Research Article

Analysis on the Development of Smart City of Big Cities in China and Its Effect to Economic Structure Based on Entropy Method

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This work aims to analyze the construction of smart cities in China’s large cities and its impact on the economic structure. Some developed countries, such as the United States and Europe, have established mature smart city evaluation systems. Therefore, this work draws on the evaluation system of smart cities in developed countries to study the development status of smart cities in large cities in China. An extend linear system evaluation model is established. Besides, five first-level indicators and 24 second-level indicators are established from the five aspects: urban infrastructure, technological innovation, smart economy, human services, and intelligent environment to evaluate the development status of the city. In addition, a susceptible infected system model has been established to study the impact of smart city construction on the industrial structure. The research results demonstrate that the development level of smart cities and smart industries in eastern China is relatively high, and the comprehensive scores of smart city construction in Beijing, Shanghai, Guangzhou, Shenzhen, and Chongqing all exceed 0.082. However, the development level of smart cities and smart industries in the central and western regions is relatively low. The comprehensive evaluation scores of smart cities such as Tianjin, Hangzhou, and Wuhan are between 0.35 and 0.8, and technological innovation still needs to be further developed. In conclusion, the development gap between eastern, central, and western China has further widened with time. This work provides possible research experience for China’s smart city construction and industrial construction.

1. Introduction

1.1. Background and Significance. Esposito et al. [1] pointed out that with the rapid development of Internet, Internet of Things (IoT), Computer Technology (CT), and smart city, as the development direction of future cities, has gradually entered people’s vision. Smart city is a more relaxed, intelligent, and convenient urban life, which is regarded as the development direction of cities in the future. Li et al. [2] stated that in order to promote the development of smart cities, in 2012, China took some regions and cities as the development pilot of smart cities, including more than 90 cities or regions such as Beijing Dongcheng District, Tianjin Eco City, and Shijiazhuang. In 2014, the National Development and Reform Commission, the Ministry of Land and Resources, the Ministry of Housing and Urban Rural Development, the Ministry of Industry and Information Technology, the Ministry of Science and Technology, the Ministry of Public Security, the Ministry of Finance, and other departments jointly submitted an application to the State Council for building a smart city. Li et al. [3] indicated that the State Council agreed and adopted the guiding opinions on promoting the healthy development of smart cities and bringing the development of smart cities into the scope of national development. Sun and Zhang [4] suggested that, by 2020, China will build some smart cities with urban development characteristics. By the end of 2017, more than 500 cities had submitted smart city development plans, marking a new stage in China’s smart city construction. Under the current conditions, this article studies the current situation and problems of smart city development, analyzes the impact of smart city development on China’s economic structure and its role in promoting the economy, provides experience for the follow-up construction of smart city, and has great significance for China to build an industrial power and realize the great rejuvenation of the Chinese nation.
1.2. Related Work. Anand et al. [5] used fuzzy Analytic Hierarchy Process (AHP) to determine the importance of SC-oriented Sustainable Development standards and Developing Country (DC)-oriented SC SD indexes design. Shen et al. [6] adopted mixed research methods, such as literature review and semi-structured interview, used entropy method and similarity-based ideal solution ranking technology, and put forward the Chinese SCs’ performance-oriented Evaluation Index System (EIS). Angelakoglou et al. [7] introduced an overall framework to determine the Key Performance Index (KPI) repository to evaluate regular businesses, new technologies, and services related to SC solutions. Wang et al. (2020) [8] aimed at blind construction and unsatisfactory effect in SC construction, probed into the SC performance indexes, and put forward the SC-oriented EIS based on Cloud Computing (CC) platform. Razmjoo et al. [9] studied different aspects of SC development, introduced new feasible indexes related to Green Buildings (GBs) and Electric Vehicles (EVs) in SC standards design, and suggested the obstacles in SC development and the countermeasures. Jararweh et al. [10] pointed out that the proliferation of smart city and Internet of Things applications had brought many challenges related to network performance, reliability, and security. Li et al. [11] pointed out that smart city evaluation was an important part of smart city construction, and played an important role in guiding and promoting urban smart development. At present, the existing research and application of smart city evaluation is still in the exploratory stage.

To sum up, there are many deficiencies in the current research on supply chain and smart city construction that need to be improved. The main deficiency is that the computing platform does not support the construction of information systems. Therefore, this paper studies and designs an environmental impact assessment system-oriented to supply chain to improve the efficiency of smart city construction.

