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Exploration and Consideration on Realization Path of Digital Transformation of Water Supply Enterprises in China

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Abstract: Based on the development experience of digital transformation of water supply enterprises in developed countries, this paper puts forward the problems faced by China's water supply enterprises on the road of digital transformation, combined with the case of digital transformation of the water industry in some of China's domestic advanced regions, the road of digital transformation of China's water supply enterprises puts forward operational suggestions and countermeasures and hopes that the enterprise can successfully achieve digital transformation through continuous accumulation and step-by-step progress.

1. Introduction

With the release of a series of policies such as "Digital China," "Intelligent Water," and "14th Five-Year Plan", China's informatization has entered a new stage of accelerated digitalization and the construction of Digital China. The rapid development of digitalization is a general trend, and it has become a common trend to guide management by digital means. Digital transformation of water supply enterprises is both a challenge and an opportunity, but domestic water supply enterprises are still generally in the digital transformation of the exploration stage; on how to achieve the digital transformation of enterprises, there are many confusions, such as the seemingly intelligent platform and can not directly solve the business problems, digital platforms developed at great expense but used only to present data. At the same time, the need for more talent is also a common pain point domestic water supply enterprises face. Due to the lack of composite talents who understand both digital technology and water supply business, it is difficult for water supply enterprises to carry out in-depth excavation of existing data and innovative development of new business models. Based on the development experience of digital transformation in the international water industry, this study, combined with the existing development experience, puts forward operable suggestions on the realization path of the digital transformation of China's water supply enterprises to provide a reference for the digital transformation of domestic water supply enterprises.

2. Digital transformation practices in the world's water supply companies

Since entering the 21st century, the world's water supply companies have generally started the digital water transformation journey, and some domestic and international water supply companies

representing international leaders have made cutting-edge progress in the top-level design of digital transformation, the mastery and application of cutting-edge digital technologies, and the deep integration of digital technologies and business. In 2019, the International Water Association (IWA) released a digital water white paper report, Digital Water: Industry Leaders Chart the Transformation Journey, which noted that many of the companies surveyed have already begun digital water transformation, with early-stage water companies focusing on deploying software platforms, Early-stage water companies are focusing on deploying software platforms, new sensors, and smart meters. The more digitally advanced companies are moving towards intelligent solutions using VR, big data, and AI technologies. In contrast, advanced companies such as AGSWater in Portugal have begun to provide services and support to external water companies. Over the past two decades, China's water sector has developed rapidly and has achieved remarkable results. On July 2, 2020, Global Water Intelligence (GWI) conducted a ranking of the competitiveness of the global water industry, and China came in 13th place.[1]

2.1 Digital Transformation Cases of Foreign Water Supply Enterprises

Overseas countries, especially developed countries, pay more attention to the digital transformation of water supply than at home, combining digital optimization technologies with the construction of water management systems to achieve a perfect management model.

Singapore has a plan for future water management and digital reforms to create a unified and efficient water management system. This system optimizes all aspects of water source monitoring, drinking water production, and delivery for unified management.

The Tokyo Metropolitan Government has proposed a long-term strategic vision for water supply (2020) based on the three guiding principles of "stable water supply," "improved response to earthquakes," and "good-tasting tap water," as well as the concept of deep integration of digital technology and applications. The Tokyo Metropolitan Government has formulated a long-term strategic vision for water services development (2020) based on the deep integration of digital technology and application scenarios. The Tokyo Metropolitan Government plans to build a digital water system that covers critical services such as water supply monitoring, energy optimization, emergency water supply, and water quality management.

The EU's Smart Water project not only looks at technologies in water supply systems, such as real-time online hydraulic modeling but also analyses water demand by customers, deriving data on different types of water use and obtaining information on trends in water consumption and other information to improve the accuracy and flexibility of water tariffs and billing services. The project exemplifies an essential feature of the digitalization phase of using data assets to enhance services and add value to users. [2]

The above case reflects the exploration and effectiveness of international advanced water groups in digitalization planning, concepts, and practice, which is worth understanding, studying, and learning from for domestic water supply enterprises.

2.2 Digital Transformation Cases of Foreign Water Supply Enterprises

2.2.1 Chongqing Water Group's Exploration of Big Data Technology

Chongqing Water Group is a state-controlled professional water-listed company with a complete industrial chain. In recent years, Chongqing Water Group has attached importance to constructing intelligent water services and digital transformation. In 2019, it invested over 38 million in cooperation with Alibaba Group to build a smart water big data center. It plans to apply it in areas such as intelligent customer service, intelligent scheduling, decision-making assistance, and fault

diagnosis.

