



Journal of Global Urban Governance

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Journal of Global Urban Governance

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Inaugural Statement

Urban governance has emerged as a critical area of research in recent years, as cities have become increasingly important sites of economic, social, and political activity. In particular, scholars and practitioners have focused on the challenges of governing cities in the context of rapid urbanization, demographic change, and globalization. One important area of research has been the governance of metropolitan areas, which are often characterized by complex governance structures, overlapping jurisdictions, and competing interests. Another area of research has been the regional development of cities, which involves collaboration and coordination between different levels of government, civil society organizations, and private actors. The Journal of Global Urban Governance seeks to build on these important research areas by providing a platform for scholars to explore the dynamics of urban governance in a global context.

It is with great pleasure that we introduce the inaugural issue of the Journal of Global Urban Governance. As our world becomes increasingly urbanized, the importance of understanding and improving urban governance has never been more crucial. The Journal of Global Urban Governance seeks to advance this understanding by providing a platform for rigorous research, critical analysis, and informed debate on urban governance issues from around the world.

Our journal aims to bring together scholars, practitioners, policymakers, and activists who are interested in the complex dynamics of urban governance in a global context. We welcome contributions that explore a wide range of urban governance issues, including but not limited to: the role of local governments and civil society organizations, the challenges of managing urban growth and development, the impacts of urban policies on social and economic inequality, the politics of urban infrastructure provision, and the implications of urbanization for democracy and citizenship.

We believe that the Journal of Global Urban Governance can make a valuable contribution to the field of urban studies by promoting interdisciplinary and comparative approaches to the study of urban governance, and by fostering dialogue between researchers and practitioners from different regions and sectors. We hope that our journal will become a trusted source of

knowledge and inspiration for those who seek to create more livable, equitable, and sustainable cities around the world.

We invite you to join us on this exciting journey by submitting your work to the Journal of Global Urban Governance, by reading and engaging with our publications, and by contributing to the wider conversation on urban governance in your own communities and networks.

Aims & Scope of the Journal of Global Urban Governance

The Journal of Global Urban Governance aims to publish high-quality research on urban governance issues from around the world. Our journal is interested in a broad range of topics related to urban governance, including but not limited to:

Metropolitan governance and regional development

The role of local governments and civil society organizations in urban governance

The politics of urban infrastructure provision

The challenges of managing urban growth and development

The impacts of urban policies on social and economic inequality

The implications of urbanization for democracy and citizenship

We welcome submissions from scholars, practitioners, policymakers, and activists who are interested in advancing the field of urban governance. Our journal is committed to promoting interdisciplinary and comparative approaches to the study of urban governance, and to fostering dialogue between researchers and practitioners from different regions and sectors. We believe that by publishing cutting-edge research on urban governance issues, our journal can contribute to the development of more effective and equitable urban policies and practices around the world.

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Energy efficiency evaluation in Guangdong-Hong Kong-Macao Greater Bay Area with Super-SBM-Undesirable model

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KEYWORDS

Energy efficiency;
CO2 emission performance;
Total-factor energy efficiency;
Super-SBM model;
Malmquist Indices

ABSTRACT

Energy efficiency reflects the level of low-carbon economic development. Using the data of the Guangdong-Hong Kong-Macao Greater Bay Area (GBA) urban agglomeration from 2005 to 2019 to analyze the carbon emission characteristics of GBA in the spatiotemporal dimension, and construct the Super-SBM-Undesirable model and the Malmquist indices to measure the energy efficiency of each city, and the decomposition method based on MI further analysis. The results show that TFP has a continuous upward trend in some areas during the observation period. First, the high-input and high-pollution development model has improved significantly. Second, technological progress and coordinated economic development have gradually achieved social and environmental development in this region. During the inspection period, the total factor energy efficiency did not change much or was basically in a continuous fluctuation state, indicating that the efficiency improvement in this area had no obvious effect. From the perspective of individual differences, total factor energy efficiency reflects the rationality of economic, social and environmental coordination and regional resource allocation. Overall, there is a lot of room for improvement in total factor energy efficiency development and resource allocation in most GBA regions.

1. Introduction

In recent years, climate change has become a global issue of universal concern to human society. It is not only an environmental issue, but also a development issue. The "Kyoto Protocol" discussed at the Copenhagen World Climate Change Conference in December 2009 pushed human society's attention to global climate change to a new stage. At the end of 2015, the Paris Agreement reached by countries made arrangements for the global response to climate change after 2020. From April 30 to May 10, 2018, the United Nations Framework Convention on Climate Change (UNFCCC) launched a new round of negotiations in Bonn, Germany, on the formulation and implementation of relevant guidelines for the implementation of the Paris Agreement on climate change. Various measures have made low-carbon development an inevitable trend for the world to take the road of sustainable development. As the world's second largest economy, China has adhered to its commitments under the Paris Agreement, proposing to reduce carbon dioxide emissions per unit of GDP by 40% to 45% compared with 2005 levels by 2020, and to peak carbon dioxide emissions around 2030 and strive to

reach the peak as soon as possible, and voluntary action targets such as reducing carbon dioxide emissions per unit of GDP by 60% to 65% compared with 2005. This has not only been appreciated by the international community, but also provided a strong policy guarantee for China's continuous innovation of technologies and policies in the low-carbon field, demonstrating the responsibility of a major country. The Guangdong-Hong Kong-Macao Greater Bay Area has continued to develop in terms of economy, politics, ecology, civilization, etc. by taking advantage of the institutional advantages of "one country, two systems", and has been at the forefront of China (Chinese government website, 2018), and the top in the world. Since the reform and opening up, the rapid urbanization and industrialization of the Guangdong-Hong Kong-Macao Greater Bay Area has achieved remarkable achievements, but also brought about problems such as industrial structure imbalance, tightening resource constraints, and environmental degradation (Hu et al., 2018; Zhou et al., 2019; Jiang and Wu, 2021). As one of the regions with the highest level of urbanization and the strongest economic vitality in China (Wang et al., 2020; Wang and Chen, 2021). China has given the Guangdong-Hong Kong-Macao Greater Bay Area the mission of real-

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izing green, low-carbon and cyclical development and building a green development demonstration zone (Xu et al., 2019). The Greater Bay Area should take the initiative to assume regional responsibility, accelerate its practice and take the lead in achieving carbon neutrality.

Improving energy efficiency is particularly important for GBA to achieve carbon reduction and economic growth emissions. Therefore, comprehensively analyze the current situation and development trend of energy efficiency in GBA cities, discuss the influencing factors of energy efficiency, comprehensively grasp the development level of energy efficiency in the Bay Area cities, and compare and analyze the differences in energy efficiency of various cities. significant. The purpose of this paper is to measure the energy efficiency and changing trends of GBA cities, to tap the energy saving potential of cities in the Bay Area, and to analyze the causes of energy inefficiency.

At present, there are two kinds of energy efficiency evaluation methods: parametric method and non-parametric method. Stochastic Frontier Analysis (SFA) proposed by Aigner et al. (1977), is the representative of the parameterized method. It can effectively solve the problem of multi-input and multi-output, and can be used for industrial energy efficiency evaluation. When using the SFA model, it is necessary to determine the function expression of the input and output of the model, which is subjective and easily affects the calculation results of the model (Branca et al., 2020). As a non-parametric efficiency measurement method, data envelopment analysis (DEA) can overcome the above shortcomings, avoid the influence of subjective factors, simplify the calculation process and reduce errors. It is widely used in energy efficiency measurement (Chen et al., 2020; Zeng et al., 2019). Sueyoshi et al. (2020) proposed a two-stage evaluation and optimization method of renewable energy development based on DEA, and the adjustment of energy structure to maximize the efficiency of renewable energy is discussed. When optimizing the energy mix, the maturity and efficiency of energy conversion technologies are not considered. Combined with data envelopment analysis—judgment analysis, environmental assessment, and rank sum test, the efficiency of China’s provincial power industry is discussed. Differences between groups of provinces can be identified through a unified efficiency evaluation.

Obtaining as much output as possible with as little input as possible is the connotation of the relative efficiency evaluation of DEA, which is the basic assumption on which the classical DEA model relies (Munisamy and Arabi, 2015). However, in the real world of production operations there are often by-products produced along with the desired output, i.e. by-products that we do not wish to produce. These products are known as bad outputs, such as pollutants emitted during production (Kuhn et al., 2020). In order for industry to reach economically optimal levels of efficiency, these undesired outputs must be minimized. Because the traditional DEA model is based on a radial perspective, it cannot fully consider the relaxation of input-output indicators, and the efficiency value measured by the operation decision-making unit is biased or even inaccurate (Tone, 2011). To solve these problems (Tone, 2003), the Slack Metric-Based DEA (SBM-DEA) model is proposed that can measure, with reasonable accuracy, the efficiency assessment of industries with undesired outputs.

