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Effect of Agricultural Comprehensive Development on Increasing Income of Farmers in Jiangsu Hilly and Mountainous Areas

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Abstract To adapt to rural and agricultural economic development, Jiangsu Province adjusted main task of comprehensive development of hilly and mountainous areas to supporting and promoting agricultural structural adjustment of hilly and mountainous areas and promoting increase of agricultural benefits and farmers' income. Through typical survey, this paper made an objective evaluation of effect of agricultural comprehensive development of hilly and mountainous areas in Jiangsu Province from increasing farmers' income. Results indicated that agricultural comprehensive development investment projects in Jiangsu hilly and mountainous areas are closely coupled with local agricultural production structure; financial funds promote social capital input to construction of economic forest, fruit and grass planting, and livestock raising. Through demonstration and guidance of farmers, it promoted adjustment of agricultural production structure and increased farmers' income. Finally, it came up with pertinent policy recommendations.

Key words Agricultural comprehensive development, Increasing farmers' income, Effect, Jiangsu hilly and mountainous areas

1 Introduction

The agricultural comprehensive development of Jiangsu Province started in 1988. At this great background, the agricultural comprehensive development of hilly and mountainous areas was launched in the same period. In 1996, in the work report of the Fourth Session of the Eighth National People's Congress of Jiangsu Province, it specially proposed accelerating development of coastal mudflat and hilly and mountainous areas and building a number of new bases for agricultural and sideline products. The proposal were formally included into the *Ninth Five-Year Plan for National Economy and Social Development and Outline for the Long-term Goals through the Year 2010*. In the same year, Liyang City conference was held and the agricultural comprehensive development of hilly and mountainous areas stated a climax. With more than ten years of development, agricultural production conditions get significantly improved in hilly and mountainous areas; agricultural productivity was considerably improved; agricultural development strength was obviously heightened; agricultural comprehensive development has obtained outstanding economic, ecological, and social benefits^[1]. However, hilly and mountainous areas of Jiangsu Province are still backward in economic development, thus objective and scientific evaluation of effect of agricultural comprehensive development is of great significance for formulating and improving related policies. Therefore, in line with actual effect of agricultural comprehensive development in Jiangsu hilly and mountainous areas in recent years, we made survey and evaluation in Jiangsu hilly and mountainous areas.

2 Analysis on mechanism of agricultural comprehensive development promoting increase of farmers' income

At the early stage, agricultural comprehensive development in Jiangsu hilly and mountainous areas focuses on small watershed management, water control and soil improvement, and improvement of production conditions. Later, it gradually changed to promoting agricultural structural adjustment, building modern agriculture, and increasing farmers' income^[2]. Investment mainly comes from financial subsidies of the state, provinces, cities, and counties. Since financial resources of 25 hilly and mountainous cities and counties are limited, state and province investment is unpaid appropriation. All areas make declaration in accordance with actual situations. If projects are approved, they will obtain financial subsidies for development of hilly and mountainous areas, and fund management adopts county-level reimbursement system. Besides, self-raised funds, private funds, industrial and commercial funds, and external funds also take up larger portion in development investment. Agricultural comprehensive development of Jiangsu Province takes promoting increase of farmers' income as core objective, so whether increasing income of farmers in hilly and mountainous areas becomes an essential standard for evaluating success of development of hilly and mountainous areas^[3]. Agricultural comprehensive development in hilly and mountainous areas plays a great role in increasing income of local farmers especially through promoting diversified economy, sci-tech projects, and structural adjustment investment of local farmers. In general, agricultural comprehensive development in hilly and mountainous areas promotes increase of farmers' income through following 4 action mechanisms. (i) Increasing employment of rural labor in development projects; farmers obtain jobs and remuneration through participating infrastructure construction, project management, maintenance, and production and operation. (ii) Influencing produc-

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tion decisions of farmers; through demonstration, radiation, and supporting of economic forest and fruit bases, forage grass base or sci-tech demonstration areas, develop superior agricultural products and industries with gifted resources. (iii) Farmers obtaining operation profit from directly contracting projects. (iv) Income from land circulation. In this study, we mainly analyze the second point.

