Problems and Countermeasures in the Investment and Financing of Rural Small-scale Water Conservancy Facilities in China

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Abstract Construction of small-scale irrigation and water conservancy facilities is an important content of the improvement of agricultural infrastructure. Construction of small-scale irrigation and water conservancy facilities in rural China is seriously lagged at present. Many small-scale water conservancies are seriously aged or totally damaged without maintaining. Some measures should be adopted to enhance the construction of rural small-scale water conservancy facilities, such as increasing fiscal input, realizing the diversification of financing ways, reasonable directing the financing and laborers recruiting of the mass.

Key words Rural irrigation and water conservancy facilities; small-scale irrigation and water conservancy facilities; Investment and financing; China

small-scale irrigation and water conservancy facilities usually refer to the irrigation and water conservancy facilities with 666.67 hm² irrigation area, 2 000 hm² waterlogging area, and below 1 m³/s channel flow, which are mainly distributed in the fields. Their functions are field irrigation, aquaculture and the disaster and disease control, such as the flood and waterlogging control, the alkali treatment and the prevention of endemic diseases. small-scale water conservancy facilities have direct effect on agricultural production and can not be replaced by the large and medium-sized ones. According to the incomplete statistics, China has about 1 600 × 10⁶ small-scale irrigation and water conservancy facilities throughout the country at present, which is a extremely broad distribution. Because that small-scale water conservancy projects have strong public nature, they should be included in the scope of financial assistance. Therefore, government has to set up stable and sustained investment and financing mechanism in order to ensure the long-term effective operation of small water conservancy facilities.

1 Development course of the investment and financing of rural small-scale water conservancy facilities in China

Before the reform and opening up, China's small-scale irrigation and water conservancy construction adopted the method of government support and peasant working. The state regulated that all the teams having the ability to take this burden should resolve it by themselves without state subsidy. Teams having difficulty in capital could apply for subsidy according to the degree of difficulties. After the reform and opening up, the form of investment has mainly changed into two types. The first is policy guidance, which is achieved mainly through appropriate financial subsidies at different levels in order to mobilize the rural collective investment and peasant working. The second type is social cooperation, that is policy guide, market oriented, agriculture and irrigation support. In the year 1981, China implemented different contract modes according to the engineering type, scale and management system of production team. However, the effectiveness of this reform was not significant, because the reform had no change in the ownership, use rights, profit right and other contents of property rights. In the 1990s, some places started to carry out the reform of property rights of small-scale irrigation and water conservancy with the characteristics of strengthening the exclusive of property rights. For example, Huangzhuang Village in Fei County, Shandong Province carried out an open bid auction for the small-scale irrigation and water conservancy facilities in the year 1993. Later, similar reforms were conducted in other places. However, the overall construction problem of small-scale farmland water conservancy projects could not be solved effectively because of the lack of normalization. After the rural tax reform, "two working system" had been phased out in the year 2000. The "one project one discussion" system gradually became an important measure for the construction of collective public welfare financing and management such as village farmland water conservancy construction. However, because of the phenomenon of "discussing without decisions, making decisions without execution" often happened, the development of agricultural infrastructure construction became slow. For instance, effective irrigated area in Shaanxi Province decreased gradually from the year 2002 to 2004. The effective irrigated areas in the three years reduced by 5 630, 6 530 and 30 080 hm² due to the damaged water conservancy facilities, respectively. Lag of agricultural infrastructure has become a serious obstacle to agricultural development.

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2 Problem of China's rural small-scale water conservancy construction during the investment and financing process

2.1 Serious shortage of government investment; the setback of peasants' investment. Because rural small-scale water conservancy project mainly serves to agriculture, a high-risk and low-income weak industry, this determines that its economic benefits level is far below the social average profit margin. Wen Liping points out that it is difficult to obtain profits by simply relying on the construction of irrigation and drainage engineering after analyzing the cases of farmland water conservancy projects. Small-scale water conservancy projects with strong public nature should be in the scope of financial assistance. After the reform, transformation of investment and financing form has become an "excuse" for the government’s reducing and exiting from construction. Small-scale water conservancy projects are difficult to secure a higher level of subsidy due to its small scale and low project level. Almost all the projects are up to the support of financial burden at township level and self-prepare capital of the mass. Proportion of small-scale water conservancy projects expenditure in agricultural production support expenditure by Chinese government reduced from 56.0% in the year 1978 to 24.6% in 1990, decreasing by about 31 percentage points. With the implementation of active fiscal policy after the year 1996, the state increased the investment on water conservancy facilities, but its investment mainly concentrated in the governance of major rivers. In 2005, central finance set up a special fund for the construction grants of small-scale irrigation water conservancy projects, and started up the investment and financing pilot for small-scale water conservancy projects with "privately run under state ownership". However, farmer's investment enthusiasm was low due to the low proportion of central government grant and the high proportion of peasants' bear.

