Research on the Contribution of Digital Economy to the Development of Western Industrial Zone in Beijing

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Abstract: With the continuous development of the economy and technological innovation, the digital economy has become a global hot topic. Digital government, digital society, and digital governance have laid a solid foundation for the vigorous development of the digital economy. The combination of urban traditional industry and digital economy has become a far-reaching strategy. The digital economy does not exist independently of the traditional industrial economy. The future of traditional economy is bound to move towards digitization, networking, and intelligence. This article points out that there are still difficulties in transformation in the industrial zones in Shijingshan District, Fengtai District, Mentougou District, Fangshan District, and other areas. This article is divided into four parts: An overview of the development of western Beijing; The current status of digital economy development; the impact of digital economy on the development level of Beijing's western industrial zone, and How to grasp the development trend of digital economy.

Keywords: western region of Beijing; digital Economy; old industrial area; transformation

1. Introduction

In today's era, the digital economy, as a new force, economy, and industry, has triggered overall social and economic changes. In terms of traditional industries, the digital economy is constantly infiltrating, forming industrial digitization; In terms of infrastructure, the development and growth of 5G networks, big data centers, and industrial internet have led to the formation of digital industrialization. The digital economy has the important characteristics of rapid development and wide coverage, gradually becoming a key force in changing the world competitive landscape. The western region of Beijing, including Shijingshan District, Fengtai District, Mentougou District, and Fangshan District, used traditional industries such as coal mining and steel as pillar industries. In recent years, the old industrial zones mentioned above have problems of high energy consumption, high costs, and low efficiency. The digital economy is catering to the development needs of post industrialization in the western region of Beijing Industrial Zone. Adapt to the situation, transform and develop. This article is divided into four parts: An overview of the economic development in western Beijing; The current status of digital economy development. The impact of digital economy on the level of economic development in western Beijing, and How to seize the opportunities for digital economy development. Intended to promote industrial transformation in the western region of Beijing.

2. Literature review

With the continuous development of the digital economy and the continuous popularization of digitalization, digitalization has entered every aspect of life. Under the requirements of green and sustainable development, many old industrial zones need to keep up with the times and transform in conjunction with the digital economy. Various studies have conducted extensive analysis on the current situation, approaches, significance, and shortcomings of the development of the digital economy and its assistance in the development of old industrial zones.

The revitalization and development of old industrial zones is a major issue that urgently needs to be addressed. How to make the traditional industries in old industrial areas adapt to the times and regain vitality? Ren. And Zhu. Conducted research on the high-quality development transformation and policy adjustment of China's regional economy in the new era in 2021. Pointing out that the direction of high-quality regional economic policy adjustment in the new era lies in esflishing a gradient and hierarchical regional innovation system. The key is to improve the supply quality of regional integrated public services and strengthen the regional linkage mechanism of internal and external connectivity. [1] In 2022, Shi. And Zhu. Analyzed the characteristics and trends of global industrial digital transformation and development. Pointing out that Chinese industry needs to implement the construction of digital information infrastructure, enhance the innovation and radiation capabilities of core technologies. [2] In the same year, Chao. Conducted research on empowering high-quality economic development under the new situation of deep integration of digital economy and real economy. Through data analysis, it is pointed out that the service industry and industry are the fastest growing areas of industrial digitization, and the transformation of agriculture still needs to be further deepened. [3] In 2023, Fu. And Pan. used