1.3. Research Methods and Innovation. Based on the existing achievements of supply chain-oriented environmental impact assessment in Europe, America, and other economically developed countries and China, this paper innovatively establishes a supply chain-oriented environmental impact assessment system. Then, the evaluation model of smart city is established by entropy method to study the impact of smart city construction on the economic structure. The research results provide possible research experience for the establishment of smart city evaluation model.

2. Research Method

2.1. Establishment of SC Development Level Indexes

2.1.1. Design Principles. Keshavarzi et al. [12] suggested that smart cities come from the media, referring to linking urban systems and services through various information technologies or innovative concepts. Patrão et al. [13] pointed out that smart cities made urban life more convenient, reduce problems encountered in the process of urbanization development, improve urban resource utilization efficiency, optimize urban management, improve urban service levels, and raise the living standards of citizens. Wu et al. [14] summarized the evaluation results of the environmental impact assessment indicators for the supply chain and combined with the urbanization management level data as shown in Table 1.

2.2. Analysis and Construction of SC Evaluation Model Based on Entropy Method

2.2.1. Entropy Analysis. Wang et al. [15] stated that, as a method to judge the dispersion degree of indicators, entropy method usually measures the influence degree of different factors on the evaluation object with the help of the degree of system disorder. Zhao et al. [16] held that in entropy method, the function of the index depends on the weight of the index. Cai and Tang [17] thought that the greater the weight, the greater the function, and vice versa. Rao et al. [18] proposed that because the weight of the index is completely determined by the analyzed data itself, the evaluation results have strong objectivity. Barrows et al. [19] showed that compared with the principal component analysis method, the entropy method focuses on the weight calculation of each evaluation index, further obtains the key index factors affecting the construction of smart city, and finally ranks the construction level of smart city according to the calculation results of each sample data.

2.2.2. Construction of Supply Chain Evaluation Model. Goodboy and Martin [20] indicated that the SC evaluation model is realized according to the entropy method. Khine and Nyunt [21] proposed that when using entropy method to analyze, it is necessary to first standardize the original data, then calculate the original matrix, contribution, entropy, and weight, respectively, and finally comprehensively evaluate the development of smart city, so as to determine the smart city evaluation model. When evaluating the smart city model with entropy method, the specific calculation steps of entropy method are as follows:

The first step is data standardization as shown in formula (1).

$$X_{ij} = \frac{(X_{ij} - \min X_j)}{(\max X_j - \min X_j)}$$

As shown in formula (1), $X_{ij}$ refers to the evaluation value of the $i$ scheme under the $j$-th attribute, $i = 1, 2, \ldots, 11$; $j = 1, 2, \ldots, 25$.

The second step is weight determination and index synthesis.

① The original matrix is composed of standardized index data $X$

$$X_{ij} = (X_{ij})_{11 \times 25}$$

② Find the contribution degree of the $i$-th scheme under the $j$-th attribute $P_{ij}$. The formula is as follows:
Find the entropy of all attributes \( j = 1, 2, \ldots, 25 \). The formula is as follows:

\[
E_j = -K \sum_{i=1}^{m} P_{ij} \ln(P_{ij}).
\]

Calculate the difference coefficient of each index under the \( j \)-th attribute \( D_j \) \( (j = 1, 2, \ldots, 25) \). The formula is as follows:

\[
D_j = 1 - E_j
\]

Calculate the weight of each attribute \( W_j \) \( (j = 1, 2, \ldots, 25) \). The formula is as follows:

\[
W_j = \frac{D_j}{\sum_{j=1}^{25} D_j}
\]

Weight multiplied by the comprehensive score \( F \) of standardized urban indicators \( F \).

\[
F = W_j \times X_{ij}.
\]

The entropy method is used to analyze the implementation process of the supply chain evaluation model. The results are shown in Figure 1.

It can be seen from the implementation method of the supply chain evaluation model in Figure 1 that index synthesis is first required in the process of establishing the smart city evaluation index system. The original data is input and standardized based on index investigation and system setting. After the standardization, the weights of the original matrix are calculated to solve the comprehensive evaluation model of urban development.

