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Difficulties and Countermeasures of Developing Irrigation and Water Conservancy in New Era

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Abstract This paper expounds the great significance of irrigation and water conservancy for the agricultural development. Vigorously developing irrigation and water conservancy can promote high yield and stable yield of grain, effectively increase farmers' income, alleviate the impact of drought on agricultural production, be conducive to the adjustment of agricultural production structure, and promote county economic development. The difficulties of developing irrigation and water conservancy in new era are analyzed as follows: the subject of liabilities defaults seriously; it lacks effective input security system; the quality of project degenerates badly; the agricultural technological development is slow. Corresponding policy suggestions are put forward as follows: make the input subject of irrigation and water conservancy clear; form stable investment channels; strengthen the organizing and guiding functions of grass-roots government; reinforce the coordination and management of capital; strengthen the promotion of agricultural technology; quicken the pace of reform of irrigation and water conservancy.

Key words Irrigation and water conservancy, Difficulties, Agricultural development, Countermeasures, China

Water conservancy is the indispensable prerequisite for modern agricultural construction, irreplaceable basis support for socio-economic development, and indivisible guarantee system for improving ecological environment^[1]. Irrigation and water conservancy, as an important component of new village construction, is of great significance to agricultural development, rural economic prosperity and farmers' income increase in China. No. 1 Document of the central government in 2011 definitely points out that we will ceaselessly increase inputs in water conservancy, establish stable growth mechanism of water conservancy inputs, implement the strictest management system of water resources, perfect the management system of water resources combining watershed management and regional management, and regard the management of water resources as the strategic measures for quickening the economic development. I expound the role of irrigation and water conservancy in promoting China's agricultural development, analyze the problems existing in the process of development of irrigation and water conservancy, and put forward corresponding countermeasures and suggestions.

1 The significance of irrigation and water conservancy for the agricultural development

Irrigation and water conservancy is a part of agricultural infrastructure. Since the founding of new China, China has constructed roughly 20 million small irrigation and water conservancy projects, which plays a significant role in improving the conditions of production and living for farmers, and promoting grain production. Strengthening water conservancy construction can

provide guarantee for the supply of agricultural products, improve the rural infrastructure construction, and play a significant role for agricultural development and rural economic prosperity^[2].

1.1 Promote high yield and stable yield of grain At present, China's social development is still uneven; there is income inequality among regions; some of the poverty-stricken areas are dominated by agriculture, agriculture is based on farming, and farming is based on grain growing. It can be said that the construction level of farmland water conservancy facilities is the basis of grain yield of per unit area in rural areas. Through analysis in terms of overall effect, the average yield per mu of ordinary arable land is 230 kg, while the average yield per mu of farmland guaranteed by the water conservancy facilities is 365 kg, which clearly shows the effectiveness and role of irrigation and water conservancy in promoting increase of grain yield.

1.2 Effectively increase farmers' income There is a large proportion of rural population in China, so in many areas, the income of grain yield is the main source of rural residents' income. Only by increasing output of gain in the rural areas can we effectively increase the income of farmers and promote rural economic development. Increase of grain yield in rural areas is proportional to income increase of rural residents. Only by guaranteeing the infrastructure construction of irrigation and water conservancy effectively can we promote increase of grain yield in rural areas and income increase of rural residents.

1.3 Alleviate the impact of drought on agricultural production Drought and flood wreak enormous havoc on the economic development of rural areas. Impacted by drought and flood in many areas, personal safety and economic development have been seriously affected (Table 1). Strengthening rural infrastructure construction of irrigation and water conservancy, to a certain extent, can enhance the ability of farmland to withstand natural disasters, timely ensure water needed by

farmland and increase agricultural income. Due to stable development of construction of irrigation and water conservancy,

many agricultural areas can properly handle problems and reduce agricultural losses when in the face of disasters.

