% level. A village secretary with a long working term will have a better understanding of the situation of the village and the relationship between the villagers. At the same time, there are more contacts with superior governments and higher prestige among the villagers. Therefore, it is easier to participate in fundraising to raise funds and labor for the farmers.

The collective irrigation ratio of the village had a positive impact on the number of village infrastructure projects, and this was significant at the 5% level. The higher the proportion of collective irrigation, the greater the demand for irrigation facilities in the village. Therefore, the village will actively apply for more irrigation facilities. The proportion of total non-agricultural farmers had a negative impact on the total number of village infrastructure projects, which was significant at the 10% level; the proportion of non-agricultural farmers is high, which reduces the demand for agricultural infrastructure. The cadres at the department level and above outside the village had a positive impact on the total number of village infrastructure projects, significant at the 10% level. The village cadres will actively lobby those who leave the village to serve as cadres and apply for investment in agricultural infrastructure. Those who work outside are more familiar with the situation in the village and are more willing to invest in the village. The years of education of the village secretary had a significant positive impact on the total number of village infrastructure projects. A village secretary with a long education period has a higher level of education and more prominent policy interpretation or interpersonal relationships, which are conducive to actively applying to the higher level for agricultural infrastructure construction projects.

The cultivated land area of the village had a significant negative impact on the number of projects that are proposed and funded by the village. With a large area of cultivated land, the demand for agricultural infrastructure is large and the expenses are high, and a village without fixed income

cannot afford it. The proportion of collective irrigation had a significant positive impact on the number of projects that were proposed by the village and the superior investment model, and it had a significant negative impact on the number of projects proposed by the village and that bear the full investment. The proportion of collective irrigation is large, and the demand for irrigation facilities is also large. To encourage or subsidize large-scale irrigation and planting, the superior government will take the initiative to bear the cost of the construction. Because of the high cost of construction, the village cannot afford to invest in the whole project and must apply to the government. The income level of the villagers had a significant negative impact on the number of projects proposed and fully funded by the superior government. Villagers with high incomes can self-finance the process of building agricultural infrastructure without burdening the superior government. The number of village enterprises had a positive impact on the number of projects proposed and fully funded by the village. At the 1% level, the village enterprises significantly increased the collective income of the village. The more enterprises there are, the greater the village collective income will be for the construction of agricultural infrastructure. The average village is able to fully afford a project. The number of farmers significantly reduced the number of projects in the PBG model. The number of farmers increases the cost of collective decision-making, which is not conducive to the formation of collective willingness to facility construction or fundraising for farmers in the PBG model. The proportion of completely non-agricultural farmers significantly reduced the number of projects following the two models where the superior government fully funds the investment. Farmers who do not farm and engage in non-agricultural production will increase their income and will also reduce the proportion of the village's agricultural production. The superior government has the goal of reducing poverty. Agricultural infrastructure projects will not be placed in these villages.

The cadres above the department level who left the village significantly increased the proportion of village projects following the PBG model. The education period of the village secretary significantly increased the number of projects proposed by the village and fully funded by the superior government. The length of education improves the cultural level of the secretary, and there are advantages in organizing the willingness to construct facilities and applying to higher authorities. The village secretary's tenure also significantly increased the number of projects in the PBG model. The distance between the village and the county town significantly increased the number of projects proposed by the village proposal and fully funded by the superior government as the distance reflects the economic development level of the village to a certain extent. The superior government is more inclined to place construction projects in an underdeveloped village for the purpose of alleviating poverty.

4. Conclusions

This study analyzed the status of agricultural infrastructure construction and the factors affecting the PBG model, and it quantitatively analyzed the different factors for agricultural infrastructure construction and PBG using the micro survey data from the village level. The following three conclusions are drawn. First, at present, Jiangsu Province's PBG model (the village proposes the project, which is jointly funded by the village committee and superior government) accounted for only 22.83% of projects. The bottleneck in the promotion of PBG is fundraising by farmers. Secondly, the proportion of collective irrigation will significantly increase the number of projects in the PBG model and the total number of infrastructure projects in the village. Villages with a high proportion of collective irrigation have high social trust and are more likely to form collective decisions. Thirdly, the transfer of farmland management rights hinders the promotion of PBG. In the process of agricultural infrastructure construction, there is no reasonable ratio of investment between the transfer-out households and the transfer-in households, which will result in both parties not being willing to invest in agricultural infrastructure construction.

It is recommended to fully utilize the role of village self-governance and social forces in agricultural infrastructure investment. The government can use indirect investment methods such as financial subsidies, special loan subsidies, and tax reductions to replace the original direct investment method.

In accordance with the principle of “who invests, who protects, who benefits”, the government actively guides private enterprises and farmers to participate in agricultural infrastructure investment so that they can obtain more practical benefits. For agricultural infrastructure projects requiring a small amount of investment, village collectives can actively organize villagers to raise funds. For investment in large-scale agricultural infrastructure, village cadres can fundraise and apply to the superior government for the gap in funds. Additionally, it is necessary to establish an inspection and supervision mechanism for investment, supervise the entire process of agricultural infrastructure governance, and improve the transparency of policy implementation. By deepening the reform of land property rights, the main body of agricultural infrastructure responsibility will be clarified, and the system and mechanism should be further innovated, social funds should be fully absorbed, and the sources of funds for agricultural infrastructure management funds should be enriched. At the same time, village cadres are the link between farmers and national policies. To this end, it is necessary to improve the enthusiasm of village cadres for the work of the people, improve organizational capabilities, safeguard the interests of village collectives, and seek benefits for the people. When farmers’ trust in village cadres and national policies is improved, farmers may more actively participate in the construction of agricultural infrastructure.

Currently, the transfer of farmland management rights in China also hinder the promotion of PBG. The transfer-out households are no longer willing to invest in agricultural infrastructure construction because they are no longer cultivating the land. The transfer-in households are affected by the transfer period, and these households cannot continue to enjoy the benefits of agricultural infrastructure after the contract expires, nor are they willing to participate in the construction of agricultural infrastructure. To this end, the village collective should fully consider allocating funds between the transferor and the transferee in the process of organizing the farmer’s fundraising; the village collective can first assess the life of the infrastructure. Then, according to the ratio between transfer-in households and the service life of agricultural infrastructure, transfer-in households shall pay the part of the payment during the operation of the land, and the remaining part shall be paid by transfer-out households.

This study also has shortcomings. Limited by capital, the sample size of this study is small and mainly concentrated in Jiangsu province, so the conclusion may not be applicable to the whole country and the representativeness of the conclusion is insufficient. In the future, we will further expand the sample size and increase the surveys in different provinces, so as to make the conclusions and policy recommendations more representative.

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