2.3. Impact of SC Construction on the Economic Structure. Dogan and Inglesi-Lotz [22] suggested that economic structure refers to the composition and structure of the national economy, including enterprise structure, industrial structure, and regional structure. Cai and Wang [23] stated that the main economic structure factor is the social demand for final products. The SC construction will undoubtedly affect the original urban economic structure. Meanwhile, many high-tech enterprises adaptable to the market will be incubated during SC development. Industries with backward technology and management will be promoted to carry out enterprise transformation actively.

This article mainly compares the industrial structure changes of Beijing (BJ), Tianjin (TJ), Shijiazhuang (SJZ), Changchun (CC), Shanghai (SH), Hangzhou (Hz), Wuhan (WH), Guangzhou (GZ), Shenzhen (SZ), Guiyang (Gy), and Chongqing (CQ) before and after the construction of the supply chain from 2011 to 2020 to study the impact of supply chain construction on the economic structure of smart city.

3. Results and Discussion

3.1. Analysis on the Changes of Industrial Structure before and after the Construction of Supply Chain in Different Smart Cities. Firstly, taking 2011 as an example, this paper analyzes
the data standardization score results of entropy method in the structure of urban smart city construction (Figure 2).

Through the standardized analysis of the industrial structure data of supply chain construction in various cities, it is found that the entropy method can be used to process the data of different secondary structures, which is feasible.

As can be seen from Figure 3, from 2010 to 2020, various indicators of smart city have developed significantly, which indicates that with the development of the city, the smart level of the city has gradually improved. At the same time, the difference of various indicators of smart city is large, indicating that the urban development of smart city is uneven, which brings challenges to urban governance.

Taking 2011, 2015, and 2020 as examples, this paper analyzes the changes of industrial structure before and after the construction of smart city in 12 cities, including Beijing (BJ), Tianjin (TJ), Shijiazhuang (SJZ), Changchun (CC), Shanghai (SH), Hangzhou (Hz), Wuhan (WH), Guangzhou (GZ), Shenzhen (SZ), Guiyang (Gy), Taiyuan (TY), and Chongqing (CQ).

As shown in Figure 4, through the analysis of the attribute weights during the construction of smart cities in 2011, it can be found that among the five main indicators of infrastructure, scientific and technological innovation, intelligent economy, humanized service, and intelligent environment, the overall weight of infrastructure, intelligent economy, and humanized service exceeds 0.2, of which the overall weight of humanized service is the largest. This can reflect that the supply chain of smart city focuses more on the construction of humanities and social security level. Through further analysis of 24 secondary indicators, it is found that X2 (number of broadband access users) has a high weight, which reflects the large number of users and the increase of population in the process of smart city construction, which is also a reflection of the more emphasis on the level of humanities and social security.

As shown in Figure 5, through the analysis of the attribute weights during the construction of the supply chain of smart cities in 2015, it can be found that among the five main indicators of infrastructure, scientific and technological innovation, intelligent economy, humanized service, and intelligent environment, humanized service still accounts for the largest weight as a whole, which can reflect that the smart cities pays more attention to the construction of humanities and social security level. The second is the smart economy, which reflects that the smart city pays more attention to its economic construction. Further analysis of 24 secondary indicators shows that x18 (cultural institutions) has the highest weight, which reflects that the smart city pays more attention to the construction of education and culture in the process of building the smart city, making the smart city have its own cultural heritage. Secondly, the weight of x15 (number of hospitals) is high, which means that in the process of smart city construction, we focus on improving urban medical services, so that people can experience better urban medical services.

As shown in Figure 6, through the analysis of the attribute weights in the supply chain construction of smart
cities in 2020, it can be found that the weights of the five main indicators are $w$ (Humanized service) $> W$ (Intelligent Economy) $> W$ (Infrastructure) $> W$ (Intelligent Environment) $> W$ (Scientific and Technological innovation), in which the overall weight of humanized service is the largest, which can reflect that the supply chain of smart cities still focuses on the construction of humanities and social security level. Through further analysis of 24 secondary indicators, it is found that $X_2$ (number of broadband access users) has the highest weight, which reflects a large number of users and the increase of population in the process of smart city construction, which is also a reflection of the more emphasis on the level of humanities and social security. Secondly, the weight of $X_8$ (per capita GDP) is high, which is 0.81, which...
reflects that people pay more attention to per capita income when developing the level of humanities and social security, so as to improve people's happiness. Of course, the weight of x18 (cultural institutions) reaches 0.80. In the process of smart city supply chain development, we also pay attention to the cultivation of culture, which makes the smart city have its own cultural connotation when developing an economy.
Taking 2011, 2015, and 2020 as examples, the comprehensive evaluation before and after supply chain construction of 11 cities such as Beijing (BJ), Tianjin (TJ), Shijiazhuang (SJZ), Changchun (CC), Shanghai (SH), Hangzhou (HZ), Wuhan (WH), Guangzhou (GZ), Shenzhen (SZ), Guiyang (Gy), and Chongqing (CQ) is analyzed and ranked as shown in Table 2.