2.2.2 Digital Transformation Practice of Shenzhen Water Group

With the goal of "building the most trusted integrated environmental water service provider," Shenzhen Water Group has built a water digitalization system under the Deepwater brand and is committed to becoming a leader in water digitalization in China. In recent years, they have been focusing on the Group's development strategy, focusing on safety operation, quality enhancement, and environmental improvement, building a digital operation and management foundation for the Group, integrating digital core technologies, improving business processes, innovating operation modes, assisting in the upgrading of the water industry, constructing an intelligent water ecosystem, and realizing the Group's high-quality development.

2.2.3 The Zhejiang model

Zhejiang Province has started a new digital journey through the Regional Conference on Digital Reform, which clarified the significance and salient points of digital reform and put forward crucial tasks such as accelerating the construction of the "1+5+2" working system. Zhejiang will use its data resources and unique technical advantages to actively participate in constructing an intelligent public data platform. At the same time, the Zhejiang Provincial Water Resources Department has undertaken critical tasks related to the digital water economic reform. Firstly, it emphasizes further improving the understanding of digital reform and gradually forming the concept of water resources digitalization. The second is to strengthen the ability to generalize and improve, based on the existing foundation, combined with the needs of the water economy, to strengthen the theoretical and institutional research, to systematically and normatively promote the reform of digital water protection, and to strive to upgrade the practical results of the digital transformation of water into theoretical and institutional results. Thirdly, there should be relevant application scenarios, mainly focusing on the core management of water affairs, giving full play to the role of water protection, focusing on promoting the construction of platforms such as the digital flood control system and the watershed management system, improving the comprehensive utilization rate, and ensuring the advancement of technology and the high efficiency of actions. [3]

3. Difficulties in the digital transformation of Chinese water supply companies

3.1 Lack of top-level planning

Uncertainty in the development direction and path of water supply enterprises and the lack of top-level design have led to system construction deviating from the strategic objectives of enterprise development, resulting in relatively dispersed and fragmented application systems and restricting the efficiency of enterprise digital transformation.

3.2 Inadequate capacity to apply digital technologies

The traditional water industry is backward regarding operation level and process management, which means the industrial automation foundation in the water supply field needs to be stronger, and the production efficiency of water plants needs to be higher. Enterprises need to be faster in developing data, standardization, and refinement and have low levels of public security capacity, emergency response capacity, operating costs, and energy conservation. Most enterprises have to optimize their human, financial, material, and personnel management processes, and their efficiency needs improvement.

3.3 Low adoption of new technologies

Most water supply enterprises are still in the primary stage of informatization, with low levels of use of new-generation ICT technologies, digital resource mining, intelligent production operations and management, and low levels of digital technology-enabled business.

4. Ideas for the digital transformation of Chinese water supply companies

China needs water supply companies that have completed the digital transformation. Therefore, there are no cases to learn from, resulting in many water supply companies needing to learn how to work in this area.

4.1 Point push based on business scenario building and application

Point-like promotion means actively promoting the construction of digital application scenarios at the grassroots level. In the digitalization phase, data will become an enterprise asset that can be useful internally and externally. Internally, digitalization drives the improvement of enterprise efficiency, i.e., gains through the enhancement of employees' digital capabilities; externally, digitalization drives the increase of enterprise and user value, i.e., the use of data assets to provide more new products or business models to users, so that the enterprise and the user can gain benefits. We need to realize the value of data through digital applications. Therefore, the development of digital applications should also be driven by both internal and external aspects, with the core driver of internal application scenarios being the revenue of the enterprise and the core driver of external application scenarios being the users' revenue.

Internal digital application scenarios can be prioritized from the field operations to start promoting the field operations because the field operations of water supply enterprises often consume more human resources. Using digital means can effectively enhance the ability of employees to reduce workforce inputs, improve the efficiency of field operations and management, and generate benefits. For example, in the past, transcribing water meter data and issuing bills had to be done manually, with high labor costs. After installing the NB-IoT intelligent water meter, it can automatically read the data and send it to the back office. By installing NB-IoT intelligent water meters, companies can access water meter data in real time and analyze users' water consumption to detect anomalies promptly. After opening the electronic billing function, it can save labor costs for the company. In addition, valve inspection, water tank cleaning, and other links can be digitized to improve the efficiency of workers, thereby improving the company's management capabilities.