3 Typical survey on effect of agricultural comprehensive development on increasing income of farmers in Jiangsu hilly and mountainous areas

Jiangsu hilly and mountainous areas are mainly distributed in northern areas of Jiangsu Province adjacent to Shandong Province, western and southern areas adjacent to Zhejiang Province, and hilly areas along the banks of Lake Tai. Except Taizhou, Nantong, and Yancheng, all other cities in Jiangsu Province have hilly and mountainous areas, involving 37 counties (districts), 226 towns, and 2646 villages^[4].

3.1 Selection of typical survey points Liyang City is a miniature and typical city in 25 cities and counties of Jiangsu Province implementing agricultural comprehensive development of hilly and mountainous areas. The development of Liyang City has a long history, and agricultural comprehensive development of hilly and mountainous areas is large. We selected Pingqiao Town and Hengjian Tang as survey samples with Shangxing Town in plain area as comparison. Our survey was completed through directly entering in farmers households and we collected data of 82 households, including 29 households in Shangxing Town, 23 in Pingqiao Town, and 30 households in Hengjian Town. In recent years, agricultural comprehensive development of Pingqiao Town and Hengjian Town had high investment fund, large implementation scale, and the investment direction was mainly in economic forest and fruit, and tea which were favorable for diversified operation of increasing farmers' income. Statistics indicated that the proportion of output value of diversified operation to total agricultural output value is increasing significantly and has exceeded 75% at present.

3.2 Comparison of agricultural production structure of survey points Survey results indicate that in family income structure of surveyed households, income of agricultural production takes up a high portion; Shangping Town, Pingqiao Town and Hengjian Town was 71.19%, 76.07%, and 73.62% respectively, hilly and mountainous areas were slightly higher than plain areas, but family labor income of the latter was higher the former. This reflects that family income of farmers in hilly and mountainous areas mainly comes from agriculture, and implementing agricultural comprehensive development and promoting agricultural structural adjustment will be realistic path for increasing farmers' income.

Farmers in hilly and mountainous areas have different agricultural production structure from farmers in plain areas. As to the

ratio of agricultural planting area and forestry planting area, Pingqiao Town was 0.63:1, Hengjian Town was 1.51:1, and Shangxing Town was 32.13:1, showing forestry production proportion of plain areas much lower than hilly and mountain areas. We use the similarity coefficient (S_{ij}) between planting industry and forestry structure to evaluate difference of planting structure between plain areas and hilly and mountainous areas. S_{ij} is calculated by following formula:

$$S_{ij} = \sum_n x_{ij} y_{jn} / \sqrt{\sum_n x_{in}^2 \sum_n y_{jn}^2}$$

where x_{in} and y_{jn} denote planting area of n types of agricultural products in land i and j . Statistical results indicate that there is significant difference between Shangxing Town and two hilly and mountainous towns, the structural similarity coefficient is very low, while two hilly and mountainous towns show similar characteristics, as listed in Table 1.

Table 1 Similarity coefficient between planting industry and forestry structure (S_{ij})

Similarity coefficient	Shangxing Town	Pingqiao Town	Hengjian Town
Shangxing Town	1.00	0.43	0.30
Pingqiao Town	—	1.00	0.74
Hengjian Town	—	—	1.00

From internal aspect of planting industry, the proportion of grain crop planting area to industrial crop planting area was 0.18:1 in Pingqiao Town, 0.13:1 in Hengjian Town, and 2.38:1 in Shangxing Town; as to the percentage of tea and mulberry tree planting area to planting area, it was 40.98% in Pingqiao Town, 59.20% in Hengjian Town, and 5.40% in Shangxing Town, showing significant difference between plain areas and hilly and mountainous areas. The above data reflect that implementing agricultural comprehensive development in hilly and mountainous areas and strengthening demonstration and guidance of new crops and technologies to farmers according to actual situations of agricultural production structure are favorable for driving farmers to make agricultural structure adjustment and increasing family income.

3.3 Comparison of benefits of farmers in survey points In the questionnaire, we designed two evaluation indicators for agricultural comprehensive development in hilly and mountainous areas as increasing family income: farmers directly benefited and farmers indirectly benefited. For farmers directly benefited, agricultural production of farmers belongs to a part of development project for hilly and mountainous areas or farmers accept technical guidance and training of hilly and mountainous area development bases and sci-tech parks, and support of all levels of government in funds, policies and materials; for farmers indirectly benefited, farmers view and imitate agricultural comprehensive development bases and sci-tech parks to make production and structural adjustment. Others are not benefited.