Table 1 Statistics of flood disaster in China from 2000 to 2009

Year	Flood area		Deaths in disaster//People	Collapsed house	Total direct economic losses// $\times 10^8$ Yuan
	Flood affected area	Damage area			
2000	9 045.01	5 396.03	1 942	112.61	711.63
2001	7 137.78	4 253.39	1 605	43.49	623.03
2002	12 384.21	7 439.01	1 819	146.23	838.00
2003	20 365.70	12 999.80	1 551	245.42	1300.51
2004	7 781.90	4 017.10	1 282	93.31	713.51
2005	14 967.48	8 216.68	1 660	153.29	1 662.20
2006	10 521.86	5 592.42	2 276	105.82	1 332.62
2007	12 548.92	5 969.02	1 230	102.97	1 123.30
2008	8 867.82	4 537.58	633	44.70	955.44
2009	8 748.16	3 795.79	538	55.59	845.96

Note: Data are from Ministry of Water Resources of the People's Republic of China.

1.4 Conduce to the adjustment of agricultural production structure

The infrastructure construction of irrigation and water conservancy provides the farmland use water needed by agricultural planting. Agricultural planting structure will no longer be confined to traditional planting mode, and it has broken away from the restriction of natural conditions and brought unlimited power for agricultural production. Under the condition of sound facilities of irrigation and water conservancy, if we can have certain market, and the sales channels are unrestricted, then we can adjust planting varieties timely in accordance with the situation of agricultural production, which is conducive to agricultural development and adjustment of rural structure, laying foundation for rural economic development.

1.5 Promote county economic development Due to undeveloped technological level of productivity, the development of county economy in many rural areas still relies on agricultural development. The agricultural production has a large proportion in total output value of county economy, and the benefits of agricultural production directly determine the total output value of county economy. Facility of irrigation and water conservancy is the basis of agricultural development, and relying upon infrastructure of irrigation and water conservancy can effectively improve the benefits of agricultural production, and provide basis for the development of county economy to some extent.

2 The difficulties of developing irrigation and water conservancy in new era

Since the founding of new China, China has ceaselessly attached great importance to the development of irrigation and water conservancy. The irrigation and water conservancy in China has played an important role in terms of rural irrigation, farmland disaster disposal and so on. The construction of irrigation and water conservancy has made significant achievements. However, due to some historical factors and impact of the economic system, The irrigation and water conservancy in China still has some problems and shortcomings in the process of development, which seriously affects the development of the irrigation and water conservancy in China, detrimental to construction of new countryside.

2.1 The subject of liabilities defaults seriously China im-

plemented planned economic system before reform and opening up. The responsible main body of irrigation and water conservancy is collective. With the deepening of China's reform and opening up, the development of rural economy accelerates constantly. The appearance of household contract responsibility system makes the original system broken, the responsibility of irrigation and water conservancy unclear, and the phenomenon of subject vacancy more serious. The understandings on responsible main body of irrigation and water conservancy between local government and farmers are not unified, lacking operable laws, regulations and restriction mechanism in practice, resulting in many problems in the process of construction of irrigation and water conservancy such as nonstandard operation. Some local governments only pay attention to the construction of vanity projects in the process of development and local interests, neglecting infrastructure construction of irrigation and water conservancy, which makes the policy of China difficult to be implemented effectively. In terms of farmers, they argue that the construction of irrigation and water conservancy should fall within the sphere of national management, and the enthusiasm for construction of irrigation and water conservancy is short. In addition, there are no effective incentive mechanism and powerful organizational management, making the rural residents show little interests in construction of irrigation and water conservancy. In a certain sense, unclear responsible main body is the greatest problem faced by the current construction of irrigation and water conservancy, and the root cause of other problems.

2.2 It lacks effective input security system Implementation of the rural tax system reform, and establishment and improvement of public financial mechanism are of great significance in reducing farmers' burdens, regulating tax management, and promoting sustainable development of irrigation and water conservancy construction. However, due to the cancellation of the taxes for the moment, as for the source of construction of irrigation and water conservancy, there are no corresponding alternative measures, seriously affecting the development of constructing irrigation and water conservancy. At present, Chinese villagers' system of "one thing, one discussion" has not yet been effectively carried out, and local governments at all levels have not yet formed virtuous input mechanism to-

wards irrigation and water conservancy construction, especially the small-scale irrigation and water conservancy construction. The level of inputs declines year by year, making the gap of fund needed by irrigation and water conservancy construction widen year by year. Meanwhile, the funds needed by irrigation and water conservancy construction are basically the financial expenditure of government. As for developing irrigation and water conservancy by using various types of social capitals, it has not yet formed certain mechanism, and diversified input mechanism, which seriously affects the sustainable development of irrigation and water conservancy construction.