As shown in Table 2, the entropy method is used to analyze the comprehensive evaluation value, comprehensive score, and ranking of each city. It can be seen that from 2011 to 2020, compared with other cities, the smart city level of Beijing, Shanghai, Shenzhen, Chongqing, and Guangzhou ranks among the top, with a comprehensive score of more than 0.06. It shows that these cities have achieved high results in the construction of smart cities, which has little correlation with time.

### Table 2: Ranking results of comprehensive evaluation scores of smart city supply chain construction in 2011, 2015, and 2020.

|          | 2011 | 2015 | 2020 |
|----------|------|------|------|
| BJ       | 0.076| 0.078| 0.071|
| TJ       | 0.052| 0.080| 0.049|
| SJZ      | 0.040| 0.034| 0.032|
| CC       | 0.034| 0.031| 0.036|
| SH       | 0.080| 0.078| 0.086|
| HZ       | 0.050| 0.050| 0.045|
| WH       | 0.045| 0.045| 0.041|
| GZ       | 0.061| 0.058| 0.061|
| SZ       | 0.058| 0.061| 0.061|
| Gy       | 0.027| 0.029| 0.032|
| CQ       | 0.063| 0.067| 0.066|
| TY       | 0.028| 0.028| 0.029|
| HHIHT    | 0.030| 0.028| 0.025|
| NJ       | 0.044| 0.048| 0.044|
| XM       | 0.034| 0.028| 0.031|
| QD       | 0.041| 0.043| 0.037|
| NN       | 0.028| 0.028| 0.029|
| SY       | 0.021| 0.018| 0.023|
| KM       | 0.030| 0.030| 0.031|
| LS       | 0.020| 0.021| 0.021|
| XA       | 0.041| 0.040| 0.040|
| LZ       | 0.026| 0.026| 0.027|
| XN       | 0.022| 0.026| 0.032|
| YC       | 0.023| 0.023| 0.024|
| WLMQ     | 0.026| 0.029| 0.026|

3.2. Analysis of Smart City Construction Results in Different Years. The entropy method is further used to analyze the construction results of different smart cities from 2011 to 2020 as shown in Figure 7.

By using the entropy method to analyze the entropy and difference coefficient of the secondary indicators from 2011 to 2020, it is found that the smaller the entropy, the greater the difference coefficient, showing a negative correlation. Further analyze the weight of secondary indicators and primary indicators in the process of smart city supply chain construction from 2011 to 2020 as shown in Figures 8–11.
Through the weight analysis of secondary indicators from 2011 to 2020 as shown in Figures 9–11. It can be found that the weight of each index has no obvious correlation with the change of time. On the whole, the weight of X2 (number of broadband access users) is the highest, which reflects the large number of users and the increase of population in the process of smart city construction, which is also a reflection of the more emphasis on the level of humanities and social security. Secondly, X8 (per capita GDP) and x18 (cultural institutions) have higher weights. The focus of X8 (per capita GDP) index reflects that people pay more attention to per capita income when developing the level of humanities and social security, so as to improve people's happiness. X18 (cultural institution) indicates that the smart city also pays attention to the cultivation of culture in the process of supply chain development, which makes the smart city have its
cultural connotation in economic development. Further from the perspective of primary indicators, it is found that humanized services account for the largest weight in 2011–2020, which can reflect that the supply chain of smart city still focuses on the construction of humanities and social security level, making the industrial structure of smart city develop in the direction of light industry and services.

Further analyze the comprehensive score of the first-level indicators of smart city construction from 2011 to 2020, we find that with the increase of years, the comprehensive score of each indicator gradually increases, and the comprehensive score of humanized service is higher than other first-level indicators as a whole. This means that in the process of smart city construction, the industrial chain structures such as infrastructure, scientific and technological innovation, intelligent economy, humanized service, and intelligent environment are gradually improving, giving full play to the coordination role of various influencing factors and taking into account the role of other factors in smart city construction. At the same time, we pay more attention to the humanized service indicators of smart city construction, which reflects that we pay more attention to the construction of education and culture in the process of smart city construction, so that the smart city has its own cultural heritage. At the same time, it focuses on improving urban medical services so that people can experience better urban medical services, which is also the embodiment of the level of humanities and social security.