Table 2 Benefit of surveyed farmer households

%

Product	Percentage of planting farmer households in surveyed farmer households		Percentage of benefited farmer households in planting farmer households			
			Farmer households directly benefited		Farmer households indirectly benefited	
	Pingqiao Town	Hengjian Town	Pingqiao Town	Hengjian Town	Pingqiao Town	Hengjian Town
Tea	17.39	20.00	75.00	83.33	25.00	16.67
Chestnut	60.87	30.00	57.14	55.56	21.43	33.33
Silkworm cocoon	56.52	10.00	61.54	0.00	7.69	0.00
Mao bamboo	17.39	36.67	0.00	0.00	25.00	9.09
Peach	17.39	10.00	50.00	33.33	25.00	33.33
Pear	8.70	3.33	0.00	0.00	50.00	0.00

Survey results indicate that influence of agricultural comprehensive development in hilly and mountainous areas is slightly different due to difference in types of agricultural products, and evaluation of famers on function of comprehensive development projects is also varied in types of agricultural products. In surveyed farmer households, chestnut planting area is large, and most chestnut planting farmers recognize promotion function of agricultural comprehensive development in hilly and mountainous areas. Tea is a crop variety recognized by planting farmers. Although there are few farmers in two areas, many planting farmers think they are directly or indirectly benefited from agricultural comprehensive development in hilly and mountainous areas. From the perspective of other products, there are fewer planting farmer households and the comments of planting farmers are also very low. This is partly because agricultural production structure is different in different areas and different projects have different development focuses. For example, hilly and mountainous areas of Hengjian Town mainly develop tea, local farmer households are benefited from radiation and promotion of agricultural comprehensive development projects, while other products have no such advantage. On the other hand, this is because some agricultural products have low technical requirements, farmers need not much technical guidance and training service. Agricultural comprehensive development fails to bring into full play, Mao bamboo is just the case. Through further comparison from value perspective, we found that there are also great differences in the percentage (contribution rate) of income from agricultural products in total family income between farmers directly and indirectly benefited, as listed in Table 3. Survey results indicate that tea, chestnut, and peach are major types benefiting farmers in comprehensive development of hilly and mountainous areas. Tea is the highest; the direct contribution rate in Pingqiao Town and Hengjian Town is 19.91% and 27.03% respectively, indirect contribution rate is 6.64% and 5.41% respectively; Mao bamboo and pear have much lower contribution rate. Such results are closely related with the fact that farmers planting tea and peaches are generally large specialized households.

4 Conclusions and policy recommendations

Results indicated that agricultural comprehensive development investment projects in Jiangsu hilly and mountainous areas are closely coupled with local agricultural production structure; financial

funds promote social capital input to construction of economic forest, fruit and grass planting, and livestock raising. Through demonstration and guidance of farmers, it promoted adjustment of agricultural production structure and increased farmers' income. At present, increase of farmers' income is still the core of issues concerning agriculture, farmers, and rural areas. Agricultural comprehensive development is an essential measure for the state investing in agriculture and promoting increase of farmers' income. To further bring into play such function, we come up with following policy recommendations.

Table 3 Contribution rate of development to income of farmers

%

Product	Farmer households directly benefited		Farmer households indirectly benefited	
	Pingqiao Town	Hengjian Town	Pingqiao Town	Hengjian Town
Tea	83.91	86.03	76.64	79.41
Chestnut	27.89	22.83	22.68	21.70
Mao bamboo	0.00	0.00	0.57	0.41
Peach	80.57	85.07	85.27	85.07
Pear	0.00	0.00	0.87	0.00

4.1 Stably increasing investment in agricultural comprehensive development of hilly and mountainous areas Agricultural infrastructure, agricultural science and technology, agricultural education and training, and agricultural ecological environment are essential parts of agricultural production factors but need to be supplied by government due to externality and non-exclusiveness. In the above investment, it is particularly necessary to stably increase investment in scientific and technological projects. In market economic condition, improving yield and competitiveness of agricultural products depend on scientific and technological content and quality. Increasing input of scientific and technological service project, firstly it is recommended to strengthen agricultural sci-tech research and speed up assembly of advanced applicable technologies; secondly, cultivate sci-tech and management talents and take many ways to train agricultural personnel; thirdly, on the basis of production, processing, storage, and circulation, it is recommended to actively introduce and adopt new varieties, new methods, new technologies, to increase scientific and technological content of agricultural products^[5].