entropy method, benchmark regression, mediation effect test, and heterogeneity test to point out that the digital economy can effectively empower the high-quality development of tourism in the western region.[4] Cao., Guo. and Li. used 478 A-share high-tech listed companies from 35 cities in China as samples and conducted empirical testing using a multi-layer linear model. Concluding that the digital economy has a significant positive impact on the innovation of business models in technology-based enterprises. [5] Yue., Tan. And Zhou. Explores the impact mechanism of digital economy on resource allocation efficiency from the perspective of factor flow based on provincial panel data in China. [6] Li. selected panel data from 215 prefecture level cities in China from 2012 to 2021. Using methods such as B&K and spatial Durbin model to analyze the internal logical relationships between digital economy, government support, regional economic resilience, and high-quality urban development.[7] Zhang. Utilized the theory of independent digital property rights advantages, combined with the distinct national strategic characteristics of core digital technologies, to propose suggestions for independent development models. [8] Hou. And Bai. Constructed a regional digital economy development level measurement system based on data from 30 provinces in China from 2013 to 2023. Founding that the impact of digital economy on carbon emissions has a significant environmental regulatory threshold effect.[9] Based on panel data from the Yangtze River Delta and Pearl River Delta urban agglomerations from 2011 to 2019, Lin. and Meng. explored the internal mechanism and spatial impact mechanism of the construction of new digital.[10] Li. used non-financial A-share listed companies in China from 2015 to 2021 as research samples to draw the conclusion that digital transformation of enterprises has a significant positive impact on enhancing enterprise value.[11] Qiao.[12] used the SYS-GMM model and based on panel data from 30 provinces from 2010 to 2021, found that industrial policies, human capital structure, and technological level have moderating effect on the impact of digital economy on the modernization of China's industrial chain.

In 2020, Hu Xiaohui, Zhu Shengjun, and Robert Hassink combined the multi-level perspective in the study of the transformation of old industrial zones, providing a multi-scale analytical framework with dialectical explanatory power of upper and lower causality.[13] Yan., Huang. Yang. And Jing. take the old industrial zone in Jianxi as an example, and from the perspective of collective memory, conduct beneficial explorations on the renewal and transformation of old industrial zones that promote industrial transformation.[14] Hu., Mao., and Zhou. Used the framework of event system theory to analyze the historical evolution, practical logic, and theoretical logic of China's industrial digital transformation. [15] Research has found that China's industrial digital transformation has undergone a strategic shift from informationization as the core to intelligence as the core.

By reading the above literature, this article studies the current situation of the development of digital economy in the old industrial zones in western Beijing. Pointing out the necessity of integrating the development of digital economy in the old industrial zones.

3. Overview of Economic Development in Western Beijing

Shijingshan District, Mentougou District, and Fangshan District are located in the western region of Beijing, and have always regarded heavy industry as the regional pillar industry. The century long history of steel and the millennium long history of coal mining are also common memories of the people of western Beijing. Taking Shijingshan as an example, the "Eight Great Factories in the West of Beijing" are eight industrial enterprises, including Shoutai Special Steel, Bawei Beiguo, Beizhong, and Jingneng Thermal Power. The total land area is 1037.2 hectares, accounting for 19.6% of the total construction land area in Shijingshan. The construction scale is 8.826 million square meters, and it is the pillar industry of Shijingshan. Since the closure of coal mines in 2015, the old industrial zone in western Beijing has gradually declined and urgently needs transformation and upgrading for high-quality development. There are significant differences in economic development among different districts in Beijing. As of 2022, the GDP of Haidian District is 1.2 trillion yuan, and the core industries of the digital economy in Haidian District account for 52.7% of the overall GDP of Haidian District. The GDP of Shijingshan District, Mentougou District, and Fangshan District in the western region of Beijing is 98 billion, 27.21 billion, and 86.09 billion, respectively. Among them, the value-added of digital economy in Mentougou District only accounts for less than 30% of the gross domestic product. This gap fully demonstrates that regions that develop the digital economy and innovate high-tech enterprises have a far leading advantage in GDP.
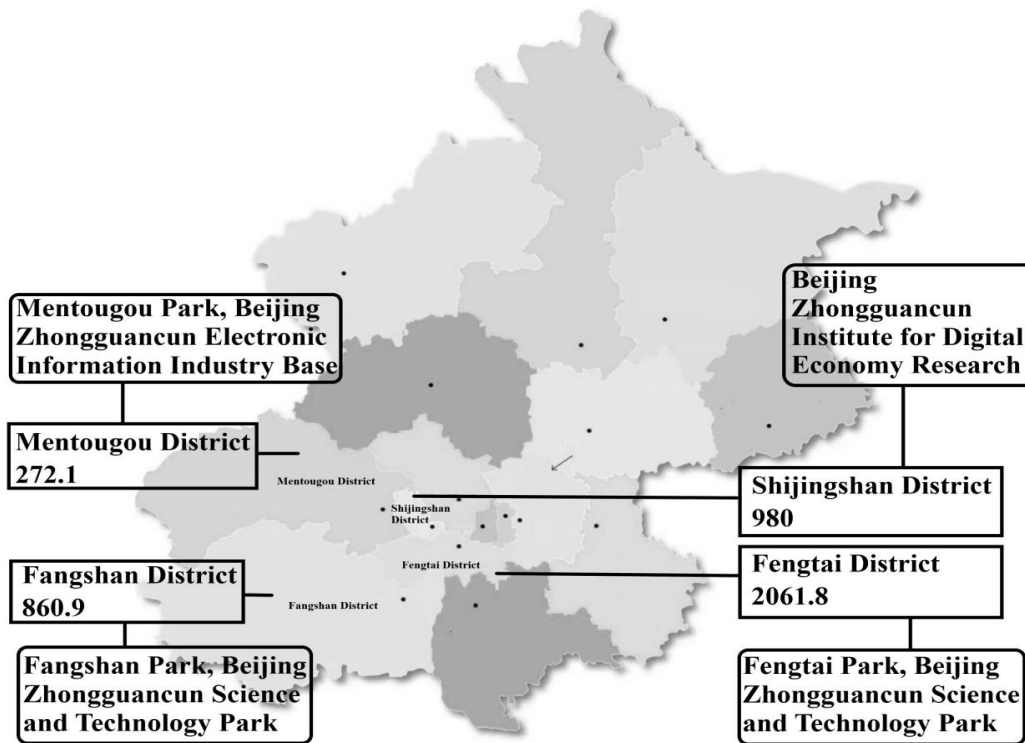
Figure 1. GDP Units (100 million) and Main Parks in Western Beijing in 2022