Many scholars mostly evaluate the energy efficiency of the research field from a static perspective, ignoring the dynamic changes before and after the efficiency (Chen and Lin, 2021). Most scholars choose the DEA radial model, ignoring the problem of slack variables when measuring inefficient decision units (Cui and Li, 2014). Super-SBM-Undesirable considers the undesired output and avoids the error caused by the subjective selection of radial angle, which can solve the problem of input and output variable relaxation; it can further measure the effective decision-making unit to make the results more accurate. The model can efficiently calculate energy efficiency considering carbon emissions. At the same time, combined with the Malmquist index model, it further explores the time series dynamic changes of GBA urban energy efficiency, and comprehensively evaluates the energy efficiency of RCEP member countries from a static and dynamic perspective. The contributions of this paper are as follows: The use of the Super-SBM-Undesirable model and the Malmquist index model to analyze the energy efficiency of GBA cities from 2005 to 2019 will help us grasp the changing trend of

energy efficiency and provide a reference for predicting future changes. Analyzing and evaluating its long-term energy efficiency will help countries understand the actual effect of energy conservation and emission reduction, and provide reference for their energy structure upgrades and emission reduction policies. The Malmquist index model is used to analyze the technical efficiency index and the technological progress efficiency index, to clarify the differences of different influencing factors in different regions, and to determine the efforts to improve energy efficiency in different regions. Provide reference for the government to formulate scientific development strategies.

2. Study area

Figure. 1 shows the Guangdong-Hong Kong-Macao Greater Bay Area. It consists of 11 cities, namely including Guangzhou (GZ), Zhaoqing (ZQ), Foshan (FS), Dongguan (DG), Huizhou (HZ), Jiangmen (JM), Zhongshan (ZS), Shenzhen (SZ), Zhuhai (ZH), Hong Kong (HK), Macao (MC). As one of China’s current national key economic development, the GBA is an area of 55,904 km² in South China. Since the reform and opening up in China, along with economic growth, GBA has experienced an extremely rapid urbanization process, in which the impervious surfaces have increased by 5.7 times from 2000 to 2015 (Ma et al. 2021). And due to the development needs of cities and the extensive use of fossil fuels, a large amount of greenhouse gases, mainly carbon dioxide, is inevitably emitted. In the past few years, local governments in the Greater Bay Area have made great efforts to achieve the carbon neutral carbon peaking goal. However, from the perspective of carbon dioxide emissions, the carbon emissions of GBA cities are extremely unbalanced, and the development level of the low-carbon economy in the Bay Area needs to be improved (as shown in Figure 1). Therefore, it is still necessary to further explore the development path of low-carbon economy and promote the coordinated emission reduction of cities in the Bay Area.

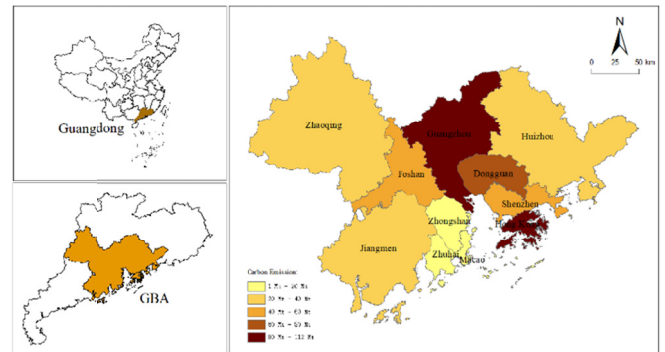


Fig. 1. Location of the GBA urban agglomeration and the distribution carbon dioxide emission in 2019

3. Research methods and data

3.1 Super-SBM-Undesirable model

In the radial DEA model, the measure of inefficiency only includes the proportional reduction (increase) of all inputs (outputs). For an invalid DMU, the difference between its current state and the projected value, in addition to the proportionally improved part, also includes the slack-improved part. The part of the relaxation improvement is not reflected in the measurement of the efficiency value. With this in mind, Kaoru Tone (2001) proposed the SBM model (slack based measure, SBM). The SBM (ERM) model uses p^* to represent the efficiency value of the DMU under evaluation. It measures the inefficiency from both input and output perspectives, so it is called a non-guided model.

The super-efficiency DEA model can process and further rank DMUs with an efficiency value of 1 in the traditional model (Pan et al., 2020). The Super-SBM-Undesirable of unexpected output model combines their strengths and not only takes into account the effect of "relax-

ation bias", but can further distinguish and rank effective DMUs (Chen et al.,2021). Therefore, the super-SBM model was chosen for the performance evaluation analysis because it has higher measurement accuracy than the traditional DEA model.

In performance evaluation, the SBM model is first used to evaluate DMUs and rank invalid DMUs; DMUs that are effective for SBM are further evaluated by super-SBM. The model allows efficiency values greater than or equal to 1, that is, the effective units of the SBM (decision units with an efficiency equal to 1) can be further evaluated and ranked. Suppose there are n decision-making units (DMUs), each DMU has m kinds of input indicators, q kinds of expected output indicators and p kinds of undesired output indicators. Let the input vector of DMU_j ($j = 1, \dots, n$) is $x_{ij} = (x_{1j}, x_{2j}, \dots, x_{mj})$, the expected output vector is $y_{rj} = (y_{1j}, y_{2j}, \dots, y_{qj})$, the undesired output vector is $b_{lj} = (b_{1j}, b_{2j}, \dots, b_{pj})$. The CRS model for calculating the SBM effective DMU_k , the super-SBM-Undesirable is as follows:

$$q_k = \min \frac{1 + \frac{1}{m} \sum_{i=1}^m s_i^- / x_{ik}}{1 - \frac{1}{q+p} (\sum_{r=1}^q s_r^+ / y_{rk} + \sum_{l=1}^p s_l^- / b_{lk})}$$

$$s.t. \begin{cases} \sum_{j=1, j \neq k}^n x_{ij} \lambda_j - s_i^- = x_{ik} \\ \sum_{j=1, j \neq k}^n y_{rj} \lambda_j + s_r^+ = y_{rk} \\ \sum_{j=1, j \neq k}^n b_{lj} \lambda_j - s_l^- = b_{lk} \\ \lambda_j \geq 0, s_i^-, s_r^+, s_l^- \geq 0 \\ i = 1, 2, \dots, m; r = 1, 2, \dots, q; l = 1, 2, \dots, p; j = 1, 2, \dots, n(j \neq k) \end{cases} \quad (1)$$

x_{ik} , y_{rk} and b_{lj} are the input vector, expected output vector and expected output vector of DMU_k respectively; s_i^+ , s_r^- , s_l^b corresponds to the slack for inputs, desired outputs, and undesired outputs; λ is the weight vector. In this model, $q_k \geq 1$. Productions built by DMUs other than DMU_k may set as

$$P = \{ (x, y, b) | \sum_{j=1, j \neq k}^n \lambda_j x_{ij} \leq x_i, \sum_{j=1, j \neq k}^n \lambda_j y_{rj} \geq y_r, \sum_{j=1, j \neq k}^n \lambda_j b_{lj} \leq b_l \} \quad (2)$$

Combining the results of SBM-Undesirable and super-SBM-Undesirable, if the efficiency value (q_j) is greater than or equal to 1, then DMU_j is super-SBM efficient; otherwise, the DMU_j is inefficient.

3.2 DEA-Malmquist index model

DEA-Malmquist Exponential Method for Analysis of Computational Efficiency (Malmquist, 1953) measures the ratio of the efficiency of a certain region in the current year to the efficiency of the previous year, that is, it describes the changes in total factor energy efficiency from the perspective of dynamic changes (Färe et al., 1944). The traditional DEA model uses the cross-sectional data of a certain year as the analysis sample, which can only reflect the relative efficiency values of different economies in the same period (Li and Chen, 2003). DEA-Malmquist exponential model can measure the dynamic changes of decision-making unit efficiency, so it can analyze panel data and decompose total factor efficiency into technical efficiency, technological progress, scale efficiency and pure technical efficiency, so as to clarify the reasons for the changes in total factor productivity of the research object (Fu and Bai, 2009). To sum up, compared with traditional DEA, the Malmquist index method has the following three advantages: First, it does not need to estimate the DUM efficiency in advance, and the initial data does not need dimensionless processing, which can effectively avoid errors and make the calculation results true and reliable. Secondly, there are no strict data requirements, multi-input multi-output or multi-input unit output can be measured, input and output only need causal relationship,

and can also be measured if there is no clear functional relationship. Finally, the efficiency measured by this method can reflect its dynamic changes, and the decomposition of the Malmquist index can explore the reasons for the changes in total factor productivity, making the results more comprehensive and objective.

Färe and Lovell (1978) named the frontier technology CRS production that constitutes the possible set as the benchmark technology, that is, the reference technology defined for computing TFP, and named the frontier technology VRS production that constitutes the possible set as the best practice technology, that is, the existing frontier technology. Supposing that a DMU produces a vector of expected outputs $y^t = (y_1^t, y_2^t, \dots, y_q^t)$ and unexpected output $b^t = (b_1^t, b_2^t, \dots, b_p^t)$ by using a vector of inputs $x^t = (x_1^t, x_2^t, \dots, x_m^t)$ in period t . Let (x^t, y^t) and (x^{t+1}, y^{t+1}) denote the same input-output pairs in periods t and $t + 1$, respectively.