4.2 Setting up information platform and developing intermediaries and strengthening market survey The essence of agricultural comprehensive development is commodity oriented ag-

gricultural resources. Agricultural comprehensive development should convert resource advantages to economic advantages through selecting and design leading and characteristics industries or products and implementing production, sales, and agricultural, industrial and commercial integrated operation, finally realize rapid development of agricultural economy and increase of farmers' income. In market economy condition, it is recommended to take market survey or prediction as starting point of selection and design of agricultural comprehensive development in hilly and mountainous areas, and take whether products can be turned into commodities as the basis of feasibility study of project meeting the actual situations^[6]. All hilly and mountainous areas should set up information platform, develop farmer operation and marketing team and other intermediary service organizations, provide information for agricultural comprehensive development projects and local farmers, promote connection between production and marketing, and guide those areas with comparative advantages to establish projects of economic forest and fruit and forage grass bases.

4.3 Strengthening institutional construction of project management and financial fund management Main problems in use of agricultural comprehensive development funds include project funds not input in accordance with requirement of project establishment, some financial funds deviating from the plan, and input and output rate not satisfactory. The direct cause of problems lies in no perfect project supervision and management system in Jiangsu Province. Strengthening institutional construction for project management is an urgent task. Firstly, it is recommended to establish overall evaluation indicator system for agricultural comprehensive development of hilly and mountainous areas^[7] and improve management methods for agricultural comprehensive development project areas; secondly, it is recommended to strengthen institutional construction and do well in organization management and supervision of project implementation; thirdly, it is recommended to improve agriculture-related laws and regulations at the legislation level. Agricultural comprehensive development of Jiangsu Province always takes the lead in the whole country, but there are still many problems of unclear responsibilities and rights, weak project and fund management, and no laws to abide by, and thus it is urgent to regulate various actions in the process of agricultural comprehensive development at the legislation level^[8].

4.4 Increasing examination and approval of processing of agricultural products Statistical results indicate that China's yield of grain, oil seed, fruit, beans, meats, eggs, and aquatic products rank first in the world, but the processing capability is only 30%, while processing capability of agricultural products in developed countries is up to 80%. Through developing agricultural product processing industry, it is expected to promote and optimize regional distribution of agricultural products and construction of superior agricultural product production bases, extend agricultural industry chain, and increase comprehensive utilization and value adding level of agricultural products, which are favorable for increasing overall benefits of agriculture and increasing farmers'

income^[9]. Development of agricultural product processing industry in hilly and mountainous areas should make effort to integrate with agricultural comprehensive development. The agricultural comprehensive development should increase establishment for projects of agricultural product processing, support construction of agricultural product processing enterprises, scientific research and development, technological services, quality standard, and information network system construction, as well as brand operation and protection.

4.5 Innovating on investment mechanism to absorb social capitals In the agricultural comprehensive development of hilly and mountainous areas in Jiangsu Province, although three kinds of capitals invest a huge amount, it is still not sufficient for the whole province. In addition, from the practice, banks invest few credit funds in agricultural comprehensive development of hilly and mountainous areas. Therefore, agricultural comprehensive development of hilly and mountainous areas should explore new channels to raise funds. One way is to take full advantage of bank credit funds to guide social industrial and commercial capitals, private capitals, and foreign capitals to invest in agricultural comprehensive development. Through innovation of agricultural comprehensive development investment mechanism, it is recommended to input financial funds and bank credits in agricultural comprehensive development. In addition, government should bring into play the role of yeast in the free investment in agricultural comprehensive development of hilly and mountainous areas, attract and lead social, industrial and commercial capitals, private capitals, and foreign capitals, and encourage urban enterprises and institutions and individuals to contract development projects of hilly and mountainous areas.

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