


Research on Dynamic Optimization Path Design of Rural Public Goods Supply System

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Abstract: The supply of public goods is a dynamic system involving in the supply subject, the supply content and the mode of supply. Promoting overall revitalization of rural areas and making plans for urban and rural development as a whole are challenged by insufficient supply, process reengineering, structural adjustment and dynamic optimization of rural public goods. This paper studied current situation of the rural public goods supply system with such solid evidences as statistical data, interviews and questionnaires. Then, based on the characteristics and structural problems of the supply system, the paper expanded the “Two-dimensional and Two-level” model and designed a dynamic optimization path so as to promote the flexibility and adaptability between supply and demand, and to promote agricultural and rural modernization.

1 INTRODUCTION

The essential requirements of socialism are continuous improvement of people's livelihood and realizing common prosperity. The “people-centered” development thought will be more distinctive as to the constant improvement of people's living standard since the 18th CPC. With Xi Jin-ping's socialist economic thought with Chinese characteristics in the new era, China's supply system of public goods and services had been continuously improved. In all the eight central “No. 1 documents” from 2013 to 2021, both the supply system construction and the alleviation of historical debt problem for the supply rural public goods were mentioned, which indicated the public demand expansion of the rural society. However, current supply system of rural public goods was still affected by institutional constraints and was suffered from supply structure imbalanced and low supply efficiency because of following factors: the long-term unbalanced development strategy, the path-dependence of institutional change, the wide geographical distribution of rural areas, the different endowment of agricultural resources and three-industry integration development in different regions, and the different peasant disintegration degree and rural population structure as well as cultural

traditions. The supply of rural public goods was far beyond to guarantee the demand in terms of both quality and quantity (Zhao 2020).

China's rural public goods supply system was more complicated and particular than that of cities from historical and structural perspectives. Relevant researches on the supply of rural public goods had been carried out in the academic circle and were increasingly growing especially after the implementation of the rural revitalization strategy. We should focus more on the construction of software conditions needed for farmers to become rich in rural areas (Yang 2019). It is proposed to combine the top-level government design with encouragement of mass participation in order to mobilize autonomous participation of villagers and establish a performance evaluation system with more participants (He 2020). Proposed a multi-level and multi-type rural public service system with government ultimate responsibilities and market participation as well as society coordination (Li 2021). The existing researches were still to be deepened in terms of multidisciplinary synthesis, statistical data and door-to-door interview. The accuracy of the research results were restricted by the relatively small sample size. This paper, by means of comprehensive characteristics of rural public product supply system

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from macro-statistical data with the micro-interview and questionnaire survey, and based on the theories of economics, sociology, politics and public management, further developed the Two-dimensional and Two-level model and studied the dynamic optimization path of rural public product supply in order to solving existing problems in the supply structure. This path, by coordinating between government supply policy arrangement, dynamic adjustment of the supply content, rational selection of the supply subject, and supervision and management of the supply process, aimed to adapt to the changes of the main social contradictions in the new era, and follow the dynamic supply and demand balance as well as the rule of cooperative development urban and rural areas. As a result, it was expected that supply of rural public products will be more adaptive and flexible to the demand; people's well-being will be improved continuously; the common social needs of agricultural development, rural governance and farmer's living will be satisfied and farmers will obtain much sense of gain and happiness.

2 MATERIALS & METHODS

Based on the reality of the rural public goods supply system and by means of quantitative analysis and qualitative analysis, this paper studied the structural problems and the implicated political and economic logic of rural public goods supply, and further put forward a dynamic optimization path. Methods: 1. Statistical data comparison. Historical longitudinal comparison and urban and rural horizontal comparison of fiscal expenditure data were made based on the 2011-2020 Statistical Yearbook. 2. Field visit survey. Firstly, the interview outline and questionnaire were designed; Secondly representative samples (2150 questionnaires in 18 villages and towns from 6 provinces) were selected; Thirdly, door-to-door interview and questionnaire filling were carried out to obtain evaluations and potential demand information of farmers on current rural public good supply. 3. Official website browsing. Official websites of government organizations in agriculture, health, education, water conservancy, transportation and so on were browsed to obtain and analyze policy documents, specific projects and financial data on the supply of public goods in rural areas.