Although the development of the western region of Beijing is relatively backward among Beijing, with the growth of the economic environment, industrial parks have been gradually established in each district. The Mentougou Zhongguancun Electronic Information Technology Park; Fangshan Zhongguancun Science and Technology Park; Shijingshan Zhongguancun Science and Technology Park; Shougang Park; Fengtai Zhongguancun Science and Technology Park are shown in the figure 1. The western region of Beijing is influenced by Zhongguancun in Haidian, and relies on it to establish characteristic parks, invest funds and personnel, and focus on the transformation and development of traditional industries.
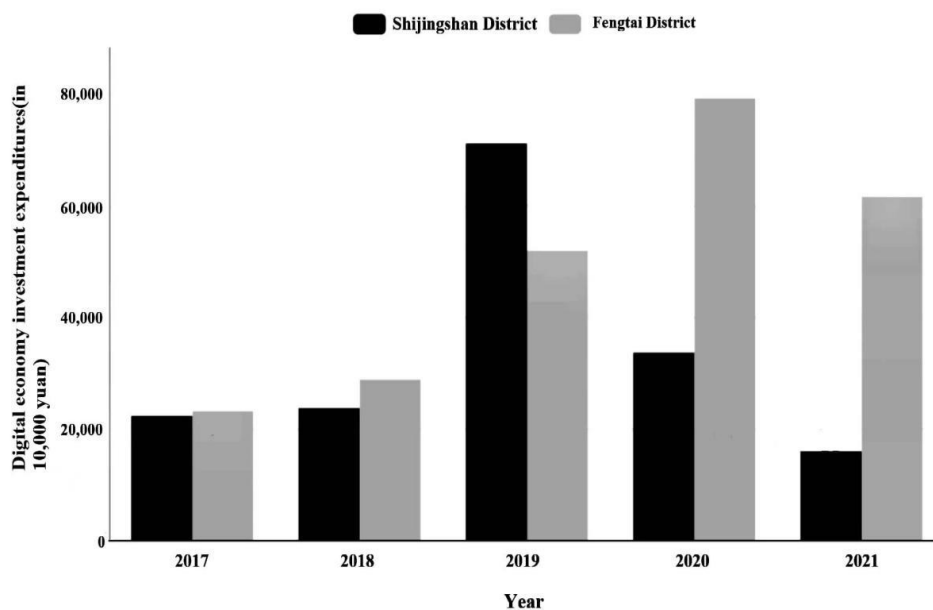