2.2 Changes of the pattern of income distribution; difficult implementation of "one project one discussion". The "one project one discussion" refers to a system of the village collective public welfare funds, the labor mobilization, usage, supervision and management determined by the villagers' congress. With the development of market economy, farmers' income sources became diversified and the per capita income gap enlarged. There were great differences in the demand quantity, type and quality of agricultural infrastructure by peasants. Therefore, the implementation difficulty of "one project one discussion" system enhanced.

Peasants can be divided into three types according to their income levels, which are poor household, medium household and rich household. Many poor households in general are pure peasants; while most of rich households are non-peasants; medium households are mainly agriculture supplemented and agriculture dominated peasants. Generally speaking, income elasticity of agricultural infrastructure demand by peasants is positive. In Fig. 1, $D_A$, $D_B$ and $D_C$ represent the agricultural infrastructure demands by the poor household, medium household and rich household, respectively. If considering the influence of the characteristics of three types of peasants, the demand curve of agricultural infrastructure will be changed, see Fig. 2.

![Fig. 1 The demand curve of agricultural infrastructure under normal situation](image1)

![Fig. 2 The demand curve of agricultural infrastructure when considering the occupational characteristics](image2)

Fig. 1 and 2 show that, impacted by the occupational characteristics, the infrastructure demand and theoretical demand of three types of agricultural households are inconsistent. Rich households engaged in mainly non-agricultural industries have low demand for agricultural infrastructure; while the poor households engaged in agriculture show great demand, but this demand is restricted by income level. Demand curve $D_A$, or even $D_B$, in Fig. 2 is usually compressed. Therefore, agricultural infrastructure demand of rural household is far below the infrastructure demand of agricultural production.

During the process of "one project one discussion", we generally follow the majority principle based on the "median vote theorem". Result of the decision making depends mainly on the demand quantity of agricultural infrastructure by medium household. However, from the aspect of social division of labor, the demand of agricultural household engaged mainly in agriculture can objectively reflect the infrastructure demand of local agricultural production. Besides, the low agricultural comparative interest has greatly influenced the effectiveness evaluation on the infrastructure of agricultural production, such as irrigation, by agriculture supplemented or agriculture dominated households. And eventually it leads to the occurrence of "discuss without decisions" phenomenon. Thus, the system of "one project one discussion" can not offer a fundamental solution for the supply and maintenance problems of rural small-scale irrigation facilities.
2.3 Weak organization of grass-roots management; the lack of peasants' cohesion. During the investment and financing process of rural small-scale water conservancy facilities, under market economy condition, national mobilization mechanism and social mobilization mechanism should coordinate and complement with each other according to the public finance theory. There are a lot of outstanding loans of China's agricultural infrastructure construction in history, and the level of agricultural productivity is low. Therefore, national mobilization mechanism still plays a leading role. In the 1980s, the implementation of household contract system in agricultural production undoubtedly liberated the productivity in the greatest extent. However, the lack of corresponding policies and measures made this reform show the significant negative impact on irrigation and water conservancy construction. Peasants only care about their own responsible fields, but are not concerned about the public affairs, such as irrigation and water conservancy. Moreover, the relationship between community and peasants has changed; new community is constituted by the elected village committee and the decentralized independent households, which could not integrate the dispersed households into a rigorous planning system any more. Thus, the phenomenon of lack of organization and management of public affairs comes into being in rural communities. In particular, difficulty in public works with relatively great investment scale further increased, including irrigation and water conservancy construction. At present, there are some intermediate organizations organized by the peasant masses of their own, such as the Agricultural Technology Association, the Rural Represents Council and the Economic Cooperatives. But the activity scope of these organizations is mainly restricted in agricultural technology information exchange, rural daily affairs treatment, and services for agricultural production and sales, while rarely involves the agricultural production and infrastructure construction. Therefore, it is difficult to organize the dispersed households effectively and to carry out the construction of small-scale irrigation and water conservancy facilities due to the weak organization of grass-roots management and the lack of relevant social organizations.