3 RESULTS & DISCUSSION

3.1 Growth of Total Supply under Imbalanced Demand and Supply

According to the historical longitudinal comparative analysis, total supply of rural public goods tended to increase. By the end of 2016, 99.3% villages had access to highways, 99.3% per cent to electricity, 96.8% to libraries and cultural stations, 99.9% to medical and health institutions and 96.5% to kindergartens and nurseries. The general public budget expenditure of the state finance increased to RMB 2456790.3 billion in 2020. Taking education as an example, in 2020, the average national general public budget for education was RMB15280.54, with a growth of 1.89%, i.e., RMB 14997.44 on year-on-year basis. The proportion of education funds in the general public budget to the general public budget expenditure was 14.78%, with a growth of 0.27% from 14.51% last year. The total amount of education funds increased from RMB 238692.9 billion in 2011 to RMB530338.7 billion in 2020. The growth of education expenditure during 2011-2020 was shown in Figure 1.

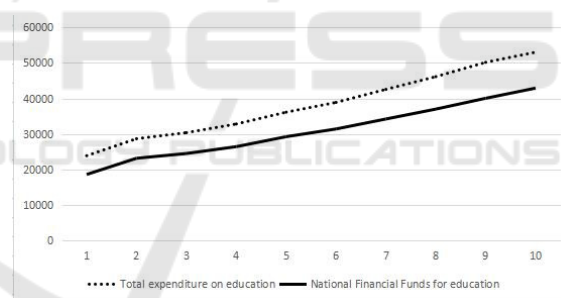


Figure 1: Growth of education expenditure 2011-2020 (RMB 100 million).

However, from the perspective of horizontal comparison between urban and rural areas, the supply of public goods was unbalanced between urban and rural areas. Taking the medical and health undertakings as an example, according to the main data bulletin of the agricultural census: 83.39 million households hadn't got any water-flushing sanitary toilets at the end of 2016, accounting for 36.2%; 7.21 million households had water-flushing non-sanitary toilets, accounting for 3.1%; 28.59 million households had sanitary latrine pits, accounting for 12.4%; 106.39 million households had ordinary latrine pits, accounting for 46.2%; 4.69 million households even didn't have any latrine pits, accounting for 2.0%. The number of village clinics

fell by 8.16% , from 662894 in 2011 to 608828 in 2020. During 2011-2020, the number of health technicians per 1000 people in rural areas did not reach 1/2 of that in urban areas. Returning to poverty because of illness, difficulties in seeing a doctor, high cost of getting medical treatment still existed. There were still gaps in the input of health resources, the stock of resources per capital and the accessibility of health services between urban and rural residents. Comparison of health technicians and clinics wards per 1000 people between urban and rural areas was shown in Table 1.

Table 1: Comparison of urban and rural medical and health resources.

Year	Health technicians per 1000 people		Clinics wards per 1000 people	
	Urban	Rural	Urban	Rural
2011	7.90	3.19	6.24	2.80
2012	8.54	3.41	6.88	3.11
2013	9.18	3.64	7.36	3.35
2014	9.70	3.77	7.84	3.54
2015	10.21	3.90	8.27	3.71
2016	10.42	4.08	8.41	3.91
2017	10.87	4.28	8.75	4.19
2018	10.91	4.63	8.70	4.56
2019	11.10	4.96	8.78	4.81
2020	11.46	5.18	8.81	4.95

3.2 Supply-demand Imbalance under Total Supply Growth

Even with the increase of national financial input to support agriculture, the advancement of urban-rural integration and the development of rural market economy, which resulting in total supply of rural public goods increasing, the structural problem of supply-demand imbalance was still there, which contains both excess supply and supply shortage. According to the data of interviews and questionnaires collected from 36 villages and communities in 18 townships of 6 provinces, it can be seen that with the imbalance of supply and demand under the condition of total supply growth was mainly reflected in following respects: 1.the vanity projects and face-saving projects provided by the grass-roots governments, such as upgrading projects and idle rural bookstore didn't match with the real public demand of agricultural production and livelihood;2.Supply of agricultural science and technology promotion, information services, environmental protection and other public products and services were not sufficient;3.the supply of public goods in agricultural production and rural life

infrastructure and also in education, health care and social security was not balanced and in a state of supply shortage. Results of surveys on demand and supply structure were shown in Table 2.

Table 2: Order table of demand structure of rural public goods.

