Intelligent Heating Business Model Based on PPP Mode

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Abstract: Jinping Xi mentioned in China nineteenth National Congress of the Communist Party that we should adhere to the principle of "continuous improvement in the management and application of Internet construction", establish an innovative "comprehensive network management system", promote the "new type of city moving towards the interconnection of all things" and enhance the ability of the government and enterprises to use Internet technology and information technology to carry out work and production and operation on the existing basis. The development of the Internet era has subtly changed the business models of all walks of life. All walks of life have also ushered in spring with the support of the Internet. As a livelihood industry that concerns tens of thousands of people, should heating innovate the traditional PPP model? This is a question worthy of our consideration. If we want to make users the center in the big environment, we should take up data as a powerful tool, use technology as an innovation opportunity, and innovate new business models on the original PPP model. This paper binds the interests of heating enterprises, users and the government, and seeks a business model that can better meet the interests of the three parties on the basis of the original PPP model.

1. Research Status of PPP Mode in China

The PPP mode is an abbreviation of English Public-Private-Partnership. It is a public-private partnership business model, which is used by government and enterprises to build social public infrastructure projects. The government can effectively solve the problem of shortage of funds in the operation of the project. The cooperation between the two parties can effectively reduce the operating cost of the project, improve the efficiency of project construction, and ultimately achieve more favorable results than the expected action of the government or social capital alone.

The development of China's PPP mode has gone through three stages: The period from 1996 to 2003 has witnessed the exploration and exploration stage, the PPP mode was introduced to China in an emerging project. In 1994, under the leadership of the State Planning Commission, BOT pilot projects were carried out successively, including Shenzhen Shajiao B Power Plant, Chengdu No. 6 Water Supply Plant and Guangzhou-Shenzhen Expressway. The projects involved are mostly in the water treatment and transportation industries, while introducing advanced technologies through foreign investment. At this stage, the government did not explicitly propose documents and policies related to the PPP mode, and the government and society are in a state of exploration.

From 2004 to 2013, the PPP mode was vigorously developed. The Ministry of Construction took the lead and officially promulgated and implemented the Management Measures for Municipal Public
Utilities Franchising to introduce the concept of franchising into public utilities. The promulgation prompted the PPP mode to initiate large-scale project practices in areas such as urban sewage treatment, waste treatment, and heating gas.

In 2014, the PPP mode officially entered the standardization stage. The Ministry of Finance fully deployed the promotion of the PPP mode and promulgated a series of policies to promote and standardize the PPP mode. At this stage, the country's promotion and application of the PPP mode has expanded even more than before. In May 2014, the National Development and Reform Commission (NDRC) launched a demonstration project of 80 construction and operation to encourage social capital to participate in it. The project involves not only traditional infrastructure, but also the information infrastructure of the Internet era and clean energy projects under the background of energy conservation and emission reduction the scope and influence of the project continue to expand, not limited to franchising.

2. Status of PPP Cooperation in Heating Field

2.1. Problems in the Field of Heating

According to the Ministry of Housing and Urban-Rural Development, “the winter heating in northern China consumes more than 150 million tons of standard coal per year, accounting for more than 50% of the building energy consumption in the northern region, which is higher than the level of developed countries under the same climatic conditions, and the energy waste is serious.” Under the background of serious waste, the drawbacks of cooperation mode and management mode are highlighted. The government, enterprises and users cannot achieve good cooperation, which leads to many problems in the existing heating field.

The management level of China's heating enterprises is imperfect, the intelligence of heating systems and the level of informationization are low, especially in terms of intelligent control and automatic adjustment. In central heating areas, the amount of heating has always plagued heating companies and government departments, especially the collection of heating data has become a major problem. A large number of heating companies are still plagued by the problem that users' indoor temperature is not easy to collect. Although many heating companies have effectively reduced energy waste by adopting technologies such as climate compensation control, the indoor temperature of users usually still occurs with fluctuations in outdoor temperature and uneven temperature problems exist in different locations and floors. Today, with the flourishing of big data, data has become a necessary and decisive factor for innovation. In addition, the basic investment in the heating field and the poor heating capacity make the residents' experience and satisfaction poor, and the heating company's expenses are difficult to collect, resulting in a vicious circle.