The Malmquist Productivity Index should be defined based on the benchmark technology, and the Malmquist Productivity Index based on the reference technology is:

$$MI^t(x^t, y^t, x^{t+1}, y^{t+1}) = \frac{D^t(x^{t+1}, y^{t+1})}{D^t(x^t, y^t)} \quad (3)$$

$$MI^{t+1}(x^t, y^t, x^{t+1}, y^{t+1}) = \frac{D^{t+1}(x^{t+1}, y^{t+1})}{D^{t+1}(x^t, y^t)} \quad (4)$$

Since the Malmquist productivity indices and anperiods defined based on the reference technology are symmetric in economic terms, their geometric mean is defined as the composite productivity index according to the idea of Fisher's ideal index(Fisher, 1922).

The MI of this DMU between two designated time point is defined as:

$$MI^{t,t+1}(x^t, y^t, x^{t+1}, y^{t+1}) = \sqrt{MI^t \cdot MI^{t+1}} = \sqrt{\frac{D^t(x^{t+1}, y^{t+1})D^{t+1}(x^t, y^t)}{D^t(x^t, y^t)D^{t+1}(x^{t+1}, y^{t+1})}} \quad (5)$$

In Eq.(5), $D^t(x^t, y^t)$ is the distance between the $DMU(x^t, y^t)$ and the frontier in period t . Similarly, $D^{t+1}(x^t, y^t)$ represents the distance between the $D^t(x^t, y^t)$ in period t and the frontier in period $t + 1$. $D^t(x^{t+1}, y^{t+1})$ and $D^{t+1}(x^{t+1}, y^{t+1})$ are distances between the $DMU(x^{t+1}, y^{t+1})$ in period $t + 1$ and the frontiers of period t and period $t + 1$ respectively.

To determine the cause of the efficiency change, we can decompose the MI exponent given in Eq. (2) into the product of two components:

$$MI^{t,t+1}(x^t, y^t, x^{t+1}, y^{t+1}) = \frac{D^{t+1}(x^{t+1}, y^{t+1})}{D^t(x^t, y^t)} \cdot \sqrt{\frac{D^t(x^{t+1}, y^{t+1})D^t(x^t, y^t)}{D^{t+1}(x^{t+1}, y^{t+1})D^{t+1}(x^t, y^t)}} = TEC \cdot TC \quad (6)$$

Among them, TEC and TC represent comprehensive technical efficiency changes and technological changes, respectively. Since the technology based on constant returns to scale (assuming all DMUs are at the optimal production scale), the resulting efficiency value is the comprehensive technical efficiency (TE); while based on the variable returns to scale technology, the pure technology after removing the scale efficiency (SE) is constructed The efficiency frontier, resulting in Pure Technical Efficiency (PTE), excludes the effect of scale. The relationship between the three: $PE = SE \cdot PTE$.

3.3 Variables and data

Carbon emission data of 9 GBA cities in Guangdong Province downloaded from Carbon Emission Accounts and Datasets for Emerging Economies (CEADs). Missing data for some years for some cities and

CO2 emissions from 2005 to 2019 for Hong Kong and Macao were obtained through the city yearbook; and energy consumption within the city's administrative area was calculated through the IPCC guidelines. Other carbon emissions data that cannot be obtained directly or calculated from energy consumption are supplemented by linear interpolation. The formula for calculating CO2 emissions from energy consumption is as follows:

$$CE_i = \sum_{j=1}^m EC_{ij} \hat{N} V_j COE_j \quad (7)$$

Assuming that there are n cities, CE_i is the carbon emission of city i ($i = 1, \dots, n$) calculated by fuel consumption; the amount of fuel j ($j = 1, \dots, m$) used is EC_{ij} , NCV_j and COE_j are the calorific value of fuel j and the coefficient of conversion to standard coal, respectively.

Based on the perspective of total factor energy efficiency, this paper uses the input-output data of 11 cities in the Guangdong-Hong Kong-Macao Greater Bay Area from 2005 to 2019 as a sample. In total factor energy efficiency, the city's fixed asset investment, population, and energy consumption are used as inputs, the corresponding GDP is the expected output, and carbon dioxide emissions are the undesired output. The original data comes from the statistical yearbooks of various cities and the Guangdong Statistical Yearbook. Input and output indicators as shown in the Table 1 below:

Total index	Level one index	Level two	Unit	
Input	Input	X1 Fixed assets investment	Billion RMB	
		X2 Population	Million	
		X3 Energy consume	Million tce	
Energy efficiency	Expected Output	X4 GDP	Billion RMB	
		Unexpected Output	X5 CO ₂ emission(CE)	Million tons

4. Results

4.1 Temporal distribution characteristics of CO₂

Based on the statistical map Fig.2 of the total carbon emissions of GBA cities at four time points, it can be seen that the carbon emissions of GBA cities increased slightly in the early stage, and tended to be stable in the later stage. High-emission cities are concentrated in the central GBA, and the distribution pattern tends to be stable during the observation period.

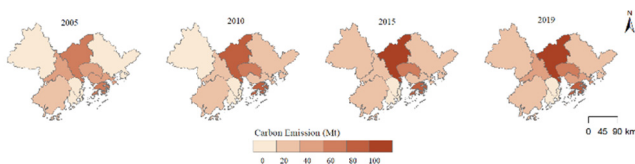


Fig. 1. The spatial distributions of carbon emission in GBA during 2005-2019

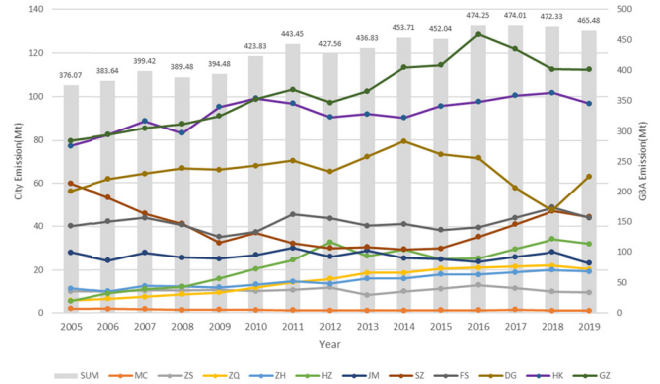


Fig. 2. Comparative analysis of carbon emission amount in GBA during 2005-2019

In terms of total amount as seen in Fig.3, the carbon dioxide emissions from 2005 to 2019 reached the maximum value in 2016, which was 474.25 Mt, and the carbon emissions from 2005 to 2016 showed a relatively gentle upward trend of fluctuation. From the perspective of carbon emissions of various cities, before 2010, Guangzhou and Hong Kong had similar carbon emissions. After 2010, Guangzhou's carbon dioxide emissions were higher than Hong Kong and became the city with the highest GBA emissions. Between 2010 and 2016 The gap in carbon emissions between Guangzhou and Hong Kong shows a widening trend. After Guangzhou's carbon emissions reached a peak of 128.7 Mt during the observation period in 2016, the gap gradually narrowed. Dongguan's carbon emissions in 2005 were close to Shenzhen's, and from 2006 to 2019, it was the city with the third-largest GBA emissions (except for 2018, which was slightly lower than Foshan), and reached a peak of 79.22 Mt during the observation period in 2014. Foshan, as the city with the fourth largest carbon emission in GBA, its emission is much lower than Dongguan and fluctuates in the range of around 40 during the observation period. The carbon emissions of other cities are basically lower than 40 Mt in each year, of which Macao has the lowest carbon emissions, and the annual emissions during the observation period did not exceed 2 Mt.

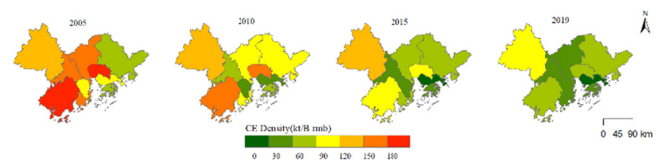


Fig. 3. The spatial distributions of carbon emission density in GBA during 2005-2019

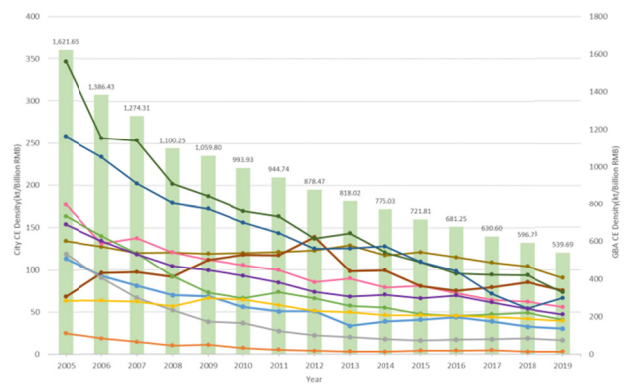


Fig. 4. Comparative analysis of carbon emission density in GBA during 2005-2019

In terms of carbon emission intensity, GBA's carbon emission per Billion RMB shows a downward trend year by year. From the statistical

map (Fig. 4) of carbon emission intensity, the energy consumption per unit of GDP in GBA cities has decreased significantly. During the observation period, except for the two cities of Huizhou and Zhaoqing, whose carbon emission intensity gradually increased in the early stage and gradually decreased in the later stage, the carbon emission intensity of other cities generally showed a fluctuating and declining development trend (Fig. 5). The output corresponding to a unit of energy is generally increasing or the energy consumption corresponding to a unit of output is generally decreasing. GBA has achieved certain results in the development of a low-carbon economy.

