

Research on Smart City Construction and Industry Correlation Effect Based on the Comparative Analysis of Beijing and Tianjin

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Abstract—Based on the 2012¹ Beijing and Tianjin Budget Supplementary Table, by calculating the direct consumption coefficient of the smart industry, it reveals the degree of connection between smart city construction and the sub-industries of the secondary and tertiary industries, and a comparative analysis of the two places. To decompose the problems encountered by the smart industry in the economic development and the impact, as shown below: smart industry has a close relationship with other industries; some industries that should begin to play an important role in the construction of smart cities have not yet been reflected; for Beijing and Tianjin, the direct consumption and transformation of the smart industry in the tertiary industry and sub-industry of the two places is not big, but the direct consumption and transformation in the secondary industry and the sub-industry are significant.

1. INTRODUCTION

Smart city is now showing a trend of blooming everywhere (Bai Yang and Li Baohuai, 2020).

Wang Guangbin and Zhang Lei (2013) pointed out that there are more than 1,000 smart cities that have been launched or are under construction worldwide. Baiyang (2020) statistics show that about 500 cities in China have clearly proposed or smart city construction.

In an earlier article, Leroy (2002) discussed the smart growth of cities, Geller (2003) also discussed smart growth is an inevitable choice for future urban economic development. Shapiro (2006) clearly cited the concept of smart city, but his research paper by Eger (2009) fundamentally opened the modern sense of smart city research. He believes that a smart city means the scientific deployment of modern technologies.

Domestic scholars pay more attention to smart cities later than foreign scholars, and their research focuses on smart cities are also different. The first category focuses on breakthroughs in smart cities from the perspective of technological innovation (Wu Xibo and Yang Zaigao, 2010; Zhang Yongmin and Du Zhongchao, 2011; Li Deren and Shao Zhenfeng, 2011; Cai Wei 2020), the second category is to explore its practicality from the perspective of application, Liu Lanjuan and Xu Xin (2014) use the CGE model to study the impact of smart city construction on the economy Zhang Weidong (2018) explored the impact mechanism of smart cities on the

transformation of all factors through the method of difference.

After sorting out the literature, what types of industries and key enterprises need to be developed around the construction of smart cities? What is the relationship between smart city construction and various industries? Regarding these issues, the current practice and theoretical circles are here trying to use the supplementary tables of Beijing and Tianjin in 2012 as a basis to discuss in depth the industrial relationship of smart city construction, clarify the driving effect of smart cities on industrial development, and provide some smart cities. Provide reference for the construction.

2. THE DRIVING EFFECT OF SMART CITY CONSTRUCTION ON INDUSTRIAL ECONOMY

A. Correlation effect

The relevance conflicts between industries complement each other and the relationship between supply and demand. When the products or services of some industries are the focus of another industry, or when this industry substitutes the products or services of another industry, they There is an obvious relationship between them. As another system of urban management transformation, the construction of smart cities involves all aspects of urban economic development and resource allocation. The existing secondary and tertiary industries are related to many industries.

¹ The input-output table is compiled every 5 years. The latest data is for 2017, but the Tianjin Bureau of Statistics has not compiled the 2017 data, so I will analyze the 2012 data.

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3. THE ANALYSIS METHODS AND DATA OF THE SMART CITY INDUSTRY ASSOCIATION

A. Analysis method of industry association

From the current point of view, the most commonly used method for industry association analysis is the input-output method. The input-output method is a systematic method to quantify the interdependence between various departments in a complex economic system. The input-output analysis method can be expressed in matrix form as a linear equation $AX+Y=X$ (intermediate product + final product = total output), after transformation, $Y=(1-A)X$, if matrix (IA) exists, then There are $X= (IA)^{-1}Y$, where $(IA)^{-1}$ is the Leontief inverse matrix. The direct consumption coefficient is the input coefficient, and its economic meaning is the amount of intermediate inputs directly consumed by each industry sector per unit of product produced by an industry.

B. Research data selection

The input-output method focuses on the analysis of the relationship between industries, and smart city, as an urban development concept, is not an industry-level concept. To this end, we need to convert smart cities to the existing industry types in the input-output table. Wu

Hequan(2010) who is the Vice President of the Chinese Academy of Engineering believes that the Internet of Things will be a concentrated expression and an important symbol of smart cities. Based on this view, this article regards the industry category of the Internet of Things as a smart industry, we choose two major categories of smart industries: communication equipment, computer and other electronic equipment industries, and information transmission, software and information technology service industries. Although this approach is inevitably different from the reality, it can basically reflect the basic industry composition of smart cities.

4. SMART INDUSTRY LINKAGE BASED ON THE ANALYSIS OF THE INPUT-OUTPUT TABLES OF BEIJING AND TIANJIN

we calculated the direct consumption coefficients of the smart industries in the two places for the secondary and tertiary industries, as shown in Tables 1 to 4. In order to better analyze the relationship between smart city construction and various industries, next, we first analyze the relationship between the smart industry and the sub-industries of the secondary and tertiary industries based on the overall results of the two places. Then, analyze the differences between the two places.