2.3 The quality of project degenerates badly Most of China's irrigation and water conservancy projects are established in the 1960s, long practising the investment policy which focuses on the farmers' inputs, supplemented by appropriate investment policy. As there is a shortage of long-term supporting projects, the standard of construction is low, and the necessary management and maintenance are short, so there is a ubiquitous phenomenon of old-fashioned irrigation and water conservancy facilities in disrepair with malfunction at present, in other words, the overall level of irrigation and water conservancy project declines conspicuously and the efficiency of irrigation and water conservancy project is critically reduced. In many regions, as the irrigation and water conservancy facilities are difficult to play an effective role, the farmland can not get effective irrigation and drainage of stagnant water, and China's grain production can not be effectively ensured. According to the analysis of related statistics, it shows that the serviceability rate of construction of China's large-scale key irrigation project is less than 40%, and ineffective and scrapped construction accounts for 26%. If we do not take relevant and effective measures for irrigation and water conservancy, it will further make irrigation and water conservancy projects deteriorate, and impair agricultural overall production capacity, thereby affecting the national food security and construction of new countryside.

2.4 The agricultural technological development is slow At present, the productivity in China's rural areas is not developed well; the level of agricultural technological promotion and application is low; in terms of irrigation mode, the rural areas still use traditional methods of irrigation, with 0.49 of utilization rate of irrigation water, which not only easily causes a waste of water resources, but also hampers rural economic development. Due to the impact of system, organization and scant funds, comprehensively using drip irrigation, sprinkler irrigation and other technologies is yet to be effectively promoted in rural areas. In addition, the development of agricultural productivity and capacity system of disaster prevention and mitigation need to be effectively improved. Meanwhile, there is a waste of water resources in rural areas. Since most of rural areas have not formed effective cooperative organizations of water use, so this kind of excessively scattered household production and operation mode not only causes waste and destruction of water resources, but also increases cost of water use. Even some rural residents ignore the function of water conservancy facilities, reclaiming and dredging in channels randomly, which pollutes the water resources to some extent, exacerbates the siltation of the channel, and seriously has a impact on the sustainable devel-

opment of irrigation and water conservancy.

3 Corresponding countermeasures and suggestions for irrigation and water conservancy

Construction of irrigation and water conservancy has great significance in the process of China's social development. In the face of problems and difficulties existing in the process of constructing irrigation and water conservancy in China, we should conduct profound understanding on the characteristics of construction of irrigation and water conservancy, conduct careful analysis on the impact of situation in the new era on construction of irrigation and water conservancy, actively guide the construction of irrigation and water conservancy through strong governmental guidance and propulsion, and establish a set of management system and operation mechanism of irrigation and water conservancy suitable for the needs of China's agricultural development on the basis of the requirements of the socialist market economy, so as to promote harmonious development of society.

3.1 Make the input subject of irrigation and water conservancy clear At present, there are many factors impacting the construction of irrigation and water conservancy, and the situation is relatively complex, so we should be based on the actual situation of current development and the perspective of the theory of public finance, to crystallize the input subjects of construction of irrigation and water conservancy. As for the construction of various kinds of farmland irrigation projects, we should crystallize the input subject of government; as for the field projects in irrigation areas, the government and farmers assume the role of input subject jointly. Meanwhile, on the basis of the actual situation of China's current development, we should formulate *Irrigation and Water Conservancy Law* as quickly as possible; improve the construction of related supporting facilities; in terms of legal perspectives, regulate all behaviour main body; establish regulation system construction of irrigation and water conservancy; continuously promote reform and development of irrigation and water conservancy, to ensure the virtuous development of irrigation and water conservancy^[3].