In order to check the degree of achievement of the carbon neutralization goal of "carbon dioxide emissions per unit of GDP will be reduced by 40% to 45% compared with 2005 by 2020", the carbon emission density in 2005(CED05) and 2019(CED19) was selected for comparison $(CED05 - CED19)/CED05$, as shown in the Fig.6, where Ave represents the overall GBA level. It was found that by 2019, the overall carbon emissions in the GBA region had dropped by 67% compared with 2005, exceeding and ahead of schedule to complete one of the phase goals of carbon peaking and carbon neutrality. The three cities of Hong Kong, Zhaoqing and Huizhou did not achieve this target. Hong Kong and Zhaoqing achieved a 38% and 32% reduction in carbon intensity respectively, while Huizhou increased its carbon intensity by 10% compared to 2005. The two cities with the largest reduction in carbon emission intensity are Macao and Shenzhen, which have reduced their carbon emission intensity by 88% and 86% respectively compared to 2005.

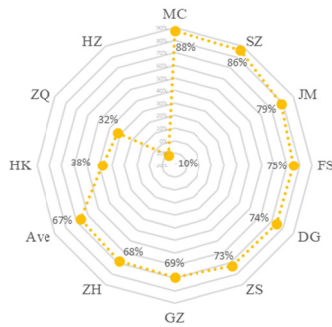


Fig. 5. The degree of achievement of the carbon neutralization goal in each city

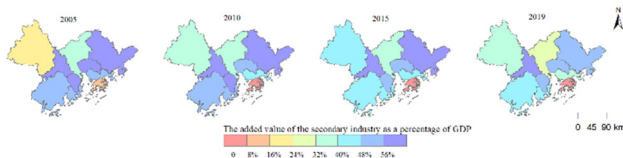


Fig. 6. The proportion of the secondary industry added value in GDP

According to the statistical map (Fig. 7) drawn by the added value of the secondary industry in 11 cities in 2005, 2010, 2015 and 2019, the added value of the secondary industry in Zhaoqing increased rapidly in the proportion of the local GDP (with a slight decline in the later period). Therefore, the insignificant decrease of carbon emission intensity in Zhaoqing may be related to the increase of manufacturing industry. Foshan, Zhongshan, Dongguan and Huizhou's secondary industry accounted for 48% or more of local GDP during the observation period. Among them, Foshan, Dongguan, and Zhongshan had a 73% reduction in carbon intensity in 2019 compared to 2005- 75%, but Huizhou increased by 10%.

4.2 Analysis of total factor energy efficiency based on super-SBM

Super-SBM-Undesirable total factor energy efficiency measures the comprehensive development coordination degree of economic, social and low-carbon development. The average comprehensive energy effi-

ciency of the 11 GBA cities is arranged in descending order from left to right. The specific results are as shown in Table 2.

It can be seen from the Table 2 that there are large differences in total factor energy efficiency between Hong Kong and Macao, as well as between Hong Kong and Macao and the other nine mainland cities. Macao's total factor energy efficiency has remained at a level of around 1.95 all year round, while Hong Kong's fluctuated and decreased from a peak of 1.03 in 2005 to 0.17 in 2013, and stabilized at around 0.25 in 2015 and thereafter. The total factor energy efficiency of the other 9 GBA mainland cities is mostly at the level of 0.05 to 0.15, and the fluctuation range is small.

Table 2 Super-SBM-Undesirable total factor energy efficiency in GBA cities

	MC	HK	SZ	FS	ZH	GZ	ZS	DG	ZQ	JM	HZ
2005	1.92	1.03	0.18	0.12	0.12	0.13	0.1	0.09	0.12	0.07	0.08
2006	1.95	0.43	0.16	0.11	0.11	0.12	0.09	0.08	0.09	0.06	0.06
2007	1.96	0.38	0.15	0.11	0.1	0.11	0.08	0.08	0.08	0.06	0.05
2008	1.91	0.32	0.14	0.11	0.09	0.1	0.08	0.07	0.06	0.05	0.05
2009	1.94	0.34	0.14	0.12	0.1	0.11	0.08	0.07	0.07	0.06	0.05
2010	1.96	0.26	0.12	0.1	0.08	0.09	0.07	0.06	0.05	0.05	0.04
2011	1.98	0.21	0.1	0.08	0.07	0.07	0.06	0.05	0.04	0.04	0.04
2012	1.96	0.19	0.1	0.07	0.07	0.07	0.05	0.05	0.04	0.04	0.04
2013	1.97	0.17	0.09	0.07	0.06	0.06	0.05	0.04	0.03	0.03	0.03
2014	1.97	0.18	0.1	0.07	0.07	0.06	0.05	0.04	0.03	0.03	0.04
2015	1.96	0.24	0.14	0.1	0.09	0.08	0.07	0.06	0.04	0.04	0.05
2016	1.97	0.25	0.15	0.11	0.1	0.09	0.07	0.07	0.05	0.05	0.05
2017	1.97	0.25	0.15	0.11	0.11	0.09	0.07	0.08	0.05	0.05	0.05
2018	1.96	0.23	0.13	0.1	0.1	0.08	0.06	0.08	0.04	0.05	0.05
2019	1.96	0.24	0.14	0.11	0.1	0.09	0.06	0.08	0.05	0.05	0.05
Mean	1.96	0.31	0.13	0.10	0.09	0.09	0.07	0.07	0.06	0.05	0.05

Taking into account the differences in urban industrial development caused by "one country, two systems", the total factor energy efficiency of Hong Kong, Macao and the other 9 GBA cities in mainland China is relatively high, resulting in a low degree of differentiation of total factor energy efficiency in the 9 GBA cities in mainland China. Therefore, after excluding the two cities of Hong Kong and Macao, we obtained the Table 3. From the perspective of time dimension, there are big differences in the trend of total factor energy efficiency in different regions during the investigation period. For example, Zhuhai and Jiangmen showed a downward trend during the inspection period. Combined with the results of the overall decline in the carbon emission intensity of these two cities, it may be caused by the low utilization efficiency of inputs such as labor, capital and energy. During the inspection period, Shenzhen's total factor energy efficiency remained at a super-efficiency level, indicating that Shenzhen is more likely to achieve coordinated development of economy and environment, and resource allocation is more reasonable. The total factor energy efficiency of Foshan fluctuates greatly. Except for Shenzhen and Foshan, the total factor energy efficiency of the other seven cities in the GBA mainland has experienced a process of first falling and then rising, reflecting that during the observation period. In the process of economic development, cities pay more and more attention to the environment, and gradually move towards a

development direction in which the economy, society and environment are coordinated. However, in general, the total factor energy efficiency development status of the eight GBA inland cities except Shenzhen is poor, and the absolute value level is low, indicating that there is still much room for improvement in resource allocation and low-carbon economic development.

Table 3 Super-SBM-Undesirable total factor energy efficiency in GBA mainland cities

	SZ	FS	DG	GZ	ZH	ZS	ZQ	HZ	JM
2005	1.20	0.62	0.49	0.66	0.58	0.66	1.06	1.25	0.40
2006	1.20	0.60	0.47	0.65	0.58	0.59	1.03	0.45	0.38
2007	1.21	0.60	0.45	0.62	0.51	0.55	1.00	0.34	0.36
2008	1.22	0.66	0.45	0.61	0.50	0.54	0.40	0.32	0.35
2009	1.28	1.00	0.43	0.58	0.50	0.49	0.39	0.28	0.33
2010	1.26	1.01	0.43	0.57	0.49	0.50	0.36	0.29	0.33
2011	1.34	0.59	0.43	0.54	0.45	0.46	0.32	0.28	0.31
2012	1.39	0.56	0.40	0.49	0.42	0.42	0.27	0.26	0.28
2013	1.38	0.53	0.37	0.48	0.41	0.42	0.25	0.26	0.25
2014	1.38	0.51	0.38	0.45	0.41	0.39	0.24	0.25	0.24
2015	1.43	1.00	0.43	0.46	0.42	0.39	0.23	0.25	0.24
2016	1.44	0.55	0.46	0.46	0.43	0.39	0.25	0.26	0.25
2017	1.37	0.54	1.01	0.48	0.47	0.39	0.25	0.26	0.26
2018	1.32	1.00	1.07	0.52	0.48	0.44	0.27	0.28	0.27
2019	1.34	1.00	1.07	0.56	0.48	0.49	0.28	0.29	0.28
Mean	1.32	0.72	0.56	0.54	0.47	0.47	0.44	0.35	0.30

4.3 Total factor energy efficiency decomposition based on Malmquist index

This paper selects MaxDEA Pro 6.13 software to analyze the energy efficiency of 11 GBA cities from 2005 to 2019. The DEA-Malmquist index method is an effective method for total factor productivity analysis of selected samples proposed by Sten Malmquist. The ratio of this year's efficiency to the previous year's efficiency, that is, the change in total factor energy efficiency, is measured from the perspective of dynamic changes (Zhang et al., 2021). Traditional DEA has the following three advantages: First, there is no need to estimate the DUM efficiency in advance, and the initial data does not need to be dimensionless, it can effectively avoid errors and make the calculation results true and reliable. Secondly, there are no strict data requirements, multi-input multi-output or multi-input unit output can be measured, input and output only need causal relationship, and can also be measured if there is no clear functional relationship. Finally, the efficiency measured by this method can reflect its dynamic changes, and the results are more comprehensive and objective. Due to these advantages, this method is widely used in total factor energy research in various industries.