Further analyze the comprehensive evaluation of primary and secondary indicators in the process of China’s smart city construction from 2011 to 2020. The results are shown in Figures 12–14.

From Figures 12 to 14, we can see the changes in the development level of smart city. From these figures, we can see that the development level of smart cities in the eastern region is high, and the development situation is gradually rising. The development level of smart cities in the central

![Figure 9: Score results of difference coefficient of secondary indicators from 2011 to 2020.](image)
Figure 10: Score results of secondary index weight from 2011 to 2020.

Figure 11: Grade I index comprehensive score results from 2011 to 2020.
and western regions is low, and with the time passes by, the development gap between eastern cities and central and western cities has further widened.

4. Impact of Smart City Construction on Economy

4.1. Impact of Smart City Construction on Industrial Structure.

The construction of smart city is based on modern information technology. While promoting urban development and construction, the construction of smart city has also had a series of impacts on China’s economic structure. In order to study the impact of smart city construction on economic structure, we analyze it from the following aspects (Table 3).

In order to study the impact of smart industry, we selected some indicators. In order to evaluate the role of smart city construction on agriculture, we selected some indicators of agricultural mechanization as tools to evaluate smart agriculture. In order to measure the role of smart city construction on industry, we selected some industries related to smart city construction as the measurement indicators of smart industry. In order to evaluate the role of smart economy, we selected some indicators of smart economy, such as the number of telecom users. The selection of these indicators is closely related to the construction of smart city, and also represents the process of modern emerging industries (Table 4).

In order to better measure the indicators, this paper uses entropy method to integrate the indicators, and then uses Stata 16 to verify the data to evaluate the impact of smart city construction on industrial structure.

From the above data, we can conclude that the construction of smart city has a significant regression coefficient on the development of smart industry, indicating that the construction of smart city has a significant impact on the development of smart industry. Among them, the coefficient of smart agriculture to smart city construction is negative, which means that the construction of smart city has played a certain inhibitory role on the development of agriculture. The reason is that the construction of smart city occupies some part of agricultural land, which limits the development of rural areas. Zhang et al. [24] suggested that the construction of smart city could significantly promote the construction of smart industry. This is because the construction of smart city relies on the development of smart industry, which provides the cornerstone for the construction of smart city. Just like the research results in Filimonova et al. [25], as the pillar industry of the smart city, the structure prediction of its production area is also crucial. Sun et al. [26] pointed out that smart economy also played a significant role in promoting the construction of smart cities.

Figure 12: Smart city level in 2011.
because the prosperity of smart economy provides power for the development of smart cities and further improves the development level of smart cities, which is consistent with the research results here.

Figure 15 shows the changes of China’s Urban Smart industrial structure from 2014 to 2020. From this figure, we can see that Beijing has developed most significantly from 2014 to 2020, and the major cities of Shanghai, Guangzhou, Taiyuan, and Chongqing have also changed greatly. At the same time, we can also see that the eastern cities and the cities in the central and western regions have developed to occupy a large proportion. Therefore, how to realize regional coordination is a problem worthy of our deepest thinking.

4.2 Development of Smart Economy. The development of smart city depends on the prosperity of smart economy. The development level of smart economy is closely related to the development of smart city. Industrial institutions with smart economy as the core provide power for the development of smart city. Therefore, we used a model to evaluate the impact of smart city development policy on smart industry. We take Beijing, Tianjin, Shanghai, and other cities that implement smart city development policies as the experimental group and Lhasa, Urumqi, Baotou, and other cities that do not fully implement the development of smart cities as the control group to study the impact of smart city construction on smart economy.

From Table 5, we can see that the development of smart economy has played a significant role in promoting the development of smart cities. At the same time, among the more developed cities in the East, the role of smart economy in promoting the development of smart cities is more obvious than that in the central and western regions.

It can be seen from Figures 16 and 17 that the construction of smart city promotes the development of smart economy. After 2015, due to the implementation of smart city policy, cities with a high degree of smart city develop faster than cities with a low degree of smart city. Therefore, the construction of smart city can significantly promote the development of smart economy.