3.2 Form stable investment channels In the process of construction of irrigation and water conservancy, we should effectively increase financial inputs of government, improve the coverage of government inputs, and substantially increase the proportion of government investment, to benefit more rural areas. We should arouse the input enthusiasm of beneficiary, give the decision-making power which needs farmers' investments and labour inputs back to farmers, develop the system of "one thing one discussion" and "one channel one discussion" in rural areas, and provide advice and assistance for the masses when they encounter technical problems in project planning, design, construction management and so on. Social capital is the useful complement to establishing stable investment channel for construction of irrigation and water conservancy. We should constantly absorb various kinds of social capital, form diversified investment mechanism, break the barriers of short supply of irrigation and water conservancy, provide a good in-

vestment environment for construction of irrigation and water conservancy developed by virtue of social capital, and continuously development of irrigation and water conservancy.

3.3 Strengthen the organizing and guiding functions of grass-roots government The construction of irrigation and water conservancy has the characteristics of wide range and commonality. In the process of construction, it is inseparable from the guidance and coordination of the grass-roots government. According to the principle of graded responsibility, we should give full play to the role of grass-roots governmental functions, strengthen the democratic consciousness of the villagers and self-management capacity, and perfect the participation and management of various kinds of cooperative organizations. County government should conscientiously implement the policy of higher-level departments, formulate the planning of construction of irrigation and water conservancy, implement the construction projects of irrigation and water conservancy, and guide and supervise the implementation of construction of irrigation and water conservancy. We should conduct effective supervision and regulation on the implementation effect of functions of grass-roots government at all levels, avoid the vacancy and ineffective behaviours of government, and effectively ensure the smooth development of irrigation and water conservancy.

3.4 Reinforce the coordination and management of capital At present, due to the impact of the planned economic system, the funds management of construction of irrigation and water conservancy in China is scattered, so that the limited fund is difficult to play its due role. Therefore, we must improve the fund management work of construction of irrigation and water conservancy; coordinate and arrange the fund management work of construction of irrigation and water conservancy; standardize the fund management work of construction of irrigation and water conservancy; rationally use funds^[4]. State agencies should conduct effective coordination and division of labour on capital flow, ensure timely provision of all types of funds and effectively play their due role. We should effectively play the role of planning of the construction of irrigation and water conservancy, strengthen the guidance and implementation of construction of irrigation and water conservancy, improve the use of funds for the construction of irrigation and water conservancy according to the content of unified planning and priorities, and effectively guarantee rational use of various kinds of funds.

3.5 Strengthen the promotion of agricultural technology The development of agricultural science and technology is the key to promoting the development of irrigation and water conservancy. In the process of developing irrigation and water conservancy, we should continue the acceleration of agricultural science and technology innovation and promotion efforts; increase inputs construction of agricultural science and technology; promote advanced technologies, such as drip irrigation and sprinkler irrigation; improve water use efficiency; speed up the construction and input of water stations; guide management and maintenance of irrigation and water conservancy; strengthen the link with agricultural research institutes; develop water use mechanism and mode suitable for the water-saving irrigation in local areas; form effective mechanism for agricultural water supply; promote sustainable agricultural development.

Through effective agricultural techniques, we conduct comprehensive management on soil erosion and reclaiming land from lakes, so as to provide reliable ecological environment for China's agricultural development. At the same time, we should strengthen the fostering of agricultural technological talents, improve the level of scientific management, provide support for the construction of irrigation and water conservancy, and promote the development of agriculture^[5].

3.6 Quicken the pace of reform of irrigation and water conservancy The management system and operation mechanism of China's construction of irrigation and water conservancy have made dramatic progress in the process of development, but with social development, the existing management system has been difficult to adapt to the social development needs as time goes by, therefore, we should summarize the experience and results of development of construction of irrigation and water conservancy, conduct careful analysis on existing problems in the process of current development, and put forward pertinent solutions. We should make full use of theories of public management and public finance; on the basis of actual situation of local development, strengthen the survey and research work on construction of irrigation and water conservancy; put forward feasible reform plans; conduct effective regulation on objectives, principles, contents and procedures of reform; make the property rights of irrigation and water conservancy projects clear; encourage the establishment of appropriate water use cooperative organizations; standardize and improve the operation of construction of irrigation and water conservancy; focus on the development of supporting reform measures; make the function fulfilment, assuming responsibility and realization of behaviour functions of the grass-roots government clear; promote further development and perfection of construction of irrigation and water conservancy in China, through combining deepening reform and strengthening management.

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