Research on sewage treatment under PPP mode

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Abstract. With the continuous progress of China's reform and opening-up, China's market economy is becoming more and more perfect, and the scientific and economic level of our country is getting higher and higher, but with the continuous improvement of economic strength, people's awareness of environmental protection is getting stronger and stronger, and the requirements for the living environment are also getting higher and higher. Sewage treatment, which plays an important role in environmental protection, has attracted people's attention. At present, our country mainly treats the sewage produced in production and life through the establishment of sewage treatment plants. PPP mode is a very suitable and popular sewage treatment mode. This paper mainly focuses on the characteristics and concept of PPP mode and the various advantages of using PPP mode to deal with sewage, targeted sewage treatment, reduce water pollution, better achieve the goal of energy-saving and emission reduction, and protect the environment.

Key words: PPP mode; Sewage treatment; Construction and management.

1. Introduction
With the continuous enhancement of China's economic strength, the level of industrial manufacturing and people's living standards are also constantly improving. At the same time, the demand for various types of resources is also increasing, and the damage and pollution to the natural environment are also increasing. The contradiction between social development and environmental protection is becoming increasingly fierce, in this case, we need to put energy into environmental protection and governance, and widely use relevant knowledge and technology in environmental protection work. Using the PPP model to build a sewage treatment plant is one of the better applications. [1,2]

2. The concept of PPP schema
2.1. Basic Concepts of PPP Schema
The so-called PPP model refers to Public-Private-Partnership, which is a relationship model in which the government, for-profit enterprises, and some non-profit organizations cooperate to achieve a certain goal. As early as the eighties of the last century, the British government put forward the concept of PPP,
which meant that the relevant government departments entrusted the construction, operation, and maintenance of some livelihood infrastructure to private enterprises through some agreement-like ways, and then provided the corresponding public goods and public services to the people. Later, due to the excellent maneuverability and adaptability of this model, it has been popularized all over the world and has been developed and improved a lot. The United Nations has also seen the advantages of this model and has given its definition, but at present, various countries and organizations have not reached a consensus on the definition of PPP model, and have not formed a unified concept. However, the PPP model refers to a relationship model in which government departments, private enterprises, and some non-profit organizations cooperate for a common purpose. [3]

2.2. Characteristics of PPP mode
After decades of development, the PPP model has become more mature, and its characteristics are more prominent: first, this model always puts the cooperative project in the main position, from the beginning to the end of the project is completed by the cooperation of government departments, private enterprises, and some non-profit organizations; The second is that this model strictly shares the risks and benefits of the project, and allocates the input according to the affordability and actual situation of the government departments, private enterprises and some non-profit organizations involved in the project; the third is that the cooperative projects all serve the public, produce public goods or provide public services. The fourth is that this model mainly cooperates through agreements, and can make full use of the respective advantages and characteristics of government departments, private enterprises, and some non-profit organizations to improve the efficiency of work and the level of public services. Better sewage treatment. [4]

2.3. Advantages of PPP mode
The reason why the PPP model can be widely used is that it has many advantages. First, in the construction of sewage treatment infrastructure, the use of PPP mode can be very efficient and convenient for financing, solve the capital problem, and the construction speed of sewage treatment facilities will be greatly accelerated. Second, its efficiency is very high, because the partners in the PPP model have for-profit organizations such as private enterprises, which attaches great importance to efficiency, which improves the efficiency of cooperative projects and accelerates the efficiency of sewage treatment. Third, the risk is small and relatively low, because sewage treatment also needs to invest a lot of money, so there will inevitably be all kinds of risks. PPP model, due to the participation of government departments, private enterprises, and some non-profit organizations, can share the risks and greatly enhance the ability to resist risks. [5]

3. The main problems existing in sewage treatment.
With the rapid development of China's economy, the process of urbanization and industrialization is also deepening, the production of domestic and production sewage is also increasing, and the state investment in sewage treatment is also gradually increasing. Although the current sewage treatment work has made some achievements, but also exposed a lot of problems. First, although the funds for investment in sewage treatment are gradually increasing, it is still far from being able to meet the current demand; second, sewage treatment is a kind of public service treatment, and the participants lack motivation during the treatment, which leads to inefficiency. The third is that the management and supervision of sewage treatment are mainly carried out through government departments, which is relatively single and lack of social supervision. Once the supervision of government departments is ineffective, it will cause a lot of problems. [6]

4. Thinking of sewage treatment Plant based on PPP Mode
As the current form of sewage treatment in China and the existing problems are very appropriate to the advantages of PPP mode, the use of PPP model to establish a sewage treatment plant can better and faster sewage treatment and solve the existing problems at this stage. However, in the actual operation,
it is still necessary to choose a reasonable and effective PPP mode according to the actual scale and demand of the sewage treatment plant.