Table 4 Malmquist Index (TPF Change) in GBA cities

	MC	DG	FS	GZ	HZ	JM	SZ	HK	ZQ	ZS	ZH	Mean
2005-2006	1.02	1.11	1.13	1.14	0.96	1.08	1.10	1.05	0.99	1.14	1.11	1.07
2006-2007	1.00	1.12	1.18	1.11	1.06	1.09	1.11	1.60	1.01	1.14	1.11	1.13
2007-2008	0.98	1.10	1.21	1.10	1.11	1.10	1.10	1.05	0.99	1.11	1.08	1.08

2008-2009	1.01	0.99	1.07	1.03	0.99	1.02	1.04	0.99	1.05	1.01	1.07	1.02
2009-2010	1.01	1.08	1.11	1.10	1.15	1.16	1.11	1.06	1.04	1.13	1.10	1.10
2010-2011	1.01	1.08	1.06	1.09	1.13	1.08	1.13	1.07	1.04	1.08	1.11	1.08
2011-2012	0.99	1.09	1.10	1.04	1.12	1.03	1.18	1.06	0.98	1.11	1.11	1.07
2012-2013	1.01	1.06	1.07	1.09	1.11	1.05	1.12	1.04	1.04	1.07	1.11	1.07
2013-2014	1.00	1.09	1.06	1.03	1.08	1.02	1.09	1.05	1.06	1.03	1.10	1.05
2014-2015	0.99	1.12	1.08	1.03	1.03	1.07	1.04	1.07	1.02	1.04	1.07	1.05
2015-2016	1.00	1.10	1.07	1.02	1.06	1.07	1.06	1.02	1.09	1.06	1.08	1.06
2016-2017	1.00	1.13	1.04	1.04	1.07	1.09	1.06	1.06	1.05	0.99	1.14	1.06
2017-2018	0.99	1.11	1.06	1.03	1.02	1.07	1.04	1.05	1.04	1.03	1.02	1.04
2018-2019	1.00	1.07	1.04	1.11	1.03	1.04	1.04	1.01	1.05	1.01	1.01	1.04
Mean	1.00	1.09	1.09	1.07	1.06	1.07	1.09	1.08	1.03	1.07	1.09	1.07

According to the result of Malmquist Index in Table 4, most of the TFP index is in the range of [1, 1.2], indicating that the total factor productivity generally shows a slow upward trend in each period, and the energy efficiency has been improved. Among them, Dongguan, Foshan, Shenzhen and Zhuhai had the highest TFP index during the observation period, at 1.09, indicating a higher degree of energy efficiency improvement. Except for Macao, the TFP of each city during the observation period increased by an average of 3%-9% per year; except for Macao and Zhaoqing, the TFP of the other 10 cities increased by more than 6% per year during the observation period.

Malmquist results can be subdivided into comprehensive technical efficiency changes and technological progress (Farrel, 1957), specifically the TFP index is equal to the product of the comprehensive technical efficiency change and technological progress. Since the industrial composition and technological development of Macao and Hong Kong under the "One Country, Two Systems" policy are quite different from those of GBA cities in the other nine continents, Macao and Hong Kong are not included in the subsequent decomposition analysis of the TPF index. The following Table 5 from left to right shows the technological progress, comprehensive technical efficiency index, pure technical efficiency index, scale efficiency index and TFP index of the nine GBA cities in Guangdong Province during the observation period:

Table 5 Total factor energy efficiency decomposition in time dimensions

	TC	TEC	PTEC	SEC	MI
2005-2006	1.23	0.90	0.95	0.93	1.09
2006-2007	1.20	0.93	0.98	0.96	1.12
2007-2008	1.16	0.93	0.98	0.94	1.06
2008-2009	1.02	1.02	0.94	1.12	1.05
2009-2010	1.11	0.99	1.01	0.98	1.10
2010-2011	1.19	0.91	1.11	0.86	1.07
2011-2012	1.14	0.93	0.92	1.06	1.07
2012-2013	1.13	0.96	1.04	1.02	1.09
2013-2014	1.10	0.97	0.97	1.00	1.08
2014-2015	1.00	1.13	1.13	1.05	1.13
2015-2016	1.08	0.98	0.98	1.00	1.04

2016-2017	0.97	1.15	1.03	1.12	1.08
2017-2018	0.99	1.14	1.07	1.09	1.14
2018-2019	1.03	1.04	1.01	1.03	1.08
Mean	1.11	1.00	1.01	1.01	1.08

From the perspective of time dimension, the average TFP index of the nine GBA cities in Guangdong Province is 1.08, showing a slow upward trend, of which the average technological progress index is 1.11, which is mainly due to the technological progress in the early stage, and the speed of technological development in the later stage has slowed down or even slightly. While the comprehensive technical efficiency fluctuates during the observation period, most of the time in the early stage is in recession, and the later development trend is gradually improving, and the average growth rate from 2005 to 2019 is 1. It can be seen that the main reason for the rise in TFP is technological progress. Judging from the dismantling data of comprehensive technical efficiency, the average pure technical efficiency and scale efficiency of GBA cities have not increased significantly. The industrial resource allocation structure needs to be further strengthened in management and the allocation structure of input indicators should be improved.

The comprehensive technical efficiency is disassembled and analyzed in terms of city and time. The comprehensive technical efficiency is equal to the product of the pure technical efficiency and the scale efficiency. If the corresponding comprehensive technical efficiency of a city has improved between a certain two years, the background color of the change value of the pure technical efficiency and the scale efficiency of the city during the period is marked as light green. The Table 6 shows the changes in pure technical efficiency and scale efficiency from 2005 to 2019.

Table 6 Comprehensive technical efficiency decomposition in time and city dimensions

Year		DG	FS	GZ	HZ	JM	SZ	ZQ	ZS	ZH
2005-2006	PTEC	0.96	0.96	1.00	0.75	0.98	0.98	0.89	1.04	0.99
	SEC	1.00	1.01	0.97	0.48	0.97	1.02	1.10	0.86	0.99
2006-2007	PTEC	0.98	1.02	1.00	0.66	1.01	1.02	1.07	1.08	0.97
	SEC	0.97	0.98	0.95	1.14	0.92	0.99	0.91	0.87	0.90
2007-2008	PTEC	0.99	1.09	1.01	0.92	0.98	1.02	0.77	1.00	1.02
	SEC	1.01	1.00	0.98	1.03	1.00	0.98	0.52	0.98	0.96
2008-2009	PTEC	0.95	1.38	1.01	0.78	0.54	1.02	0.82	0.94	1.04
	SEC	1.00	1.11	0.95	1.13	1.77	1.03	1.19	0.97	0.97
2009-2010	PTEC	1.04	1.01	0.99	1.00	1.04	0.98	0.91	1.14	1.02
	SEC	0.98	1.00	0.98	1.01	0.97	1.00	1.01	0.90	0.96
2010-2011	PTEC	2.00	0.99	0.98	1.01	0.99	1.12	0.88	1.03	0.97
	SEC	0.49	0.59	0.97	0.96	0.93	0.95	1.02	0.87	0.96
2011-2012	PTEC	1.01	1.00	0.49	0.93	1.01	1.03	0.93	0.87	1.03
	SEC	0.93	0.94	1.86	1.01	0.89	1.01	0.92	1.05	0.90
2012-2013	PTEC	0.49	1.00	0.96	1.09	1.00	0.99	0.96	1.84	0.99
	SEC	1.89	0.95	1.00	0.91	0.92	1.00	0.95	0.55	0.97

2013-2014	PTEC	1.02	1.00	0.95	0.97	1.03	1.03	1.00	0.78	0.99
	SEC	1.00	0.96	0.99	1.00	0.91	0.97	0.98	1.20	1.01
2014-2015	PTEC	2.06	1.02	1.02	1.07	1.04	0.99	0.99	1.00	0.99
	SEC	0.55	1.90	1.00	0.94	0.99	1.05	0.98	0.98	1.03
2015-2016	PTEC	1.02	0.99	1.01	0.98	0.98	0.98	1.04	0.85	0.98
	SEC	1.06	0.55	0.99	1.04	1.04	1.03	1.02	1.20	1.06
2016-2017	PTEC	1.03	1.00	1.06	0.97	0.98	1.00	1.03	1.20	0.98
	SEC	2.13	0.98	0.99	1.06	1.05	0.95	0.99	0.82	1.11
2017-2018	PTEC	1.01	1.02	1.08	0.98	0.98	1.00	1.06	1.50	0.98
	SEC	1.04	1.83	1.00	1.06	1.07	0.97	1.02	0.76	1.02
2018-2019	PTEC	0.97	1.00	1.06	0.98	0.98	0.99	0.97	1.15	0.99
	SEC	1.04	1.00	1.01	1.09	1.06	1.02	1.06	0.98	1.02

According to the data and color markings in the Table 6, during the observation period, except for Shenzhen, Zhongshan and Foshan, the comprehensive technical efficiency of the other six GBA cities in Guangdong Province basically showed a declining trend before 2015. During the observation period in Dongguan City, the change value of pure technical efficiency in three years fluctuated in [0.49, 2.06], and the change value of scale efficiency in the range of [0.49, 2.13], reflecting the development of production management technology in Dongguan City unstable. The comprehensive technical efficiency of Foshan fluctuated during the observation period, and the pure technical efficiency declined slightly in 2010-2011 and 2015-2016, while the scale efficiency changes were 0.59 and 0.55, which were significantly deviated from the optimum. Lack of management. The change value of pure technical efficiency in Guangzhou in 2011-2012 was 0.49, a significant decrease, and the change value of scale efficiency was 1.86. The optimization of production management made up for the decline of production management technology. The data of Jiangmen in 2008-2009 also reflected this situation. From 2012 to 2013, the change value of pure technical efficiency in Zhongshan was 1.84, and the change value of scale efficiency was 0.55. The comprehensive technical efficiency of this year was reflected in that the progress was mainly led by production management technology.