To sum up, this article analyzes the change data of the industrial structure before and after the construction of the supply chain of different smart cities. The data scoring results are used to predict the gap between the constructions of
Table 3: SES model.

| Primary index          | Secondary index                                                                 |
|------------------------|----------------------------------------------------------------------------------|
| Smart agriculture      | Total power of agricultural machinery $Y_1$                                      |
|                        | The area of machine-cultivated land $Y_2$                                        |
|                        | Machine-sowed land area                                                          |
|                        | Machine harvesting area                                                          |
|                        | Number of large and medium-sized tractors                                        |
|                        | Agricultural drainage and irrigation diesel engine                               |
|                        | Water saving irrigation machinery                                                |
| Smart industry         | Medical and pharmaceutical products manufacturing new products                  |
|                        | Medical and pharmaceutical products manufacturing output value of new products   |
|                        | Manufacture of aircrafts and spacecrafts and related equipment new products       |
|                        | Manufacture of aircrafts and spacecrafts and related equipment output value of new products |
|                        | Manufacture of electronic equipment and communication equipment new products     |
|                        | Manufacture of electronic equipment and communication equipment output value of new products |
|                        | New products of manufacture of computer and office equipments                    |
|                        | Manufacture of computer and office equipment output value of new products        |
|                        | Manufacture of medical equipment and measuring instrument new products           |
|                        | Manufacture of medical equipments and measuring instrument output value of new    |
| Smart economy          | Telecom business income                                                           |
|                        | Number of people in information transmission, computer services, and software industry |
|                        | Tens of thousands of mobile phone users                                          |
|                        | Inclusive financial index                                                        |
|                        | Coverage of digital finance                                                      |
|                        | Depth of use of digital finance                                                   |
|                        | Digitalization degree of digital finance                                         |
|                        | Online mobile payment level                                                      |
smart cities and analyze the industrial structure and economic impact of smart cities. Finally, the results demonstrate that the development of smart economy has played a great role in promoting the development of smart cities. At the same time, the role of smart economy in promoting the development of smart cities in the developed cities in the east is more obvious than in the central and western regions. The effect of smart city on the structure of smart economy suggests that the impact factor of smart city construction on agriculture is $-0.0174$, and the impact factor on the economy

Table 4: The effect of smart city to the smart economic structure.

| Smart city          | Smart agriculture | Smart industry | Smart economy | _cons |
|---------------------|-------------------|----------------|---------------|-------|
|                     | $-0.0174^*$       | $0.1176^{***}$ | $0.0084$      | $0.0472^{***}$ |
|                     | (-1.7882)         | (6.0763)      | (1.4705)      | (8.9190) |
|                     | $-0.0187^*$       | $0.1181^{***}$ | $0.0125$      | $0.0432^*$ |
|                     | (-1.9230)         | (6.1461)      | (1.1850)      | (2.5466) |
|                     | $0.0054$          | $0.0050$      | $-0.0020$     | $0.1169^{**}$ |
|                     | (0.2889)          | (0.5098)      | (-0.7471)     | (2.4968) |
|                     | $0.0041$          | $0.0046$      | $-0.0042$     | $0.1218^{**}$ |
|                     | (0.2045)          | (0.4463)      | (-1.0999)     | (2.4084) |

$t$ statistics in parentheses, $^* p < 0.10$, $^{**} p < 0.05$, $^{***} p < 0.01$.

Figure 15: Smart economic structure changes situation from 2014 to 2020.
is 0.0084. Therefore, the research reported here significantly promotes economic development in smart cities.

5. Conclusion

Smart city construction needs to realize comprehensive perception, ubiquitous interconnection, pervasive computing, and integrated applications through a new generation of IT applications (such as the Internet of Things and cloud computing represented by mobile technology). At the same time, SC construction has greatly improved people’s living standards. Based on the study of the existing smart city construction-oriented environmental impact assessment system in Europe, America, and China, this paper constructs a new comprehensive smart city assessment system, and puts forward the smart city assessment model through entropy analysis. Finally, it analyzes the smart city construction level of 11 major cities such as Beijing in China from 2011 to 2020, and explores the impact of smart city construction on industrial structure. The research results show that as the main first tier cities in China, Beijing, Shanghai, Guangzhou, Shenzhen, and Chongqing have a comprehensive score of more than 0.082 for smart city construction. It is known that Heiz construction has developed to a high level. The comprehensive evaluation scores of smart cities such as Tianjin, Hangzhou, and Wuhan are between 0.35–0.8, and scientific and technological innovation still needs to be further developed. However, the comprehensive scores of smart cities such as Guiyang, Shijiazhuang, and Changchun are low, below 0.3, with large development space. Since the construction of SC in 2011, the comprehensive score of industrial chain structures such as infrastructure, scientific