Figure 2. Research and Experimental Development (R&D) Funds for Information Transmission, Software, and Information Technology Services in Shijingshan and Fengtai Districts

As shown in the figure 2. From 2017 to 2022, R&D funding for large-scale information transmission, software, and information technology service industries in Beijing is showing an increasing trend year by year. The continuously increasing funding investment can demonstrate the government's confidence in developing

the digital economy. At the end of 2019, affected by the COVID-19, the funding of Shijingshan District and Fengtai District decreased. However, with the successful hosting of the Winter Olympics and the Trade Fair in Shijingshan District, the economic potential of Shijingshan District is endless and the development situation is bright. Old industrial zone in Shougang Park

seized the opportunity to become a landmark, in line with the digital economy situation, and added the Zhongguancun Science Fiction Industry Center. Enterprises settle in the park to debug intelligent devices, and the digital economy attracts the agglomeration of science fiction industries.
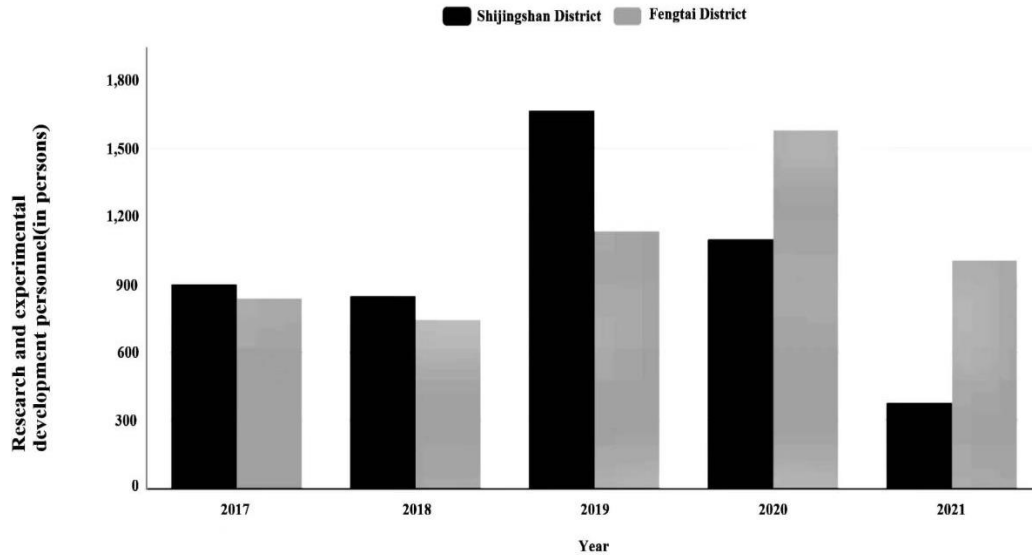
Figure 3. Number of personnel engaged in research and experimental development (R&D) of information transmission, software, and information technology service industries in Shijingshan and Fengtai districts

As shown in the figure 3. It can be seen that in 2019, Shijingshan District had the highest investment in funds, with the highest number of people engaged in information technology. In 2020, Fengtai District had the highest investment in funds, and the number of people engaged in information technology also reached a new five-year high. The financial investment of the district government is an important factor affecting employees. Increasing investment in the digital economy and attracting more talents to work is important means to achieve the transformation of the old industrial zone in the western region of Beijing towards the digital economy.