5. Conclusions

A spatiotemporal analysis of carbon emissions, carbon emission intensity and the proportion of secondary industry added value in GDP of eleven GBA cities found that the total carbon emissions of GBA began to decline slowly after reaching a peak of 474.25Mt in 2016, and ? per unit in 2019. Compared with 2005, GDP carbon dioxide emissions dropped by 67%, exceeding the target of 45% reduction in intensity. Among them, the carbon emission intensity of Huizhou also increased by 10%, which may be caused by the rapid development of the secondary industry. After having a basic understanding of GBA carbon emissions, the Super-SBM-Undesirable model combined with the Malmquist index was used to evaluate and analyze the energy efficiency of the input-output panel data of eleven GBA cities. It was found that due to the "one country, two systems" policy, the energy efficiency of Macao, with the gaming industry and other tertiary industries as its main development industries, was at a super-efficiency level during the observation period. The frontiers constituted such that other cities with a high proportion of secondary industry added value in GDP have a poorer degree of differentiation in energy efficiency. Therefore, in the follow-up TFP index analysis and decomposition, only nine cities in Guangdong Province are included in GBA. During the observation period, TFP has continued to rise in some areas. First, the high-input and high-pollution development model has improved significantly, and the second is Technological pro-

gress, coordinated economic development, society and environment are gradually realized in the region. During the inspection period, the total factor energy efficiency did not change much or was basically in a continuous fluctuation state, indicating that the efficiency improvement in this area had no obvious effect. From the perspective of individual differences, total factor energy efficiency reflects the rationality of economic, social and environmental coordination and regional resource allocation. Overall, there is a lot of room for improvement in total factor energy efficiency development and resource allocation in most GBA regions.

Under the basic national policy of "one country, two systems", the Guangdong-Hong Kong-Macao Greater Bay Area has great differences in carbon productivity levels. In order to balance the economic level and carbon emission level of the urban agglomeration in the Greater Bay Area, respond to the national initiative to jointly build a green "Belt and Road", and build a beautiful new China, based on the research results of this paper, the following suggestions are put forward:

(1) On the level of economic development: Hong Kong and Macao have entered the post-industrial era, and the demand for high-energy-consuming industrial products is low, and attention should be paid to the development of low-energy-consumption and high-output industries. The Guangdong region is in the process of industrialization and urbanization, and the demand for high energy-consuming industrial products is relatively high. Therefore, in the future, the economic development mode of the Guangdong region should be transformed, and the Guangdong region should complete its industrialization and urbanization as soon as possible, change the "energy for GDP" and "carbon emissions for GDP" model, and put an end to the high energy consumption and extensive economic development model.

(2) Industrial structure: On this basis, Hong Kong and Macao should be committed to developing a more intensive, efficient and advanced tertiary industry, and expanding other service industries such as transportation, communications, housekeeping, and electronic information technology. The Guangdong region should learn from the experience of Hong Kong and Macao, adjust the industrial structure, and the secondary industry with high energy consumption should optimize and upgrade the technology, improve the technical level, and vigorously develop low energy consumption, High-yield tertiary industry.

(3) Energy utilization: While developing the economy, Hong Kong and Macao should put the economical and intensive use of energy in the same position, and pursue the low-carbon development of the city; while the Guangdong region has a relatively high economic level at present, green environmental protection is the Low carbon development in the region is an urgent priority. Transform energy utilization, innovate energy system, develop renewable energy, reduce carbon emissions, and build low-carbon development of the Guangdong-Hong Kong-Macao Greater Bay Area urban agglomeration.

(4) In terms of carbon market construction: Guangdong Province is one of the seven existing carbon emission trading market pilots, and has regional advantages in innovation in the low-carbon field. Compared with the collection of carbon tax, the development of the carbon market has less impact on the operation and production of enterprises, and provides various channels for enterprises to achieve carbon goals. At present, it is necessary to further expand the scope of carbon trading and emission control industries. Under the guidance of the "dual carbon" goal, do a good job in the top-level design of the carbon market in the Guangdong-Hong Kong-Macao Greater Bay Area, promote the launch of key carbon financial products and new derivatives, and cooperate with the national carbon market. Dislocation development and complement each other. During the "14th Five-Year Plan" period, actively integrate the existing carbon emission trading resources in Guangdong, promote the cooperation and regional linkage of carbon emission trading between Hong Kong and Macao and the mainland, and explore the cross-border (border) carbon emission quota market and voluntary carbon trading market.

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Changes in China's Local Governance: From Government-Enterprise Integration to Multiple Collaborative Governance

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KEYWORDS

ABSTRACT

Integrated Governance and Multiple Collaborative Governance; Local Governance; Development Zone

Industrial associations are important civil society organizations. This paper sketches their new role, and Multiple Collaborative Governance explicates local government-business relations in China. After the reform of the tax-sharing system, the governance of China's development zones has presented a mode of operation and management for local government and enterprise integration. However, in recent years, the governance patterns of local development zone have been changed. Industrial associations have been organized to influence the relations between local governments and enterprises. Although local government and enterprises have become more integrated, a three-dimensional collaborative governance model has emerged. This model has introduced restructured industrial associations into the governance of local development zones. We call this the "government-industrial association-enterprise" multiple collaborative governance model. In this model, the industrial association plays a leading role, along with government guidance. It establishes companies and adopts a market-oriented approach in the renovation of China's industrial zones. Taking Guangdong's Sino-German Metal Ecology Park as an example, the authors explain the connotation and operational logic of the multiple collaborative governance model. We also analyze the validity and limitations of multiple collaborative governance in present local governmental innovation. In the end, the paper raises issues that need future study.

1. Introduction

The relationship between China's economic growth and governmental governance model and efficiency has been a hot topic in academic research in recent years. Development zones have been an important platform for the improvement of China's economic growth and urbanization level over the past decades, and even an important channel for governments at all levels to improve public services. Many studies on new public management, new public governance and co-production suggest that cooperation across the sectors could provide quality public services and also reduce costs.¹ It is an important proposition to observe the institutional changes of local governance in China.² Since its rise in the 1980s, the development zone has played an important role in China's regional economic and social development. As a specific space of the nation-state, development zones have a narrow scope and implement special policies and management tools to attract external production factors and foreign direct investment, and to promote their own development in the domestic economy. Scholars have referred to these areas as "innovation regions"³ in China's governance, because they deviate from areas dominated by traditional urban and rural governance.

Local governments use development zones as enclaves to maintain their reach within the local economy. It was calculated that over 6,800 development zones were active by the end of 2000.⁴

Jean Oi has summarized such local governance and the reasons for local economic booms as "local government corporatism". She argues that local governments not only intervene in economic activities, but also form corporate organizations along with enterprises to promote local economies.⁵ Walder has compared local government to the headquarters of a company. The enterprise is a subsidiary, and it participates in the economic activities of its organization—in Walder's words, "local government is the entrepreneur".⁶ Although Oi and Walder's research is not limited to development zones, "local government corporatism," also called "local government corporatization," is considered as the core of the governance pattern in China's development zones in the early stages of the Reform and Opening Up. It is used to explain why the local economy can flourish in an authoritarian state.

After the 1990s, "local government corporatism" or "local government corporatization" was challenged in the reform of the tax-sharing

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system. The tax-sharing system engenders a model of urbanization that combines the commodification of land usage and the land-bound finance system invented by local governments. Under this development model, local government also changes its face in the local economy. ZheXiaoYe argues that at this time, local government behavior has the characteristics of integrated governance of administration, politicization and corporatization. Local governments no longer directly manage economic entities, but use organizations such as financing platforms and land-project platforms to dip into the market economy. The way to operate the jurisdiction, thus forms an “administrative-political-company” integrated governance model trinity. This integrated governance is the result of local government’s shift from managing enterprises to managing urban space and a platform in which land use is financialized. In sum, since the tax-sharing reform, local governments have used corporative platforms to implement entrepreneurial operations.

