

# Yellow River Irrigation Management Organization Transfer and Results Analysis in Shouzhangji Township

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## ABSTRACT

THE PRESENT PAPER is, firstly, to introduce the basic situation and problems existing in irrigation management organization of Shouzhangji Irrigated District of Liangshan County, Shandong Province. Belonging to gravity irrigation, the district covers a total area of 41.32 square kilometers ( $\text{km}^2$ ), and has 2,693 hectares (ha) of arable farmland, 2,334 ha of effectively irrigated farmland, 48 villages and a population of 30,920. Since the realization of the production contract system in 1980, the investments from both local and state governments became more and more limited. The state-funded irrigation management organizations were not able to take on all of the irrigation project construction and necessary management jobs. The function of irrigation projects and agriculture output went down. The farmer incomes decreased seriously. Therefore, it is urgently necessary to improve irrigation facilities and find the best irrigation management forms. Secondly, the paper deals with the present irrigation management organization system as well as on how it was transferred from the old system to the present one. The paper studies the obligations and the source of funds related to present irrigation management organizations, as well as how the irrigation management organizations mobilize funds which are necessary for irrigation system rehabilitation and operation and maintenance (O&M).

Considering the construction, rehabilitation and planning of transferred irrigation management systems are more difficult than before, the paper introduces the principle and method of irrigation project construction after irrigation management organization transferred. The quality supervision methods of irrigation projects have also been studied in the presentation.

Finally, the benefits resulting from transferred irrigation management organizations have been analysed. The paper also summarizes the experiences related to how the irrigation management organizations are transferred more effectively. The present study shows that the irrigation management organization transfer of Shouzhangji Township has resulted in desirable effects.

## BACKGROUND

Situated in Liangshan County of Shandong Province, the Shouzhangji Yellow River Irrigation System covers 48 villages with a total population of 30,920, a total area of 41.32  $\text{km}^2$ , a total arable farmland of 2,693 ha, and a total effective irrigation area of 2,334 ha. Belonging to gravity irrigation, the district gets its water source from the main canal of ChanGai Irrigation Area. Since the establishment of an irrigation system invested by the state in 1965, the construction, rehabilitation and O&M in Shouzhangji irrigation system have been undertaken by the state and local governments with large irrigation project investment, low management level, project function deterioration as well as seriously wasted water resources. What is worst is that since the realization of the rural production contract in 1980, due to the less project investment from both state and local governments, the construction and O&M were at a standstill. [According to statistics, three-level irrigation project equipment were less than 10 percent of the total area.] The irrigation project intact rate was less than 50 percent. Some irrigation projects were not able to function. The average water utilization rate was less than 40 percent. In 1980, the average irrigation duty was 18,000 cubic meters per hectare ( $\text{m}^3/\text{ha}$ ) the grain output was only 5,925 kilograms per hectare ( $\text{kg}/\text{ha}$ ). The living standard of the farmers was very low. The annual average grain production was only 360  $\text{kg}/\text{man}$ . The benefits of the irrigation system had decreased. The effectively irrigated area decreased from 1,724 ha in 1980 to 1,347 ha in 1982. The irrigated area decreased by 21.9 percent. Therefore, in order to raise irrigation benefits and increase farmer incomes, it should be in accordance with the development features of the social situation, to transfer the old irrigation management system and establish desirable irrigation system management organizations.

## PRESENT IRRIGATION MANAGEMENT ORGANIZATION SYSTEM

In 1985, according to the development of the rural production situation and Yellow River irrigation characteristics, the county and township governments made the decision to transfer the old irrigation management system. The old irrigation management system where everything was dependent on the government has been changed in three steps. The first was to set up a Farmers' Irrigation Management Committee under the leadership of the local government. The second was to set up Irrigation Management Sections according to physical, irrigation project, and water use conditions as well as agricultural crop pattern. The third was to establish Village Irrigation Management Groups based on villages. The forms of different organizations and relevant obligations are as follows:

## **Farmers' Irrigation Management Committee**

Under the leadership of township government, the Farmers' Irrigation Management Committee (FIMC) was set up in 1985, with one chairman, two deputy chairmen, several committee members elected. They were a township chief and responsible persons in public security, judicial, agricultural, and water resources departments. The chiefs of all irrigation management sections were elected as committee members. One irrigation management group chief and one active irrigation management farmer in every village were elected as the representatives of FIMC. The FIMC chairman summarizes the annual work and delivers the next year's working schedule as well as answers the questions on irrigation project construction and O&M from the farmers. The main obligations of the FIMC are to study and make out irrigation planning and irrigation regulations, carry out decisions from the representative conference as well as to solve and coordinate the [water contradictions] among the different irrigation sections, etc. All the members of FIMC work for the FIMC on a part-time basis. The FIMC, established and participated in both representatives of the local government and farmers, has played important roles in exchanging information, mutual coordination, and in the unified irrigation system planning, [unified standard] as well as in jointly developing the scope of the irrigation district.