4.1. Application of PPP model in existing sewage treatment plants

At present, most of the existing sewage treatment plants are led by relevant government departments. For those who can treat sewage normally, we can choose different PPP modes according to their scale and shape. Existing sewage treatment facilities can be entrusted to private enterprises for operation, management, and maintenance by signing agreements and contracts. The whole of these sewage treatment facilities are outsourced to private enterprises, and government departments are only responsible for collecting certain funds. The advantage of using this model is that it can greatly improve the efficiency of treatment because private enterprises all need to make a profit, so it will improve the sewage treatment facilities, improve their treatment capacity, and greatly improve the efficiency of treatment. In addition to overall outsourcing, operation and maintenance can only be handed over to the private sector and dominated by government departments. [7]

4.2. Application of PPP Model in New sewage treatment Plant

In addition to those existing sewage treatment plants, the PPP model can also be used for new sewage treatment plants. One is to hand over the construction of the sewage treatment plant to the private enterprise, and once the construction is completed, the rights of operation, management, and maintenance will be returned to the relevant government departments. the government then outsourced it to other private enterprises in the form of long-term contracts to be responsible for day-to-day operation and maintenance. The other is that the construction, maintenance, management and operation of the sewage treatment plant can be handed over to the same or several private enterprises. Within a certain period, private enterprises are responsible for the daily operation of the sewage treatment plant, which can charge the users a prescribed fee. After the expiration of the contract, all the authority of the sewage treatment plant still belongs to the government. This model gives the government better control of sewage treatment plants than sales and semi-permanent forms. Conclusion sewage treatment is a very important part of environmental protection in our country. Reasonable use of PPP model establishment and management can effectively improve the efficiency of sewage treatment and make the environmental protection cause of our country have a better development. [8]

4.3. Risk sharing and performance management

To share the risk of the amount of water treated by the sewage treatment plant, an agreement has been made on the possible situation of insufficient and excessive treatment water. The government pays the sewage treatment service fee to the project company by adopting the return mechanism of feasibility gap subsidy, and the funds come from two parts: user payment and feasibility gap subsidy, in which user payment mainly comes from the sewage treatment fee levied, in the case of the insufficient sewage treatment fee. The government subsidizes the project company with financial funds as a feasibility gap. The designed water handling capacity of this project is less than 10,000 cubic meters per day. combined with the prediction of the feasibility study report and the risk-sharing mechanism, the basic water output is set at 60% of the designed water treatment in the first year of the franchise and 80% in the second year. Three years to the end of the operation period for the design treatment of water. If the actual treated water quantity is less than the annual basic quantity, it will be compensated for the investment recovery and profit of the difference between the basic water quantity and the actual water quantity quality supervision, regardless of the variable operating cost. If the actual treatment capacity exceeds the basic water volume, it will be calculated according to a certain proportion of the unit price of sewage treatment services, which in principle only ensures the recovery of variable operating costs. Performance management is mainly aimed at testing the effluent quality during the operation period to confirm that the project company provides standard sewage treatment services. The county housing and construction bureau entrust testing institutions with testing qualifications to conduct spot checks on the inlet and
effluent quality of the sewage treatment plant by the requirements of the testing standards, and the test data are used as the basis for supervising the production and operation of the sewage treatment plant. [8]

5. Operation suggestion

5.1. About supervision and management
The supervision framework of the project is entrusted by the county government to the Housing and Construction Bureau to sign a franchise agreement between Party An and the project company, and to supervise and manage as a regulatory body, which belongs to the way that the identity of the regulator coincides with that of Party A. This way of supervision can not guarantee the interests of private enterprises in the event of disputes, nor can it effectively control the widespread dishonesty of the government, and professionally can not reach the level of supervision. In terms of supervision, it is suggested that the regulatory department should be independent, form a professional regulatory force, and supervise the government and the project company equally, to ensure the rights and obligations of both sides.

5.2. On the change of ideas
PPP model is a market-oriented management mode of public and private-public services, but can not be regarded as a single means of financing. While introducing social capital, the government should consider the ways of maintaining the attractiveness of investment returns and safeguarding the interests of investors. It should not only correct its attitude of cooperation in the signing of contracts but also strictly abide by the spirit of contracts and implement their respective risks.

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