4. Current Status of Digital Economy Development

From a macro perspective, the scale of China's digital economy has developed steadily. In 2022, the value-added of Beijing's digital economy has reached 1625.19 billion yuan, with rapid growth within five years. The digital economy has significantly exceeded the GDP growth rate of the same period for several consecutive years, accounting for over 40% of GDP, which is equivalent to the proportion of China's secondary industry in GDP.
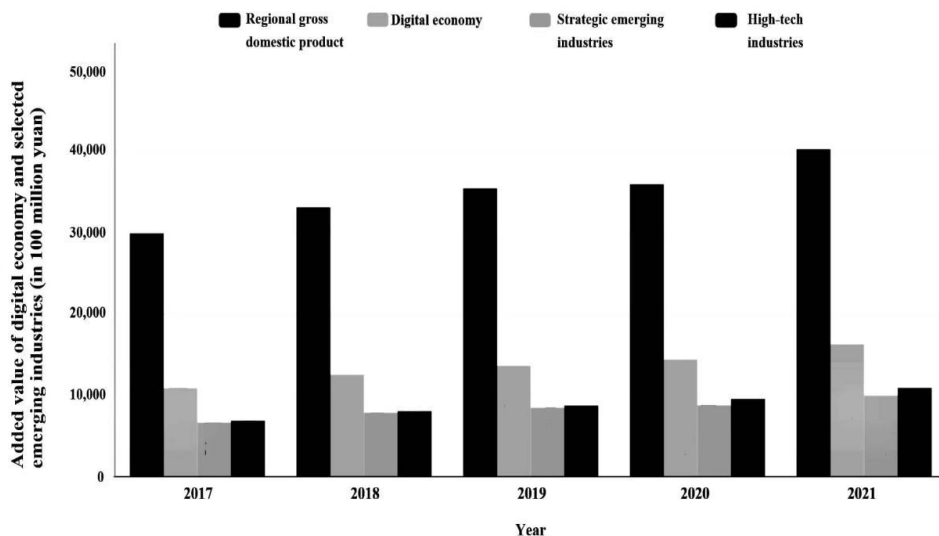
Figure 4. Beijing's digital economy and added value of some emerging industries

From the figure 4, it can be seen that the digital economy has the highest value-added and growth rate. It can be seen that Beijing's overall emphasis on the digital economy is increasing, promoting the rapid development of the digital economy. In terms of the development of western Beijing, Beijing Government urged Shougang Group and Jingneng Group to play a coordinating role as the main body. Leading the way towards the digital economy era and developing towards high-end, green, and digital directions. Shijingshan District, with Shougang Park as the core of digital economy development, deeply cultivated virtual reality, industrial Internet, and built characteristic parks including industrial Internet industrial park, virtual reality industrial park, and so on. The Winter Olympics, the Service Trade Fair, and the new landmark, as the three characteristics of Shijingshan District, have gradually made Shijingshan a key area of Chinese culture. The industries in the New Shougang area are constantly upgrading, developing industries such as creative design and digital trade, and supporting the continuous development of Beijing's science fiction industry. Utilizing technological resources such as Zhongguancun to create high-end industries and occupy innovation highlands, Shijingshan District has built a digital economy foundation and a bright development trend.

The construction of Zhongguancun Artificial Intelligence Technology Park is in full swing in Mentougou District, focusing on the fields of medical equipment, artificial intelligence, and digital audiovisual technology. Mentougou District is strengthening the cultivation and introduction of high-end industries, and accelerating the cluster cultivation of medical devices. Mentougou has been listed as a key layout park for the artificial intelligence industry in Beijing. Building an independent and controllable domestic computing power cluster, adapting to the digital economy situation, and echoing China's computing power network. The strategic concept of "Jingxi Smart Valley" aims to cover various industries such as healthcare, manufacturing, finance, transportation, etc., and facilitate the lives of the general public with the digital economy.

5. The Impact of Digital Economy on the Development Level of Beijing Western Industrial Zone

The digital economy has played an indispensable role in accelerating the development of the Jingxi Industrial Zone. As Figure 5, the digital economy has provided comprehensive and multi-faceted support for the economic advancement of the Jingxi Industrial Zone.

Figure 5. The Impact of Digital Economy on the Economic Development Level of Western Beijing