Many Chinese scholars have studied the new governance model after the tax reform, and have regarded this model as an alternative social management tool for China’s market economy. Zhou Luyao argues that the connection between the political mechanism, the administrative mechanism, and corporate management have shaped the integrated governance model since the mid-1990s; the platform-companies have become governing tools for unified governance. Chen Guoquan and Mao Yimin have summarized the “administration committee + investment company” government and enterprise integrated governance model as “government and enterprise integration”. To stimulate development zones, Chen Kelin argues that “the development zone model empowers the local government through the three dimensions of people, finance and affairs. The advantages of local governments have shaped the management characteristics of the political and enterprise integration model.” It should be noted that since the mid 1990s, the governance of development zones has formed “political and enterprise integration” different from the model in Oi and Walder’s argument about township village enterprises (TVEs). The main body of this governance model is the government and the enterprise, but on the basis of the leading role of the government. This model has formed a high degree of integration between the government and the enterprise, which has been involved in both the logic of government and the logic of enterprise forces. The existence of the government-enterprise integrated governance model has provided a powerful impetus for local economic development since the tax-sharing reform. This can explain the rapid development of China’s economy since the mid-1990s.

However, although this governance model has achieved effective governing performance, it has become the root of a series of problems in local economic and social development. For the problems brought about by the government-enterprise integration governance model, the explanation given by ZheXiaoYe is that there is an inherent institutional paradox in the integrated governance: “A government-led internal-circulation organization system whose core task is to achieve the internal management; the will of power and performance of government are mutually reinforcing within the integral governance model.” Further, the core feature of the integration of government and enterprise is the government’s “recentralization”, which has injected what scholars call “public power” (gong quanli) into private law. This has increased of the political and agency cost, thwarting the supervision of local government and the restriction of power in the 1990s.

From the perspective of governance subjects, the government-enterprise integration model in development zone governance is essentially a governmental organization. Most existing academic studies have focused on the role of government and enterprises in the governance of development zones. From the perspective of the relationship between government and enterprises, the governance model in development zones is divided into three schemes: government-led, enterprise-led, and government-enterprise hybrids. In addition to the government and the enterprises, other governing entities are involved in the governance of development zones, such as industrial associations and social organizations. Therefore, this study’s research questions are: with the advancement of economic reform and the diversification of governance entities, how do other organizations participate in the governance of development zones? What is the impact of the governance model in the

present reform? Has there been a recent change in the governance model for China’s economic development?

The purpose of this article is to elaborate upon a new governance model for contemporary China’s development zones. It assesses the role of association beyond state-enterprise relations, especially in situations when state-enterprise relations have become complicated in contemporary China. This study focuses on the interaction between local government, social associations, and enterprises in the making of a new development zone in the Pearl River Delta. This is used to illustrate the inadequate examination of the governance model in China’s development zones.

Based on a case from long-term fieldwork in the Pearl River Delta, interviews conducted at the field site, relevant official documents collected between 2016 to 2017 (see Appendix A), and secondary literature, the authors argue that the invention of a new governance model in China’s development zone is mediated by domestic anxiety toward development and compromises between provincial and city governments. The industrial association plays an important role in the making of a new governance model in China’s development zones. People would expect that the expansion of industrial associations would force government to allow more space for private enterprises in the Chinese market economy. This study finds that the expansion of industrial associations in state-enterprise relations has been encouraged by local governments, incorporating local interests with planning from the highest levels of government. In developing this argument, this article will focus on the neglected role of the industrial association in the making of a new governance model for China’s development zones.

The development zone selected in this paper is a modern industrial park set up between Guangdong, the most economically developed region in China, and the German government. For Guangdong, this development zone is an area where industrialization and urbanization are going on simultaneously, and the reform of its governance mechanism represents a new trend of local governance in China. The park is a joint market operation of party committee, government, social organizations and enterprises, which is a typical feature of China’s economic development and local governance. This paper mainly investigates the relationship and coordination mechanism between the multi-layer governance institutions in this development zone. One of the most important is the central coordinating role of social organizations. As a developing manufacturing power, it is extremely important for China to achieve industrial upgrading and high-quality economic growth. The direction of China’s local governance reform should be in line with this broad goal. In addition, urbanization and urban construction are also important tasks of local governance in China. Through the analysis of the development zone, this paper focuses on the effectiveness and limitations of its multiple collaborative governance mechanisms. Especially after social organizations play a substantive role in local coordinated governance, we need to study whether the cost of corruption in local governance is reduced, whether the supply efficiency of basic public services is improved, and whether the national and local development strategies are well implemented at the enterprise level.⁷

This article is structured as follows. The following section reviews inter-disciplinary perspectives on the structural rationale of governance models executed in China’s development zones, emphasizing the transition of the governance model in state-enterprise relations. The third section shows how the new governance model has been invented through local government’s designation of a new development zone in the Pearl River Delta. In this section, original empirical data is presented to illustrate the evolution of governing entities in the development zone. The domestic construction of development zones is investigated by examining capital mobilization and the rising role of industrial associations. This reveals how local governments have been driven away from chances to innovate their governance models, in terms of framing and internationalizing the Central government rationale in local agendas. It also shows how associations operate local governance scenarios. The article concludes that the industrial association has led to the development of the development zone, and has promoted economic exchange through inter-party diplomacy in transnational projects. Ultimately, this

has been successful. However, there are problems in the operations of the multiple collaborative governance model.

2. The Governance Model in China's Development Zones

2.1 Government and Enterprise Integrated Governance

The integration of government and the enterprise governance mode in the development zone can be analyzed on three levels: governance subjects, governance mechanisms and governance tools. (Figure 1) Within all three levels, the government has responsibilities such as providing policy support, ensuring fair income distribution, obtaining extra-budgetary transfer payments, and attracting foreign investment. Its functions are transferred from direct-operated enterprises to operating land. Land property rights and fiscal rights replace corporate property rights, allowing government more space for its monopoly on managing the market economy. However, this monopoly is realized by administration committees established by the government.

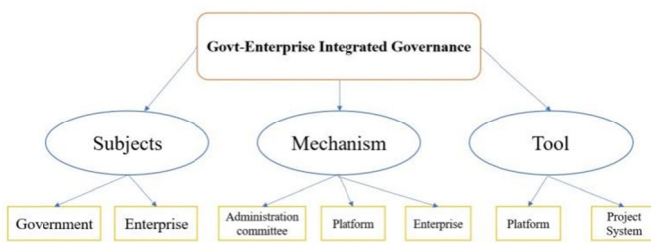


Figure 1

The administration committee is the equivalent of the local government's dispatching agency, and performs administrative powers on behalf of local governments. It is responsible for the daily management and operations of the development zones. For development investment and construction, it is responsible for the investment companies established by local governments. An investment company is different from an enterprise; it is a "government-type enterprise" owned by a state-owned enterprise, but possessing certain administrative powers. In the development zones, investment companies are under the leadership and management of the administration committee. In other words, the main governing entity of the government-enterprise integration model is the "government-administration committee-enterprise", and the government is the leader, connecting enterprises through an administration committee, and integrated governance.

The mechanism of government and enterprise integration and governance has been summarized by scholars as "the linkage of the political mechanism, administrative mechanism, and company operating mechanism". The administrative mechanism is the power given to government agencies on the basis of the formal institutional rules of the bureaucracy. On the basis of the government's administrative integration, the bureaucratic system and the technical governing approaches are used for regional planning, requisitioning land, arranging projects, establishing procedures, establishing institutions, and coordinating relationships. Political mechanisms are unconventional power operations that transcend the formal institutional rules of bureaucracy, relying on political mobilization to enable governments to bypass established rules. The local government derives its authority by implementing upper-level government's intentions in order to improve decision-making efficiency.

However, it may manufacture uncertainty within the bureaucratic system. The enterprise is retooled in the government's capital mobilization. Through the establishment of the investment companies, local governments can produce, operate, and provide public goods, and mobilize capital under the control of core resources such as land. In order to achieve the government's established policy objectives by using these two mechanisms, "development zones" and "industrial parks" have been created, both nationally and internationally, by Chinese local governments. The administrative mechanism, the political mechanism and the enterprise mechanism constitute the three supporting points of the

government-enterprise integration governance mechanism. They form a triangular stable structure that induces and constrains the behavior of each subject in the governance of development zones. Project systems and platform companies are the institutional tools of government and enterprise integrated governance.

The project system is a top-down form of resource allocation in China. Since the mid-1990s, the project system has transcended the financial sector and become an important governing tool in state bureaucratic governance and policy enforcement. The platform company is a government-type enterprise, which has the dual identity of government and enterprise. It forms the organizational structure of "a set of two teams and two brands". The local government relies on platform companies to organically combine the public resource monopoly and the marketization of operational methods to form a new project-platform system. In essence, the project-platform system for increasing local investment is a responsive strategy of local governments to answer the developmental call of various Central government policy constraints. In local practice however, the everyday operations of such government-led platform companies are driven by the project system. Through the hierarchical operation of the project system, "The lower-level regimes may have amendments to the established centralized framework and bureaucratic logic, adding their respective intentions and interests, and gaining more autonomy."