## **Irrigation Management Sections (IMS)**

In order to take full advantage of farmer management and according to the physical condition, irrigation project distribution, project structure management and water resources utilization level of the irrigation district, the covering area of the main and branch canals in the irrigation district has been divided into 5 irrigated sections. Each section controls 8 to 10 villages and about 500 ha of irrigated farmland. Each irrigation section has established the relevant section-level irrigation management organization with 1-2 section chiefs, and 2-3 section members. All the staff in the irrigation management organizations consist of farmers who are recommended by village committees, approved by the township FIMC and registered in the county FIMC. The obligations of IMS are: to be responsible for the project structure management and water use management [in the scope of section], to lead the village level irrigation management organizations, to coordinate the [water use contradiction] among the villages, to organize project construction, to levy water charges, supervise project construction quality, etc. The pay is 45-60 Yuan RMB (about US\$5.2-6.9) per man-month which is covered by the water charge.

## **Village-Level Irrigation Management Groups**

The village-level irrigation management group generally consists of 3 persons, in which the village committee chief is appointed as the group chief, and two group members are elected by villagers. Generally speaking, the group members are enthusiastic about irrigation management, rich in irrigation experience and are held in high esteem by farmers. According to irrigation facilities in the area, the village irrigation management groups employ [2 to 4] management staff members who are responsible for different canal sections and for the management of the relevant canals, ditches, roads, trees and irrigation facilities in their duty section and get 30 Yuan RMB pay (about US\$3.5) per man-month which is paid from the water charge.

## **THE SOURCE AND MANAGEMENT OF FUNDS**

In order to carry out irrigation project construction successfully, the established irrigation management organizations have taken many steps to mobilize funds needed for water resources development. The main steps are as follows.

### **Water Charge**

Based on water supply cost, state economic policy, and water resources situation, the standard of water charge has been made out according to actual irrigated area. The annual average water charge is 120 Yuan RMB/ha (US\$13.79 ha). The total amount of water charge in the whole township is about 300,000 Yuan RMB (US\$34,480) yearly.

### **Duty Labor System**

Each farmer is asked to contribute 41 duty labor days in irrigation structure construction. The duty labor account has been set up in the township. The labor allocation information should be sent to the villages in the form of a notice paper. The villages have the labor allocation account. The farmers have their own labor allocation handbook. The duty labor allocation is based on the principle of unification and concentration, harnessing in sections, reasonableness and equity. For main facilities with a great number of projects and requiring a great deal of labor, the FIMC will mobilize

labor at a township-wide range in order to complete the task within a short time. The project construction will be allocated in accordance with benefitted area to harness section by section; the labor used in the project construction will be calculated and balanced at the end of every year. By doing so, both project schedule and quality are guaranteed. A reasonable labor burden is realized.

### **Mobilization of Funds**

For important projects at the local points, the FIMC will mobilize funds from beneficiaries according to the principle that "the people who are benefitted should be burdened." In recent years, 2,700,000 Yuan RMB (about US\$310,300) have been mobilized from farmers and the problem of fund shortage has been solved successfully.

### **Adjustment of Crossing Land Plots**

In order to solve the problem of farmland area used in project construction and due to uneven distribution of ditches, roads, and canals in the range of different villages, the FIMC has adjusted the crossing land plots among villages. The problem of inequity land levy has been solved and successful water conservancy on farm is guaranteed.

### **Fund Management and Utilization**

The principle of "coming from farmers and going to farmers" as well as unified management are realized in fund management and utilization. The farmers who constructed or set up desirable irrigation facilities will be rewarded. According to the regulations made by FIMC, desirable canal lining will get a prize of 30-50 Yuan RMB per 100 meters (m) (US\$3.5-5.7), desirable underground water supply concrete tube will get a prize of 50-70 Yuan RMB per 100 m (US\$5.7-8.1), which motivated the farmer activity in building irrigation projects.

## **THE PRINCIPLE AND METHOD OF IRRIGATION PROJECT CONSTRUCTION**

Under the leadership of the County Water Resources Bureau and considering the present and the future, the "Five Year Irrigation Project Schedule of Shouzhongji Township" has been made. Based on the principles of "small scale, project equipment and benefit within a year, "the canals, ditches, roads and trees have been planned systematically. Drought, waterlogging and salinity have been harnessed conjunctively. The best results have been achieved in the reasonable distribution of irrigation facilities, parallel importance of construction, management and utilization. The following measures have been taken in the process of construction.