In terms of boosting economic capabilities, the investment in the digital industry in Jingxi has been increasing year by year, fostering the growth of emerging enterprises such as artificial intelligence. The action plan

for the digital industry in Jingxi was swiftly launched in 2022, successfully accomplishing the Winter Olympics and the China International Fair for Trade in Services (CIFTIS). Eighty transformation tasks have been completed, with a cumulative investment exceeding 22 billion yuan. Taking "Jingxi Smart Valley" in Mentougou as an example. They have established a talent development program in the field of artificial intelligence and increased financial investment accordingly. They have collaborated with Zhongguancun Development Group to establish a 1.01 billion yuan fund for artificial intelligence, fostering numerous high-caliber digital talents and enterprises. In the future, the Mentougou District government will focus on the coordinated development of the Beijing-Tianjin-Hebei region. Diversify its development toward application-oriented approaches, and improve the ecosystem of artificial intelligence. By the end of 2030, the AI industry output in Mentougou is projected to reach 40 billion yuan. At least four AI companies are expected to go public, and 20 specialized AI enterprises will be established. Jingxi Smart Valley will become a prominent industrial park for AI, a base for nurturing innovative technology talents, leading the digitized industry in Jingxi to a world-class level.

In improving industrial upgrading in Jingxi, the digital economy is driving the digital transformation of traditional industrial zones. The development goal of the "Jingxi Plan" issued by Beijing Municipality. It is to revitalize the old Shougang Industrial Park, leveraging the opportunities presented by the Winter Olympics and the China International Fair for Trade in Services to facilitate industrial transformation and upgrading. The plan has transformed the former industrial steel furnaces into the world's first industrial heritage site using AR and VR technologies. Allowing people to experience the historical steel production process while experiencing the novelty brought by technological development. Attracting more tourists to visit and turning "Shougang Park" into a popular "internet celebrity check-in" destination. Over the past five years, the digital industry in the Jingxi area has experienced rapid development. Cloud computing, which was primarily aimed at large enterprises, has been popularized among small and medium-sized enterprises by 2022. Cloud computing utilization rate of over 80% for small and medium-sized enterprises and a government cloud service utilization rate of nearly 90%. The number of big data centers has significantly increased, with centers mainly located in Tongzhou and Shunyi, evolving from a few individual data centers in 2018. Industrial Internet, previously limited to frontline enterprises in 2018, has been popularized among small and medium-sized enterprises by 2022. Industrial Internet application rate exceeding 60% for such enterprises and a significant improvement in the level of intelligent manufacturing. The digital content industry, initially in its nascent stage, has developed into a cluster primarily focused on gaming, animation, and online education, with annual sales exceeding 100 billion yuan. Digital financial services have extended from primarily serving corporate clients to encompassing personal terminals, covering urban

households. Alipay and WeChat Pay account for over 90% of the transaction volume.

Overall, over the past five years, the digital industry in the Jingxi area has witnessed significant improvements in coverage, depth, and breadth. The industrial structure has also been continuously optimized and upgraded.

In enhancing technological innovation capabilities, the digital economy has propelled green development, facilitating sustainable growth. The development of the digital economy in the Jingxi area has played a crucial role in promoting collaboration between research institutions and businesses. As well as facilitating the transformation and application of technological achievements in Jingxi. In 2022, Fengtai District comprehensively promoted smart grids and energy monitoring systems, achieving full-process monitoring and management of the power grid and energy. By optimizing energy dispatch through big data analysis, the matching of supply and demand was improved by over 10%. Support was provided to key enterprises for conducting smart energy audits, leading to annual electricity savings of over 100 million kilowatt-hours in multiple companies, resulting in significant energy conservation. In the same year, Fengtai District completed the construction of intelligent traffic signal lights and vehicle recognition systems in the main urban area, effectively reducing traffic congestion time by over 10%. Support was extended to three companies to develop intelligent bus and taxi applications, resulting in a 5% and 10% increase in the utilization rates of buses and taxis, respectively. Ten companies were supported in implementing Industry 4.0 transformation. Three companies achieving an annual reduction in energy consumption of over one million kilowatt-hours and two companies reducing wastewater discharge by 10%. The establishment of a district-level industrial big data sharing platform has facilitated the advancement of intelligent manufacturing. These measures have all been enabled by the digital economy, effectively integrating urban functions, reducing pollution and energy waste, promoting green economic development, and achieving sustainability.