Type of public products	Frequency	Percentage %
Planting and breeding technologies and market information of agriculture products	1962	91.26
Medical and health check-up	1913	88.98
Elderly system of villages	956	44.47
Recruitment information and skill training of migrant worker	680	31.63
Safe drinking water	609	28.33
Water conservancy facilities and agricultural machinery	858	39.91
Bank/rural credit cooperative loans	420	19.53
Centralized treatment of garbage	1560	72.56
Public sports, cultural and entertainment facilities	1125	52.33

3.3 “Involution” and the “The Matthew Effect” of Rural Public Product Supply with Project System

After 2013, the “One Case, One Solution” fiscal award was gradually detached from fund-raising and labor-raising, which promoted the construction of village-level public welfare undertakings such as rural roads and bridges, cultural, sports and sanitation facilities, and village features. In 2019, Langxi County in Anhui Province arranged 89 cases for “One Case, One Solution”, and arranged a budget of RMB 8.469 million in 2020. Under the project system supply, the “Involution” dilemma and the “Matthew Effect” caused that villages with powerful collective economic strength, advantageous geographical location and rich cultural background were more easily to win project support and become a Model Village. In Xintai Country Shandong Province, 20 rural public welfare facilities projects were

implemented in seven townships in 2019, of which one township won 12 of the projects, accounting for 60%, while only three townships won only one project each. In addition, due to wide spread of Chinese rural areas and geographical heterogeneity, 6 representative provinces were investigated based on the index of expenditure on general public services, education, science and technology, social security and employment, health care, agriculture, forestry and water conservancy. The investigation results showed strong imbalance among regions as in Figure 2.

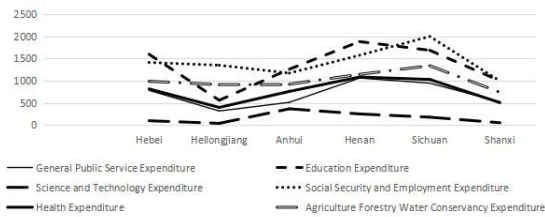


Figure 2: General public budget expenditure in 2020 (RMB 100 million).

3.4 Low Recognition of Multi-subject Cooperative Supply of Rural Public Products

Government-only supply of rural public products was changed after going through the compulsory system change and the induced system change. Now, the supply subjects extended to all levels of government(department), market (enterprises), social organizations, community collective organizations, village elites, farmers or farmer organizations. Different structural characteristics and structural efficiency were reflected in different historical periods. According to the different stages and different processes of different levels different categories of public goods and their supply, multi-subject supply resulted in different dynamic combinations through information sharing and complementary advantages. However, restricted by the path-dependent effect of institutional change, the resource endowment of different subjects and the game of interest relations, coordination of multiple subjects in supply was insufficient. Goal publicity was not organically united with interests conjunction. Total of 186 valid questionnaires, collected from Anhui, Shandong and Shaanxi provinces showed that 92.47% of the villagers believed that the rural public goods should be supplied by the government completely, and no additional funds should be provided by the villagers; 84.95% of the villagers believed that rural public goods should be provided by the village agricultural cooperative; The supply

mode of voluntary organization and market supply was not highly recognized, accounting for 50%. Summary of questionnaires regarding supply subjects of rural public goods was shown in Figure 3.

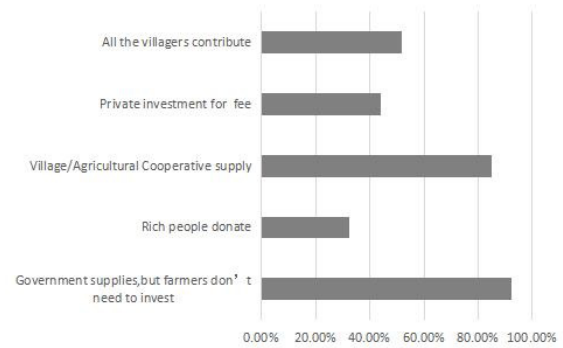


Figure 3: Summary of questionnaires regarding supply subjects of rural public goods.

3.5 Further Thoughts and Discussion

Generally speaking, “structure” is a state where each part of the whole match with each other in certain order. The rural public goods in essence aim to meet common interests of rural economic and social development, which are non-competitive or non-exclusive in consumption, exogenous in income and indivisible in utility. The supply structure of rural public goods is the supply efficiency state where diversified supply subjects, diversified supply modes, multi-level and multi-category products are combined in certain ways. Any change to such efficiency state, including structure of supply content, the structure of supply subjects, the structure of supply mode, the structure of supply region and their interaction, will cause effect on social and economic development of rural society.

Compared with previous related studies, this paper focused on the combination of macro and micro, objective data and subjective evaluation. As a result, through analysis to macro-statistical data and micro-survey data, the panorama supply system structure of rural public goods was more accurately, and the optimized path based on the fact of system structure was more pertinent.

