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EVALUATION SCORES OF DIFFERENT SMART CITIES IN CHINA

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Keywords: smart cities, energy management, waste reduction, smart transportation systems, eco-friendly urban planning.
Ключевые слова: умные города, энергоменеджмент, сокращение отходов, умные транспортные системы, экологически чистое городское планирование.

Summary**:** Urban sustainability is promoted through the development of smart cities, which prioritise initiatives such as efficient energy management, waste reduction, smart transportation systems, and eco-friendly urban planning.
Аннотация: Устойчивость городов способствует развитию умных городов, в которых приоритет отдается таким инициативам, как эффективное управление энергопотреблением, сокращение отходов, интеллектуальные транспортные системы и экологически чистое городское планирование.

The 2023 IMD Smart City Index Report ranked Beijing 12th, which is likely to have a positive impact on its GDP. Beijing is known for embracing smart city initiatives, and this recognition can attract further investment and technological advancement. Improved urban infrastructure, efficient transportation systems, and enhanced quality of life tend to attract businesses and skilled workers, potentially leading to increased economic activity and productivity. Additionally, a focus on sustainability and innovation can stimulate local entrepreneurship and the development of new industries, contributing to overall economic growth and competitiveness.

The steady development of smart city initiatives in Shenzhen and Beijing, along with the prediction of comparable GDP by 2035, signifies a significant shift in China's urban landscape. This has several implications for the future development of both cities in terms of smart city initiatives and macroeconomic growth (table 1).

The relationship between the two cities will involve both competition and collaboration. The equalisation of GDP between Shenzhen and Beijing indicates intense competition between the two cities in their quest to become leading smart cities. This competition can drive innovation and efficiency as they strive to outperform each other. However, it also presents opportunities for collaboration, where both cities can share best practices and resources to accelerate their smart city development [1].

Table 1. Comparison of Beijing and Shenzhen GDP forecasts for 2035

Rank	City	Country	2035 GDP
#1	New York	United States	$2.5T
#2	Tokyo	Japan	$1.9T
#3	Los Angeles	United States	$1.5T
#4	London	United Kingdom	$1.3T
#5	Shanghai	China	$1.3T
#6	Beijing	China	$1.1T
#7	Paris	France	$1.1T
#8	Chicago	United States	$1.0T
#9	Guangzhou	China	$0.9T
#10	Shenzhen	China	$0.9T

The pursuit of comparable GDP levels suggests that both cities will invest significantly in technological advancements. This will result in the implementation of state-of-the-art technologies, including artificial intelligence, the Internet of Things, big data analytics, and smart infrastructure.

As they strive to become smarter cities, Shenzhen and Beijing will attract talent, promote research and development, and establish an environment conducive to technological innovation.

The focus is on economic growth. The GDP levels of both cities suggest that they are likely to experience sustained economic growth. The focus on smart city initiatives is expected to attract more businesses, investment, and skilled professionals, resulting in job creation and enhanced productivity. The growth in the technology sector, along with improved urban infrastructure, can contribute to overall economic prosperity and higher living standards for residents.

Urban sustainability is promoted through the development of smart cities, which prioritise initiatives such as efficient energy management, waste reduc-

tion, smart transportation systems, and eco-friendly urban planning. Both Shenzhen and Beijing are expected to focus on these efforts, which align with China's broader goals of sustainable development. By implementing these initiatives, the quality of life and environmental conditions can be improved.

Overall, the convergence of GDP levels between Shenzhen and Beijing by 2035 suggests a competitive yet collaborative environment for smart city development. This will drive technological advancements, spur economic growth, and foster sustainable urban living.

In terms of information resources, Zibo, Benxi, and Chongqing have higher ranks. This indicates that these three cities have higher degrees of information resource integration and sharing. By contrast, Taiyuan, Harbin, and Denyang have lower degrees of information integration. For management services, the scores for spatiotemporal data and cloud platforms are similar to the total scores. Benxi, Zibo, and Deqing outperform the others, suggesting that they have better data, technology, and services. In terms of application performance, Chongqing has the highest score, which demonstrates that the city surpasses other cities in terms of application depth and breadth, technical support, and operation models. For system guarantees, better performance is noted in cities such as Benxi, Xuzhou, and Zibo. This finding reveals that these cities receive greater attention from the local governments regarding smart city construction and have better organization management structures. Finally, for innovation characteristics, Xuzhou has the highest score because of the significant depth of local theme-specific applications.