### **Harness Sections according to Different Conditions**

Different project measures have been taken according to the status of different irrigated areas in the range of overall township. For example, [water] rivalry among the villages at the northern part of the township is serious, and irrigation is very difficult. For a long period, the farmers' requirements for rehabilitating irrigation facilities were very strong. Having been set up, the new irrigation management organizations have mobilized 3,200 laborers for irrigation project rehabilitation for 20 days, [which completed an earth project of 86 thousands m<sup>3</sup>, 18 irrigation equipment facilities, and cost 132,100 Yuan RMB (US\$15,200) mobilized from farmers.] The Tangfang Secondary Main Canal with a length of 11.5 km and undredged for a long period, has been dredged and the irrigation problem of 346.7 ha of 13 villages in the north part of the township has been solved. Situated in the lower reach of the irrigation district, the east part of the township covers 318.7 ha of farmland with a high land altitude. During the irrigation season, water use is very difficult. The FIMC mobilized 204,000 Yuan RMB (US\$23.5) from farmers, and stone projects of 33,500 m<sup>3</sup> each were completed; and 5 pumping stations were built, which solved the difficult irrigation problem successfully.

### **Development of Project Construction**

In order to facilitate project equipment construction on farm, the FIMC selected 4 villages covering 266.7 ha of arable farmland, where the farmers are very active in irrigation project construction as the demonstration model of project equipment. The FIMC called on farmers to mobilize funds for farmland project construction. Fifteen canals, ditches and roads have been built. Hundred and seventy five irrigation structures, a total amount of 80,000 m<sup>3</sup> earth stone projects, have been completed. Irrigation project equipment in five levels have been realized, the project benefit has been fully played, the water saving rate amounts to 30 percent, which facilitated the development of irrigation project construction in the township.

## **Promoting Production with Science and Technology**

In order to solve the problems of high silt content in the diverted Yellow River water and canal silting, since 1986, with the cooperation of the Yellow River Irrigation Test and Research Station (which is under the leadership of the Ministry of Water Resources of PRC), mechanized concrete canal lining in branch and lateral canals as well as reasonable project distribution demonstration on-farm have been carried out. The canal lining demonstration area has been built. Two concrete lined branch canals with a total length of 2,320 m, two concrete lined lateral canals with a total length of 900 m, 5 new lateral canals with a total length of 2,520 m, 36 branch structures, and 38 lateral structures have been completed in the demonstration area of 140 ha. The finished demonstration projects increased water supply and silt transportation abilities and prevented the canal from silting up. The irrigation efficiency has been raised to 43 percent.

## **Strengthen Construction Management and Guarantee Project Quality**

In order to guarantee project quality and in accordance with the tasks, the FIMC and IMS organize special construction teams to undertake project construction under the supervision of professional engineers. The project construction may be contracted to groups. Fixed points, fixed maps, fixed standards, fixed project material, fixed time, fixed rewards and punishments (which can be called "six fixations") have been realized. The management network has been formed with the measures that "the FIMC leads sections—the section leads villages—the villages manage canals—the canal is related to persons—the person has obligations." The contract system has been implemented. Each type of irrigation structure has been registered and contracted to farmers. The duty, rights and benefits are joined together. The pay is fluctuated. Inspection every month, appraisal every season, preliminary summary at the middle of the year, general appraisal and summary at the end of the year are realized. Duty and rights are clear and definite; management is concrete; steps are strong. This has enhanced irrigation benefits greatly.

## **ANALYSIS OF RESULTS**

Since the establishment of farmer irrigation management organizations in 1985, great changes have been taking place in irrigation system management and agriculture production of the Shouzhongji Township. At present, the number of irrigation canals and ditches in the township amount to 2,764 with a total length of 760 km, the irrigation structures amount to 2,196, the area equipped with five level irrigation structures (that are main, branch, lateral, tertiary and sub-tertiary equipment) amount to 1,533 ha. The effective irrigation area has increased from 1,347 ha to 2,334 ha a raise of 73.3 percent. The intact rate of facilities along the main canal is raised from 85 percent to 90 percent. The intact rate of branch and lateral structures has increased from 78 percent to 83 percent. The irrigation duty decreased from 9,148.6 m<sup>3</sup>/ha in 1985 to 6,090 m<sup>3</sup>/ha which has saved water by 33.4 percent. The irrigation water use rate is raised from 40 percent to 66.7 percent. The irrigation rotation is decreased from 25 days to 12 days. The grain output is raised from 5,925 kg/ha in 1985 to 9,517.5 kg/ha in 1990, which means that the grain output has increased by 60.6 percent. Annual average grain production is increased from 360 kg/man to 829 kg/man. Therefore, it can be concluded that the irrigation management organization transfer of Shouzhongji Township has brought about huge social and economic benefits to the farmers.