Table 5: The impact of smart city construction on smart economy.

| Inclusive financial index | Coverage of digital finance | Depth of use of digital finance | Digitalization degree of digital finance | Online mobile payment level |
|---------------------------|-----------------------------|---------------------------------|----------------------------------------|-----------------------------|
| gd 2356121.4439*** (3.7762) | 19012377.7262*** (3.4582) | 11938948.8591** (2.0271) | 21129260.0531*** (6.2412) | 15140720.1330*** (4.6386) |
| Treated 18921184.7753*** (6.5932) | 11319621.4427*** (2.7945) | −551036.1733 (−0.1028) | 52586752.3053*** (9.0970) | 31584513.8299*** (4.8931) |
| Post 1592195.4493* (1.8570) | −21428605.8569*** (−2.2970) | −140309872.7025*** (−7.5514) | −14514608.0914*** (−4.1632) | −10765612.6797*** (−6.2651) |
| _cons 85927.3965*** (2.8569) | −18650529.1758** (−2.0713) | −27108722.8826*** (−3.2849) | −16232788.1755*** (−3.2342) | −23843192.3872*** (−4.1972) |

r statistics in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01.

Figure 16: Development trend of smart economy from 2011–2020.

Figure 17: Policy effect of smart economy from 2011–2020.
and technological innovation, intelligent economy, humanized service, and intelligent environment in the process of smart city construction has shown an upward trend, while the index of humanized service has increased emphasis. The construction and development of smart city in China pay more attention to the construction of service, humanities, and social security level, which has brought new development opportunities to improve the city’s scientific and technological level and service level. The construction of smart cities is closely related to the development of China’s industrial structure. Smart cities have a certain inhibitory effect on the development of agriculture and play a significant role in promoting the development of China’s emerging industries and financial industries. Further research indicates that the development of smart cities has a significant role in promoting the development of smart economy in China, making it more stable. Therefore, the development of smart cities provides a new direction and idea for the development of Chinese cities. The supply chain evaluation model proposed here has practical value for China’s supply chain construction, but there are still some shortcomings. The supply chain-oriented environmental information system proposed here is based on the existing research results, and the development directions of cities vary dramatically. Using the same supply chain-oriented enterprise information system lacks pertinence and customization. Follow-up research will study the establishment of enterprise information system-oriented to supply chain according to different development characteristics.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

[1] C. Esposito, M. Ficco, and B. B. Gupta, “Blockchain-based authentication and authorization for smart city applications,” Information Processing & Management, vol. 58, no. 2, Article ID 102468, 2021.

[2] G. Li, Y. Wang, J. Luo, and Y. Li, “Evaluation on construction level of smart city: an empirical study from Twenty Chinese cities,” Sustainability, vol. 10, no. 9, p. 3348, 2018.

[3] C. Li, X. Liu, Z. Dai, and Z. Zhao, “Smart city: a shareable framework and its applications in China,” Sustainability, vol. 11, no. 16, p. 4346, 2019.

[4] M. Sun and J. Zhang, “Research on the application of block chain big data platform in the construction of new smart city for low carbon emission and green environment,” Computer Communications, vol. 149, pp. 332–342, 2020.

[5] A. Anand, D. D. Winfred Rufuss, V. Rajkumar, and L. Suganthi, “Evaluation of sustainability indicators in smart cities for India using MCDM approach,” Energy Procedia, vol. 141, pp. 211–215, 2017.

[6] L. Shen, Z. Huang, S. W. Wong, S. Liao, and Y. Lou, “A holistic evaluation of smart city performance in the context of China,” Journal of Cleaner Production, vol. 200, pp. 667–679, 2018.

[7] K. Angelakoglou, N. Nikolopoulos, P. Giourka et al., “A methodological framework for the selection of key performance indicators to assess smart city solutions,” Smart Cities, vol. 2, no. 2, pp. 269–306, 2019.