2.4 Lag of water management system reform; difficult formation of an effective incentive mechanism. The ownership and management rights of irrigated areas belong to the state or collectivity, and the water users have the use right under traditional management system in irrigation area. With the establishment of market economic system step by step, the separation of the construction, management and use has aroused the "more efforts on construction and less on management" of irrigation and water conservancy construction, as well as the increasingly serious problem of "someone to use but no one to manage". China released the Implementation Suggestion on the Reform of Hydraulic Engineering Management System (discussion draft) in the year 2001, and then carried out the reform of hydraulic engineering management system. On the basis of unchanged ownership, this reform conducted the change of management right through various types of contracted responsibility system. However, there were still many problems such as the difficult determination of contract base, the district being responsible for profit but not deficit, the bloated management organization and the short-term behavior of management. All these lead to the low pricing of water conservancy, the difficulty in collecting fees and in maintaining the normal operation. And the peasants' actual burden of water charges is not mitigated due to the high price of terminal water, the confused management of water price, the phenomenon of random price markup and additional charges. The lag of water management system not only influences the construction of water conservancy facilities, but also makes the use efficiency of existing water conservancy facilities extremely lower.

3 Countermeasures for strengthening the rural small-scale water conservancy facilities

3.1 Increasing the government financial input; establishing the input steady growth mechanism of rural small-scale water conservancy facilities

(1) Increase the financial investment on farmland irrigation facilities. Governments at all levels should increase the special input on farmland water conservancy construction, set up a special fund for irrigation and water conservancy facilities. And these measures should be gradually fixed by policy, law and other forms, in order to form a continuing financial input mechanism for water conservancy construction, and to avoid fluctuations in the investment policy. In the less-developed agricultural areas and the peasants' low income areas, government should tilt powerfully, and narrow the gap between the rich area and poor area.

(2) Realize the diversification of financial investment; make full use of the guiding role of financial capital. We can adopt many modes such as financial subsidies, low-interest policy loans, directional fixed subsidies and tax incentives in order to arouse the enthusiasm of peasants and social capitals for the input of agricultural production infrastructure. For example, we can provide the peasants with material cost, machinery operating cost and other subsidies when building small-scale irrigation and water conservancy facilities, and make full play of the support, guidance and leading roles of government fund.

(3) Adjust the investment structure; strengthen the financial support for small-scale water conservancy facilities. We should develop a perfect management method for the small-scale water conservancy investment, increase the financial input of governments at all levels, bring into full play the guiding role of financial capital, and mobilize the peasants' enthusiasm to invest.

3.2 Defining the nature of water conservancy facilities scientifically; realizing the diversified investment and financing methods

(1) The first-level network of irrigation system has the characteristic of "public nature". Therefore, on the basis of making clear of investment projects and taking on the main responsibility of construction, appropriate financial capital should be introduced according to the characteristics of cash flow in
project with government fund as the leading role, in order to re-
lease the financial pressure, to exert the supervision and man-
agement mechanism in project operation after the entrance of
financial capital, and to improve the efficiency of investment
projects. Agricultural Development Bank, the only financial in-
vestment and financing institution in agriculture, should play
their own strengths, and take on the main duties.
(2) The second and third-level networks of irrigation sys-
tem (mostly rural small-scale water conservancy facilities) have
weak "public nature". They have relatively stable cash
earning stream after the completion of this project. Therefore,
they should actively turn to commercial banks for financing
based on the financial support of Agricultural Development
Bank. However, due to the high risk of agricultural production,
government should take relevant preferential policies in order to
reduce the risk of commercial and financial operation, such as
offering project security, tax preference for commercial banks.
(3) We can actively guide some large-production farmers and
rich households to participate in the construction of rural
small-scale water conservancy by the modes of auction and
rent. We can also implement market-oriented operation for the
their construction and management in order to achieve the goal
of "feeding water by water and raising project by project".