TABLE I. DIRECT CONSUMPTION COEFFICIENTS OF BEIJING'S SMART INDUSTRY ON THE SUB-INDUSTRIES OF THE SECONDARY INDUSTRY

Direct consumption coefficient by industry			
Industry Type	coefficient	Industry Type	coefficient
Coal products	0.146790	General Equipment	0.030980
Oil products	0.000004	Professional setting	0.015393
Metal products	0.016144	Transportation	0.199689
Non-metallic	0.002921	Electrical machinery	0.037290
Food and tobacco	0.040966	Communication equipment	0.265343
Textile	0.004682	Instrumentation	0.009493
Woodworking	0.008968	Repair services	0.000474
Papermaking	0.019951	Electricity supply	0.430782
Petroleum	0.013702	Gas production	0.000178
chemical product	0.098356	Water supply	0.000302
Non-metallic products	0.020900	building	0.011922

a. Compiled according to the Beijing 2012 budget table

TABLE II. DIRECT CONSUMPTION COEFFICIENTS OF TIANJIN'S SMART INDUSTRY ON THE SUB-INDUSTRIES OF THE SECONDARY INDUSTRY

Direct consumption coefficient by industry			
Industry Type	coefficient	Industry Type	coefficient
Coal products	0.144215	General Equipment	0.073347
Oil products	0.099046	Professional setting	0.024374
Metal products	0.033344	Transportation	0.264060
Non-metallic	0.013778	Electrical machinery	0.035384
Food and tobacco	0.170683	Communication equipment	0.427880
Textile	0.008366	Instrumentation	0.004907
Woodworking	0.006932	Repair services	0.030485
Papermaking	0.031655	Electricity supply	0.084975
Petroleum	0.067705	Gas production	0.007335
chemical product	0.288603	Water supply	0.004665
Non-metallic products	0.021337	building	0.007099

b. Compiled according to the Tianjin 2012 budget table

Table 1 and Table 2 show that Beijing's smart industry has a large consumption of electricity and heat production and supply. It is 0.430782, which shows that

the construction of Beijing's smart city has a very strong demand for power equipment and so on, and it needs enough power to supply smart industries. Tianjin's smart

industry has a very large consumption of metal smelting and rolled products, with a coefficient of 0.785312. This shows that in the construction of Tianjin's smart city, a large amount of metal smelting and rolled products are needed. These industries also provide for the development of smart industries. Infrastructure and production equipment.

Among them, the construction industry needs to be particularly pointed out. As far as the current situation is concerned, the direct consumption coefficient of smart city construction to the construction industry is not high, and it is in the middle and lower reaches of all industries. With the advancement of smart city construction, It will become an important measure, which also requires the direct participation of the construction industry, including the planning of smart spaces and the construction of smart communities.

TABLE III. DIRECT CONSUMPTION COEFFICIENTS OF BEIJING'S SMART INDUSTRY ON THE SUB-INDUSTRIES OF THE TERTIARY INDUSTRY

Direct consumption coefficient by industry			
Industry Type	coefficient	Industry Type	coefficient
Wholesale	0.045928	Scientific research	0.058462
Transportation	0.151253	public facilities	0.001596
Provision	0.000636	Resident services,	0.001031
information technology	0.065672	education	0.013327
financial	0.048231	social work	0.002560
real estate	0.015028	entertainment	0.024788
business services	0.031470	social security and social organization	0.000188

c. Compiled according to the Beijing 2012 budget table

TABLE IV. DIRECT CONSUMPTION COEFFICIENTS OF TIANJIN'S SMART INDUSTRY ON THE SUB-INDUSTRIES OF THE TERTIARY INDUSTRY

Direct consumption coefficient by industry			
Industry Type	coefficient	Industry Type	coefficient
Wholesale	0.022929	Scientific research	0.000640
Transportation	0.357925	public facilities	0.000814
Provision	0.000404	Resident services,	0.004700
information technology	0.011393	education	0.009630
financial	0.010075	social work	0.000008
real estate	0.006791	entertainment	0.000322
business services	0.020488	social security and social organization	0.000161

d. Compiled according to the Tianjin 2012 budget table

Table 3 and Table 4 show that the two places have similar demands on the tertiary industry and the sub-industries, and the future development of smart industries. The impact on the internal structure of the tertiary industry in the two places tends to be the same.

The industry that needs special attention is scientific research, and its direct consumption coefficient is only at the midstream level in the tertiary industry (0.05846 in Beijing and 0.000640 in Tianjin). Smart city construction, as an innovative social behavior, just needs A lot of knowledge or R&D investment, so this result seems to go against the norm. One possible reason is that scientific research as a public undertaking is mainly based on government investment, and the current government investment in this area is low, which also makes scientific

research undertakings low investment in smart city construction.

5. RESEARCH CONCLUSIONS

A. The smart industry has a close relationship with other industries.

The analysis in this article shows that the smart industry has a correlation with most of the sub-industries of the secondary and tertiary industries. Among them, the smart industry has a larger direct consumption coefficient for the production and supply of electricity and heat in the secondary industry, communication equipment development will require a large amount of input from these industries.

B. Some industries that should play an important role in the construction of smart cities have not yet demonstrated their due value.

The correlation coefficient of scientific research, government public management and other industries to the smart industry is slightly lower. In fact, these industries need to play an important role in the construction of smart cities. They are closely related to residents' lives, public welfare, and technological development. The government should provide more support and guidance in these areas to ensure the rational and orderly development of smart city construction.

C. For Beijing and Tianjin, the direct consumption of the smart industry to the sub-industry of the tertiary industry in the two places is not much different, but the direct consumption of the secondary industry is significantly different.

The sub-industries that consume the most in Tianjin are metal smelting and rolling products, information transmission, software, and information technology services. The coefficients of these two industries are higher than those of Beijing. This shows that the development of these two industries in Beijing is lower than that of Tianjin.

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