The above mentioned supply system facts and problems was based on deep level of macro and micro political and economic logic, and was the product of the change of political legitimacy, the national strategy, the limited rational behavior of the government and the game of multi-stakeholders. Rural areas have a wider geographical spread. Therefore, the natural endowment of agricultural production resources and the status of the integration

of the three industries, rural households differentiation, rural population structure and cultural traditions varies from region to region. In order to improve and perfect the supply system of rural public products and dynamically optimize the supply structure, it is necessary to expand the Two-dimension and Two-level model to harmonize supply and demand from the macro-medium- micro-level: 1. Implementing a balanced development strategy to construct a public service-oriented government from macro level; 2. Identifying responsibilities of different governmental organs, matching financial power and authority of office and optimizing the structure of financial expenditure from medium level; 3. Coordinating the relations of interests, promoting the cooperative supply of multiple subjects, from micro level. As a result, general governance mechanisms such as cooperation, competition and counterbalance could be embedded into the practical mechanisms such as supply decision-making, supply input and supply quality assurance (as shown in figure 4). At last, the supply system and realization mode of rural public goods can be improved, where government takes the leading role and non-government subjects supply endowed resource.

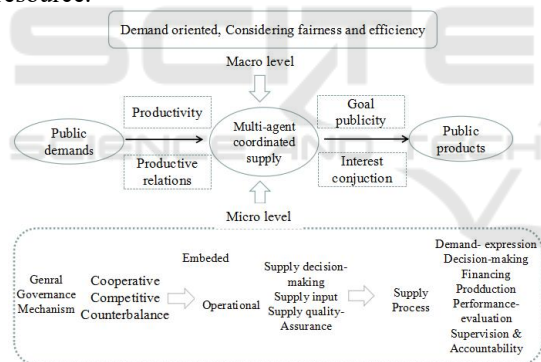


Figure 4: Mechanism of multi-subject cooperative supply of rural public goods.

4 CONCLUSIONS

On the road of development, it is inevitable that public goods are always interacted with private goods. The supply of public goods is the dynamic evolution system composed of the supply subject, the supply content and the supply mode. Compared with cities, problems encountered in public product supply in rural areas is more urgent. The cooperative supply is influenced by resource endowment and social preference. As an important field of people’s livelihood construction, the supply boundary of rural

public goods should be adjusted according to the needs of rural social development, the level of productive forces and local traditions. Selection of supply subjects should follow the dynamic development of coordination and complementation. Dynamically optimizing the supply system of rural public goods is an important part of promoting the overall revitalization of rural areas and making overall plans for urban and rural development. It is also an effective means to carry out the people-centered development thought and to continuously improve people’s livelihood and promote agricultural and rural modernization.

Based on analysis and research of macro-statistical data, micro-interview information and policy documents of rural public goods supply, this paper pointed out following main problems in current supply system of rural public products: 1. Total supply quantity was increasing, but the supply was imbalanced between urban and rural areas. So it was difficult to embody the principle of fairness; 2. The supply was less matched with the demand, which resulted in both excess supply inefficient in one place and supply short in other place. Overall speaking, farmers were not satisfied with current supply mechanism; 3. The involution of supply of rural public goods under project mechanism caused the “Matthew Effect”; 4. multiple subjects participated in the governance and supply of rural public goods, but coordination among their interests was difficult, which hardly drove the cooperative supply. The supply of rural public goods is a complex dynamic evolution system. Current situation of and existing problems in supply system were the result of comprehensive coordination between historical debt and realistic resources, between politics and economy, and between public service-oriented government and micro interest stakeholder. Therefore, at the stage of high-quality development, in the process of promoting the overall revitalization of rural areas and realizing the modernization of agricultural and rural areas, we should follow the standards of productive forces and root on changing common interests of rural society. Furthermore, we could design a path of supply system adjustment and optimization from both supply and demand perspectives with a view to macro, medium and micro level. The dynamic development process should be identifying the big picture priorities of the supply, financing through multiple channels, expanding supply subjects and enhance supply vitality, realizing short-term, mid-term and long-term objectives gradually and finally reaching organic harmony among supply policy, supply content, supply subject

and supply process with external driving force of structural imbalance and internal driving force of interest coupling among different supply subjects. Particularly, such principles as space-time differences, adaptation demand, multi-subject cooperation and transparent participation should be taken into consideration.

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The Inner Logic and Transformation of the Income Imbalance between Urban and Rural Areas in China: Based on Local Government Behavior Choice(19XJC790002); The Study on the Multi-subject Cooperative Supply of Rural Public Goods in Jiangsu Province under the Strategy of Rural Revitalization(JSSCL2019B015).

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