3.3 Perfecting the "one project one discussion" system;
guiding the mass to raise financing and labor
(1) Set up the agricultural production association, and
improve the efficiency of decision making. Due to the impact of
rural industry structure adjustment and the kinship and geopoliti-
cal relation among peasants, project resolution of rural small-
scale water conservancy projects can be initiated by the
villagers' committee. Members must be absorbed in order to re-
composes the Agricultural Producers' Association according to
the different land management scales of peasants, and to make
decisions for the water conservancy projects related with agri-
cultural production and other agricultural infrastructure projects.
The participation of Agricultural Producers' Association, on the
one hand, can exert the organizational superiority of village
committee; on the other hand, it can fully reflect the need of lo-
cal agricultural production for water conservancy facilities when
making decision, because most of the representatives are op-
erators of agricultural production. Representatives can sponta-
aneously carry out scientific demonstration on the discussed pro-
ject, and can supervise and manage the construction and oper-
ation of project effectively. Construction program of the inter-vil-
lage project can be advanced by the people's government at
county or township level. Production associations, in the bene-
fit scope of the project, are organized together to discuss the
construction of related programs.
(2) Strictly regulate the special found; improve the trans-
parency of the use of funds. The democratic financial group,
which is composed of elected representatives, should be in
charge of the fund of "one project one discussion". They are
responsible for carrying out fully self-management of the re-
ceived capital, its use and balance. When the project comple-
ted, they should notify the result of project acceptance, quality
check, final accounts, audit report and test run. The way of
publicity should be easy to use, clear at a glance, and conven-
ient for the all sectors of the community and the vast majority of
villagers to know the use situation of the whole project and
fund. It makes the mass comfort to pay and rest easy to use
the financing payments of "one project one discussion". Thus,
their activity of "one project one discussion" is improved.
(3) Create a favorable external environment; improve the
decision-making efficiency of "one project one discussion" sys-
tem. Government should create a favorable external environ-
ment, and promote the farmers' activity in agricultural produc-
tion infrastructure by benefit induced mechanism. The first is to
provide low-interest loans by Agricultural Development Bank, in
order to ensure the capital source of investment and construc-
ction of project subject. Future earnings power of project can be
used as a pledge when making loans. Government should offer
paying corresponding share of collateral for the project with small fu-
ture net cash flows when pledging, in order to eliminate the
worry about the disbursement of loans by Agricultural Develop-
ment Bank. Secondly, government should use a variety of fi-
ancial leverage, at the same time actively guide the farmers to
carry out restructuring of agricultural production, improve the
income level of agricultural production, and fundamentally stim-
ulate the peasants' enthusiasm for agricultural investment. For
example, government guides the farmers to plant improved va-
rieties by high-class seed subsidy, to expand the area of eco-
nomic crops through offering the market information and tech-
nical training services, and to form a industrialization plant model
through investment on demonstration fields. Finally, we should
strive to reduce the cost of irrigation and drainage of small-
scale water conservancy facilities by related policies. We
should offer subsidy policy for the purchased equipment of wa-
ter conservancy facilities and the electricity use of agricultural
production, including irrigation and drainage. Make efforts to
reduce the operating costs of irrigation and drainage facilities,
and eventually improve the enthusiasm of peasants for invest-
ment on small-scale water conservancy facilities.

3.4 Simplifying government organs of county or township
level; improving the construction of rural grass-roots man-
agement organizations Reform of rural tax and fee system
has caused great changes on the county economy with agricul-
ture as the leading industry. And the decision-making authority
of county and township governments is narrowing constantly.
Therefore, resource allocation system based on the level of
rights in the past should be changed. Boundaries and functions
of county administration organization should be contracted
properly. County-level government administration system
should be constructed with the principle of accountability and
service. Meanwhile, when simplifying township-level organiza-
tion, we should consider the cancellation or merger of the town-
ship-level governments in some places in order to fundamental-
ly simplify the government organs of county or township level.
The main function of management organization at village level,
the most grass-roots organizations in administrative system, is
the responsibility of organization and the offering of regional
3.5 Actively promoting the water management system; strengthening the management team construction of water conservancy

(1) Actively promote the reform of property rights system of small-scale water conservancy projects. After scientific evaluation on the small-scale water conservancy projects, various manners, such as contract, auction, lease and share-holding cooperative, are used to enlist the management and use rights. New and proposed small-scale water conservancy projects can be constructed according to the principle of "one who owns or invest on the project will benefit from it" in order to encourage individual peasant or peasants together to set up the water conservancy projects. Because small-scale water conservancy projects in agriculture have a "public type", the optimum choice for the fund raising of engineering construction and maintenance is the democratic consultation method of "one project one discussion" in the places with good prestige of the collective organization and high consciousness of the mass. 

(2) Strengthen the construction of grass-roots water management, further construct the township water conservancy station. Personnel posts of water station should be increased. At present, the scope of function is shrinking in township governments at different areas, and the existing staff needs to be diverted. Therefore, staff having professional knowledge and management skills of water conservancy can be diverted to the township water conservancy stations after technical training. Meanwhile, rights and obligations of water stations at all levels should be regulated through the form of laws and regulations in order to make corresponding power property and rights clear, and to improve the management efficiency of water station.

3.6 Speeding up the reform of land management system; improving the peasants' activity of constructing small-scale water conservancy facilities We should continually ensure the stability of land contract right of peasants, and actively open up the right to operate land. Remaining the management system in rural areas unchanged, governments at all levels should make more preferential policies to encourage the normal and reasonable circulation of land, perfect the land circulation regulations, and encourage to sign a standardized land transfer contract. Therefore, we can make farmland centralized to farming experts for a long time, enlarge the operating scale of peasants' land, reduce the overflow benefit of small-scale irrigation and water conservancy facilities, and improve the peasants' ability and enthusiasm for constructing the small-scale irrigation and water conservancy facilities.

References