2.2. The use of PPP mode in the heating field

The field of heating, as a field of social welfare for the people, has received the attention of the government. The cooperation in the PPP mode in China's heating sector has increased, and the PPP mode is getting better in the heating field. The Chinese government has successively promulgated franchise documents for public infrastructure projects, including many PPP mode cooperation policies for heating industry. These policies provide support for the introduction of PPP modes for heating projects. On November 30, 2014, there were three heating projects in the 30 PPP demonstration projects announced by the Ministry of Finance. In 2017, with the continuous emergence of the PPP mode and the high attention and support of the state and the government, the scope of the PPP mode in the heating field has been further broadened, and the PPP mode in public buildings and urban construction has also begun to develop. As the global warming warms, countries are beginning to look for cleaner, more energy-efficient sources of energy. China's emphasis on clean energy has pushed the cooperation mode of heating PPP to a higher level. Combining government and social capital to solve project financing problems and reduce financing costs, PPP mode has good development and achievements in the field of heating.
2.3. New trends in the field of heating

With the development of science and technology, the combination of Internet of Things and thermal imbalance system solutions has ushered in a stage of intelligent heating in the heating industry. Intelligent heating is a modern integrated heating solution that integrates heating production output, heating information regulation, pipe network monitoring, pipe network hydraulic analysis and room temperature collection. Unified management of system control, hydraulic information and cloud control platform can realize intelligent heat supply collection, automatic system control and scientific application supervision, thus achieving the ultimate goal of stable heat supply, high efficiency, energy conservation and environmental protection. The emergence of smart heating has solved many problems in the traditional heating industry. However, due to the relatively short time of smart heating, there has not yet been a standardized model among enterprises, government and users, and many heating enterprises have not felt the advantages of smart heating. The traditional PPP mode cooperation in the heating field should also make new changes under this background. With the emergence of intelligent heating facilities and the Internet era, the traditional PPP model can no longer be used well, and the innovation of business model is particularly important at this stage.

3. PPP Business Model under the Trend of Intelligent Heating

3.1. Deep digging of PPP mode in heating field

In the traditional PPP mode that the government participates in and provides financial support for the company's franchise, the government participates more in the perspective of a participant. The company also has a passive attitude to assist the government in realizing the public infrastructure.

![Traditional PPP cooperation mode](image)

**Figure 1.** Traditional PPP cooperation mode

After a large amount of reading literature and research, it was found that the traditional PPP mode only links the enterprise and the government, and does not communicate effectively with the users. The users have no right to speak and choose when they use, but nowadays the consumption structure transformation in the era of users, the pain points, needs and satisfaction of users are the direction we should work hard to solve. Of course, the previous heating technology could not do this, and the emergence of intelligent heating made this all possible from reality. With the emergence of intelligent heating, we are beginning to consider whether there is a new model between the government, enterprises and users to promote the development of the industry. Based on this, the PPP mode should achieve innovation and transform the functions of the government and the company. The government began to change from a participant to a supervisor. The company also actively participated in the active implementation. Not only that, but users should also become an indispensable part. The role of users is not only to meet their own needs, but also to help enterprises promote the transformation and development of enterprises.

3.2. Construction of PPP mode model in heating field

The innovative concept of the PPP mode is to establish a community of government, enterprises and users, with the government as the bridge, the users as the center, the data as the core, and the intelligent heating technology as the driving force, to create an innovative business model, so that all the three parties can gain benefits.
Among them, the government gives enterprises franchise and financial support, and the company provides high-quality infrastructure with the support of intelligent heating technology. At the same time, the government and the participants turn into supervisors and promote the transformation of government functions. The government's connection with users promotes the development of social infrastructure and benefits users. Meanwhile, users will have a sense of identity and trust in the government, which will help the government to establish an image. Enterprises and users must be closely connected. Enterprises provide better products and services for users under the intelligent heating based on Internet of Things, reduce users’ resource waste, realize personalized customization and intelligent services, and help users reduce heating costs. The user's use of intelligent heating helps enterprises collect heating data, reduce energy waste in corporation, help enterprises improve management capabilities in the form of data, enhance corporate profitability, respond to national policies, and become a low-carbon industry.

4. Conclusion
The innovative interests of the PPP mode have many advantages. For the benefit of the government, accelerating the heating reform is conducive to promoting the change of government functions and transforming the government from the participants to the supervisors, which is conducive to the deepening of the state-owned economic reform. Improve people's livelihood, organically link public service and build a harmonious society, bring more social welfare to citizens, enhance citizens' trust in the government, play a positive role in the construction of a harmonious society, and help the government better implement the Scientific Development Concept. For users, personalization, cut down heating waste, reduce heating costs, and lessen complaints to relevant corporate departments. For enterprises, to promote heating company reform, improve enterprise management system, enhance profitability, enterprises reasonably design network management balance system, obtain user heating data, reduce enterprise heating waste, improve heating quality, and build green low-carbon enterprises.

5. Suggestions
The PPP mode has a realistic meaning in the field of heating innovation. If used properly, it will reduce many of the drawbacks of the traditional model. However, the innovation of business model requires time and market inspection. It is not a simple matter to realize the innovation of traditional PPP mode in the heating field. To achieve this, it requires the relevant enterprises to have strong capabilities, and it is difficult for small enterprises to do so. Especially in today's smart heating facilities are not very popular, it is still difficult to reach this height.

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