[8] C. Wang, S. Li, T. Cheng, and B. Li, “A construction of smart city evaluation system based on cloud computing platform,” Evolutionary Intelligence, vol. 13, no. 1, pp. 119–129, 2020.

[9] A. Razmjoo, M. M. Nezhad, L. G. Kaigutha et al., “Investigating smart city development based on green buildings, electrical Vehicles and feasible indicators,” Sustainability, vol. 13, no. 14, p. 7808, 2021.

[10] Y. Jararweh, S. Otoum, and I. A. Ridhawi, “Trustworthy and sustainable smart city services at the edge,” Sustainable Cities and Society, vol. 62, Article ID 102394, 2020.

[11] C. Li, Z. Dai, X. Liu, and W. Sun, “Evaluation system: evaluation of smart city shareable framework and its applications in China,” Sustainability, vol. 12, no. 7, p. 2957, 2020.

[12] G. Keshavarzi, Y. Yildirim, and M. Arefi, “Does scale matter? An overview of the ‘smart cities’ literature,” Sustainable Cities and Society, vol. 74, Article ID 103151, 2021.

[13] C. Patrão, P. Moura, and A. T. D. Almeida, “Review of smart city assessment tools,” Smart Cities, vol. 3, no. 4, pp. 1117–1132, 2020.

[14] Z. Wu, X. Li, X. Zhou, T. Yang, and R. Lu, “City intelligence quotient evaluation system using crowdsourced social media data: a case study of the yangtze river delta region, China,” ISPRS International Journal of Geo-Information, vol. 10, no. 7, p. 702, 2021.

[15] M. Wang, T. Zhou, and D. Wang, “Tracking the evolution processes of smart cities in China by assessing performance and efficiency,” Technology in Society, vol. 63, Article ID 101353, 2020.

[16] H. Zhao, Y. Wang, and X. Liu, “The evaluation of smart city construction readiness in China using CRITIC-G1 method and the bonferroni operator,” IEEE Access, vol. 9, pp. 70024–70038, 2021.

[17] Z. Cai and Y. Tang, “Towards a sustainable city: a scoping review of eco-cities development and practices in China,” Chinese Urban Planning and Construction, pp. 179–199, 2021.

[18] C. Rao, Y. He, and X. Wang, “Comprehensive evaluation of non-waste cities based on two-tuple mixed correlation degree,” International Journal of Fuzzy Systems, vol. 23, no. 2, pp. 369–391, 2021.

[19] C. Barrows, E. Preston, A. Staid et al., “The iee reliability test system: a proposed 2019 update,” IEEE Transactions on Power Systems, vol. 35, no. 1, pp. 119–127, 2020.

[20] A. K. Goodboy and M. M. Martin, “Omega over alpha for reliability estimation of unidimensional communication measures,” Annals of the International Communication Association, vol. 44, no. 4, pp. 422–439, 2020.

[21] K. L. Khine and T. S. Nyunt, “Predictive geospatial analytics using principal component regression,” International Journal of Electrical and Computer Engineering, vol. 10, no. 3, p. 2651, 2020.

[22] E. Dogan and R. Inglesi-Lotz, “The impact of economic structure to the environmental Kuznets curve (EKC) hypothesis: evidence from European countries,” Environmental Science and Pollution Research, vol. 27, no. 11, pp. 12717–12724, 2020.

[23] J. Cai and Y. Wang, “Optimal capital allocation principles considering capital shortfalt and surplus risks in a hierarchical
corporate structure,” Insurance: Mathematics and Economics, vol. 100, pp. 329–349, 2021.

[24] M. Zhang, X. Sun, and W. Wang, “Study on the effect of environmental regulations and industrial structure on haze pollution in China from the dual perspective of independence and linkage,” Journal of Cleaner Production, vol. 256, Article ID 120748, 2020.

[25] I. V. Filimonova, Y. A. Dzyuba, S. M. Nikitenko, and I. V. Provornaya, “Forecast of regional structure of oil production in Russia,” Eurasian Mining, vol. 2020, no. 1, pp. 25–30, 2020.

[26] L. Sun, L. Qin, F. Taghizadeh-Hesary, J. Zhang, M. Mohsin, and I. S. Chaudhry, “Analyzing carbon emission transfer network structure among provinces in China: new evidence from social network analysis,” Environmental Science and Pollution Research, vol. 27, no. 18, pp. 23281–23300, 2020.