In terms of improving the employment environment, Shijingshan District has focused on technological innovation and the digital economy, continuously expanding its market. In 2022, the district government increased financial investment in the Jingxi area, leading to the establishment of more than twenty enterprises in Jingxi. According to the Beijing Statistical Yearbook published by the Beijing Municipal Bureau of Statistics. Under the influence of the digital economy, the per capita disposable income in Shijingshan District has been increasing year by year, indicating an overall upward trend in social consumption capacity. The rapid development of the digital economy, the transformation of old industrial areas, and the increase in the number of emerging enterprises have attracted favor from numerous professional talents. The progress of enterprises has further stimulated consumption, increased residents' income, and significantly improved residents' quality of life.

As the digital economy continues to grow in the Jingxi

area, emerging employment opportunities have broad prospects. Data analysis, as one of the core capabilities, is witnessing increasing demand from businesses. Companies like JD.com are hiring numerous data analysis experts to support decision-making. Simultaneously, software development has become a crucial area driving the digital economy. The demand for programmers has expanded, leading to an increased need for coding talents such as app and website developers. Enterprises like JD and JD Cloud are recruiting a large number of front-end and back-end engineers. Digitization has also blossomed employment opportunities in IT operation and network security fields. Overall, the digital economy has brought diverse employment opportunities to the Jingxi area. Not only increasing the number of job positions but also improving the quality and structure of employment. This has promoted the construction of a vibrant job market in the Jingxi area.

In optimizing urban development, the digital economy has improved public services and residents' living standards in the Jingxi area. According to the 2022 work report of Shijingshan District government. 62 5G base stations were established, providing comprehensive 5G coverage for residents in key areas. Six digital smart city application scenarios were built, including intelligent transportation utilizing 5G and IoT technology. Intelligent traffic signal lights, and monitoring equipment, optimizing traffic flow and promoting electronic governance. Additionally, 74 cloud government platforms were added. Along with the launch of a district-level integrated electronic government service platform, offering one-stop online services for certification, payment, and inquiries. The use of facial recognition and big data analysis has enhanced the efficiency of public resource allocation. Smart community construction included pilot projects for intelligent waste sorting and unmanned environmental monitoring systems. And the provision of 5G-enabled value-added services such as smart homes and elderly care, significantly enhancing the convenience of public services for residents.

To enhance international competitiveness, Shijingshan vigorously promotes digital governance and smart city development, establishing a digital service system covering various sectors. Additionally, it utilizes digital technology to preserve and promote cultural heritage while exploring the digital cultural industry. Shijingshan District has constructed a digital technology park to attract domestic and international startups, regularly hosting domestic and international summits on the digital economy. These efforts enable more international organizations and businesses to understand Shijingshan's achievements and potential in the field of the digital economy. Enhancing its international influence and visibility.

Fengtai District is committed to cultivating internationally renowned enterprises in cutting-edge digital economy fields such as mobile internet and artificial intelligence. Leveraging digital technology, it attracts domestic and international tech talents to conduct research projects in Fengtai Digital Technology Park. Introducing several support policies centered on

digitization. Several Fengtai startups have gained international recognition in digital products and services. Attracting foreign venture capital through digital channels. Moreover, Fengtai regularly hosts international industry-academia-research forums on the digital economy. Facilitating the transformation of digital scientific and technological achievements. It also collaborates with overseas science and technology parks through digital channels. Supporting enterprises in utilizing digital means to explore global digital markets and seek customers. Contributing to the cultivation of globally-oriented digital businesses in Fengtai and attracting more international organizations to understand and invest in Fengtai's digital economy.

6. Conclusion

The digital economy has become the main driving force for economic development. The progress of the digital economy contributes to the economic development of the western region of Beijing. In order to achieve high-quality economic development in the western region of Beijing, this article proposes the following suggestions. Increasing financial subsidies to enhance the industrial foundation and scientific and technological innovation capabilities of the digital economy. Government encourages industries to undergo digital transformation, and promotes upgrading in emerging industries with weak foundations such as big data, integrated circuits, artificial intelligence, and cloud computing. Strengthen talent supply and send more high-quality professional talents to the west of Beijing. Provide certain subsidies for professional talents to promote the development prospects of digital economy in the western region of Beijing to college graduates. Using the Internet to achieve innovation in the park, using media such as the Internet to attract the attention of more young people. By means of publicity, marketing, and other means, enhance the added value of the park and drive the overall economic development of the western region of Beijing.

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