The user can prioritize external digital application scenarios to provide business processing convenience and start promoting them so the user can save time and investment in business processing. For example, in the payment process, users used to need to go to the bank for card debit procedures or make on-site payments at toll outlets and business halls, which would consume more transport and time costs. By providing users with online payment means such as Alipay or WeChat, users' convenience in the payment link can be increased, bringing benefits to users. In addition, through the development and application of tools such as online business halls and intelligent cloud call platforms, it is possible to facilitate the handling of business by users, reduce hotline waiting time, and improve user satisfaction.

With the above principles, water supply enterprises can think deeply about enterprise operation and management characteristics, closely combined with business needs, to find the vitality of the digital application scenarios. The more successful application scenarios are, the more solid the foundation of digital transformation; through many digital application scenario constructions, you can continue accumulating digital transformation experience for the enterprise and digital

transformation work to achieve quantitative to qualitative change.

For example, water supply enterprises can use digital technology to empower the management of pumping stations, water supply intelligent pumping station management systems integrated use of GIS, VR, automation control, cloud computing, and other technological means, the whole process of water supply data and information generated by the integrated management, analysis, mining and comprehensive use of water supply operation and management to provide the appropriate functions and services to support the realization of the whole process of real-time monitoring of water supply, water supply equipment, the entire life cycle management, user water service tracking. It achieves real-time monitoring of the whole process of water supply, total life cycle management of water supply equipment, and complete monitoring of water service for users to achieve safe and high-quality pressurized water supply, effectively reduce the cost of pressurized water supply operation, save workforce, and improve work efficiency and management level.

4.2 Line drive based on business process reengineering and optimization

With the continuous accumulation of digital application scenarios, water supply enterprises can consider reengineering and optimizing the original business processes and organizational structure to enhance efficiency and create value, a step called "linear promotion." By optimizing business processes, companies can save a lot of human and material resources in each business process and improve operational efficiency. And this change in operational efficiency can be effectively observed. After business process optimization, enterprises can assess the effects of various digital transformation initiatives and make timely adjustments and optimizations. Therefore, business process optimization is influential in promoting digital transformation efforts.

The value of business process optimization for enterprises can also be reflected in the internal and external aspects. Unlike point promotion through business scenarios, line promotion through process optimization focuses more on deleting and optimizing internal processes or aggregating specific business scenarios that have commonalities to change the organizational structure, further improve internal efficiency, or increase external customer value.

Taking Shanghai's version 4.0 program to optimize the business environment as an example, after opening the city's unified service platform, water supply companies have optimized the water application process and shortened the time for water connection from 20 days to 6 days. This initiative dramatically saves users' water connection time, optimizes the business environment, and greatly benefits users and society.

4.3 Faceted promotion based on new business model innovations for digitalization

Through the guidance of top-level design, based on selecting technology routes and reserving digital talents, water supply enterprises can carry out digital construction in some more enormous scope, deeper degree, and higher level to promote the change of operation mode and further enhance the business efficiency, which can be called face-to-face promotion.

Faceted promotion focuses more on internal systematic efficiency improvement or face-the-user business model innovation. Faceted promotion requires relatively higher conditions and requirements; generally speaking, it needs the deep involvement of the top management of the enterprise in the transformation vision, transformation direction, the choice of technology routes, and technical personnel to ensure that the guarantee of capital investment and other aspects of solid support. However, once the implementation is successful, face-to-face promotion's impact on improving enterprise efficiency or increasing user value will be more extensive, long-lasting, and far-reaching. At the same time, the success of this face-to-face promotion will give rise to more new digital application scenarios and business process optimization, forming a virtuous circle and

continuously and repeatedly promoting the enterprise's digital transformation. [2]

The cultivation of digital awareness and the accumulation of digital experience at the top level of the enterprise are also essential for the enterprise to promote digital transformation. Therefore, the top level of the enterprise should also continuously strengthen the learning and accumulation of digital knowledge.

5. Conclusions

Digital transformation of water supply enterprises is a crucial part of the layout of digital China and is one of the keys to determining people's living standards. Digital transformation is both a challenge and an opportunity. Water supply enterprises should take the initiative to learn cutting-edge technology, think about the value and significance of digital transformation, and actively promote digital transformation work to improve the efficiency of business operations.

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