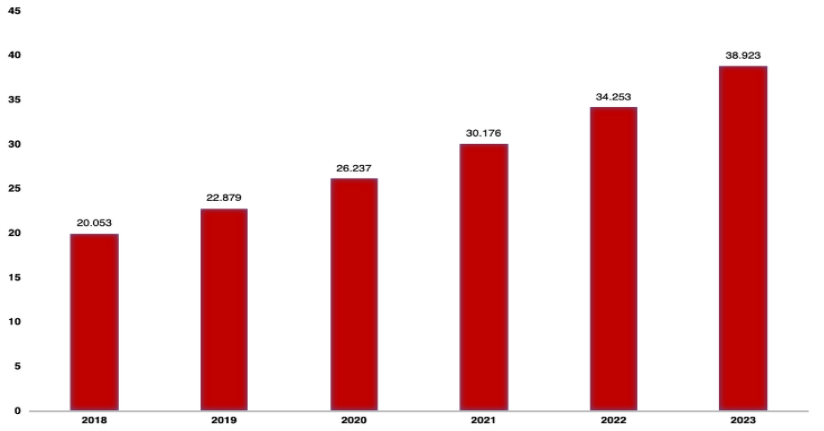

Figure 1. Technological expenditure on Smart Cities in $ billion, forecast

Data from China ICT Institute, China Business Industry Research Institute and other institutions show that the market size of China's new smart city has maintained a growth rate of more than 30 % in recent years, and will reach 21.08 trillion yuan in 2021. Specifically, the current construction of China's new smart city has the following three characteristics [2].

1. Policies at all levels show the direction,

The Outline of the Fourteenth Five-Year Plan for National Economic and Social Development of the People's Republic of China and Vision 2035 set out an important way to promote the construction of new smart cities in the new period through gradation and classification, and the Report of the Twentieth National Congress of the CPC makes it clear that the main goal is to "build livable, resilient and smart cities".

2. Digital technology injects kinetic energy.

Relying on the characteristics of high speed, low latency and large connectivity, 5G technology provides an efficient and secure data channel for smart city construction, while continuously deeply integrating with big data, artificial intelligence, cloud computing, digital twinning and other technologies, and continuing to unleash innovative potential in the fields of traffic and travel, public security and government services. The new generation of digital technology will continue to drive the deepening development of the smart city, accelerate the application of new technologies in various fields of the city, and continuously realise the transformation and upgrading of urban smart services by gradually covering all people, all time, all elements and all processes in various fields.

3.Rich scenarios of sinking cities in counties and districts.

China's new smart city continues to develop in depth, while still facing challenges.

1. Top-level planning guidance is still insufficient

At present, as the new digital technology is booming and China's urbanisation process is accelerating, the original planning is difficult to adapt to the new trends in technology and cannot meet people's new needs. As China's new smart city construction is gradually entering the "deep water zone", how to effectively connect the existing results with the new content, to avoid duplication of construction while reducing the "data silos", is the current top-level planning needs to be resolved.

2. The security of business operations still needs to be strengthened.

With the development of digitalisation, the future of key information infrastructure, key information systems rely on software, networks, data as the basis for online business will become more and more, the new smart city business will become more and more complex, business security operations will face more and more complex problems, the development of smart city industry to protect business security has become a top priority.

3. It is difficult to release the driving force of data elements.

At present, the construction of new smart cities around the world mainly relies on the establishment of information system platforms, and pays insufficient attention to the collection, management, sharing and use of data resources. Poor sharing and circulation of data resources across levels and departments, difficulties in data return due to the vertical management of government departments, and low data quality due to the lack of unified standards have become the main problems limiting the value of data elements.

4. Infrastructure support is still lacking

At present, the network infrastructure and computing infrastructure closely related to the construction of the new smart city have reached a certain scale, but the phenomenon of decentralised construction and separate management by different departments still exists, and the degree of coordination and intensification of infrastructure construction and operation is not high, leading to problems such as aging infrastructure, low intelligence level, insufficient sharing and common use, and difficulty in eliminating potential security risks.

5. Effectiveness of multi-span applications needs to be strengthened

In the past, smart city projects usually focused only on the information and intelligence construction of single or multiple scenes independently, and factors such as the difficulty of integrating and applying government data, public data and social data, as well as the difficulty of connecting the business processes of government departments, have limited the landing of multi-scene applications, hindering the improvement of the effectiveness of government management and the optimization of the public's experience.

6. The synergy of multiple construction still needs to be improved.

At present, China's new smart city is still mainly built by the government, and has not yet formed a situation where the government, enterprises and the public are jointly built and governed by multiple subjects, which not only increases the financial pressure of governments at all levels, but also restricts the play of enterprises' technological advantages, and at the same time creates problems such as insufficient experience for the people.

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