The government-enterprise integrated governance model has stimulated governance power through the integration of governance subjects, governance mechanisms, and governance tools. It has obvious advantages over traditional government organizations: it is exempt from certain national laws and government policies. The shackles of financing provide a channel for local governments to raise large-scale debt financing, expand local governments' ability to manage capital and integrate the management and logic of enterprise management into the traditional bureaucratic system. This allows them to break the constraints of elite politics. It also reconstructs the officials' valuation standards and incentives within the state. Scholars from various disciplines have noted that the development zones have broader discretionary powers which lack authorization in China's horizontal bureaucratic system.

However, the practice of development zone governance shows that while both government and enterprise integrated governance improve governance performance, the nature of re-centralization and power expansion has also led to many problems. For example, the disorderly financing of local governments and selective law enforcement have detracted from order. The dominance of political mechanisms often leads to an imbalance in responsibility and the failure of incentives and regulatory mechanisms. Furthermore, public powers have used private companies to break into private law, which has increased corruption.

This shows that the issue of high political integrity risk under the government-enterprise integrated governance model is becoming increasingly prominent. Thus, the model has been challenged and requires constant revision and adjustment. Therefore, an alternative model of organization has been implemented in the present innovation of development zones in China. We term this model multiple collaborative governance. It refers to the promotion of the association in the governance of the market economy.

2.2 The Emergence of Multiple Collaborative Governance in Development Zones

In liberal democracies, a similar governance rationale is incarnated with "public-private-partnerships" or "collaborative governance" by public administrative schools.⁸ Collaborative governance and studies of collaborative governance emerged after electoral democracies welcomed new modes of policy making to connect public and private stakeholders. The aim of this was to engage them in consensus-oriented decision making. In the present decade, the term "collaborative governance" has been translated to study new governance models in contemporary China. It is used to define the private-public participation, or government-enterprise relations, in local investment in development plans.

Nevertheless, in China the blueprint and the subjects of collaborative governance in liberal democracies are distinct. Collaborative gov-

ernance in liberal democracies strengthens the role of non-state agencies in public decision-making. As defined by scholars from management schools, collaborative governance is “a governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets.”⁹ The Chinese version of collaborative governance has been framed in similar discourse from public management studies. However, collaborative governance is regarded as an innovative institution to assist the state in conducting liberal reforms in both marketization and reform itself, in the wake of economic and social development.

In China, with the great development of the economy, the government, which concentrated all the power, stepped out of the mode of planned economy. On the one hand, it liberates the productive forces for enterprises and enables them to have more power over the flow of production factors. On the other hand, the government also cooperates with enterprises to strengthen their role in the process of making public policies. Under different economic development conditions, the public policy process of local government has been changing. In the decision-making process, multiple collaborative governance mechanisms provide richer policy tools and more flexible policy evaluation criteria, administrators can expand the options of governance policy for all kinds of participants.¹⁰

The target of collaborative governance is to strengthen the state’s role in China’s market economy. The Chinese model of *xietonggongzhi* (协同共治 collaborative co-governance) emerged during the decline of the *danwei* system in the late 1990s. This model has remained in the construction of grassroots governance in urban communities. When urban development zones have turned out to be hubs of Chinese economic development, *chanchengxietongzhili* (产城协同治理 industry-city collaborative governance) has been promoted in order to “reduce transaction costs, improve resource allocation efficiency, and achieve value creation”.

Based on an investigation of local government innovation practices, the authors discovered that following up the governing model of developmentalism, the Chinese model of “Multiple Collaborative Governance” was invented. It highlights the role of industrial associations (Figure 2). This model was invented on the basis of transforming and expanding the integration of both government and enterprises. It introduces the role of industrial associations into the governance of the development zone, thus forming the main body of “government-industry association-enterprise” multiple coordination and confronting local governments at the mechanism level. The corporate governance mechanism has been reorganized and has played a leading role through industry associations. These associations set up companies for market operations to realize park development, industrial upgrading or local development. The role of industrial associations has thus turned out to be important and functional in the governance model of Chinese development zones.

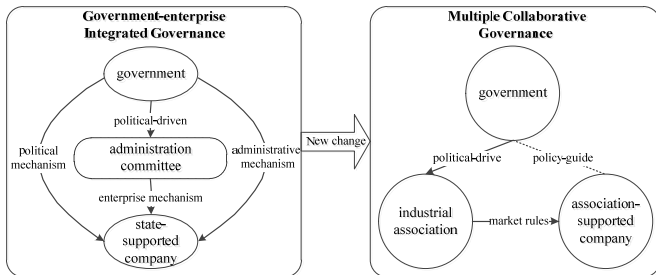


Figure 2

Multiple collaborative governance differs from government-enterprise integration governance along several aspects. Multiple collaborative governance consists of the government, industrial associations, and enterprises. In multiple collaborative governance, the role of the government changes from the subject of regulation to the subject of guidance. This is reflected in its functions of providing planning support,

policy support, and financial encouragement for the construction of new industrial parks. It does not lead enterprise operations and does not guide the industrial associations. Industrial associations organize teams to determine the planning, construction and operations of the parks. They run market-oriented associations, and accept local government supervision. They are also dependent on government policy support and guidance. The enterprises in the parks are organized by industrial associations, but are not the equivalent of industrial associations. The enterprise in the management-team of the park is an independent enterprise, operated by professional managers, in accordance with market rules.

Additionally, the mechanism of multiple collaborative governance is conducted based on the principles of government guidance, association leadership, and market-oriented operations. Government guidance is reflected by its function as the political mechanism to maintain the ability of policy support and provision, and compressing the functions of the administrative mechanism to enhance the initiative and flexibility of enterprise operations. The association-led developmental plan is reflected in the government’s support of the industrial associations, authorizing the autonomy of industry associations and allowing them to boost the economy. In present academic analysis, this is done in order to achieve positive interaction between government and industrial associations by improving internal capabilities. Market-oriented operation is reflected by the fact that the enterprises are established by industrial associations in full accordance with market-oriented principles. The everyday park operations are guided by industrial associations, rather than direct government leadership, to achieve business objectives and state development goals.

Third, a crucial subject for multiple collaborative governance is the association. Different from the government-type enterprises, the association is a single entity. This pure company organization structure can only exert its market-oriented operational advantages in investment and financing. It cannot reach its hands into scarce public resources such as land.

3. Multiple Collaborative Governance Led by Associations and Its Operation Mode: A Case Study of a Development Zone in Guangdong, China

From the development experience of countries around the world, the relationship between government and market is an important issue for the sustainable development of a country. Since the reform and opening up, by gradually clarifying the relationship between the government and the market, China has tried to avoid the direct intervention of the government on the subject of micro-economic behavior, and thus has surpassed the traditional economic system. Multiple Collaborative Governance is a consensus-oriented decision making mode.¹¹ In local governance, if the governance capacity of the government matches the social development level, the Multiple Collaborative Governance mode can be better realized, especially the governance mode dominated by social organizations, because Multiple Collaborative Governance mode is more in need of a mode in which equal subjects negotiate and make decisions to achieve a common goal.¹²

There are thousands of development zones worldwide, particularly in China. In authoritarian states, development zones are designed to execute liberal policies and market reform, in order to compete globally. In the late 1970s, the Chinese Central government created four Special Economic Zones (SEZs) in Southern China. They operated as enclaves and platforms through which the domestic economy could interact with the global market by mitigating the limitations of authoritarian regulation. Zones emerged from institutional trials, experimentation, and chance.

Case studies of the involvement of the governance model in China’s development zones is important for understanding the institutional innovation of the developmental state in China. Scholarship in political science, geography, and economics has associated the pattern of development with the emergence of development zones in China, especially governance models which were processed during the establishment of development zones. As depicted in the first section, the governance models in China’s development zones are initially defined, and then

involved in the interaction between the Central government, the local government, and enterprises.

Local governments, especially city-level governments, are the main subjects for promoting institutional innovation in China through the construction of development zones.¹³ It is initiated to create, define, and regulate domestic market reforms. Additionally, it is a model for other local governments to learn from, and is ultimately nationalized into a standard formal institution. The development zones in Guangdong province are an experimental field where policy and planning often define what is legal in the market reform.¹⁴ Thus, the authors conducted fieldwork in Jieyang, a city in Guangdong, to understand the new changes in institutional innovation beyond the existing “project system” of provincial- and city-level governance.

There is an assumption that local institutional innovation is local officials’ strategy to gain the political capital needed for promotions. Chien has argued that local institutional innovation is the product of economic decentralization in the wake of local and political centralization. Since the tax reforms of 1994, local officials have had to manipulate their decentralized resources to develop local economies in order to increase their political capital.¹⁵

However, through long-term fieldwork and a case study in Guangdong, we have found that the drive for local officials’ revision of the governance model comes not merely from expectations of political capital, but also from their concerns over the tension between local governments and enterprises. This study does not regard the transition of the governance model in development zones as the passive response of local government to answer the call of Central government projects. Instead, it argues that the innovation of the governance model in local development is a strategy that was invented by local officials to address local government-enterprise and local-Central tensions in which industrial associations are built and retooled.

3.1 A Typical Collaborative Governance Innovation Case: The Making of the Sino-German Metal Eco-park

In the theoretical evolution from government and enterprise integrated governance to multiple collaborative governance, it is obvious that the layer of social organization has been added between government and enterprises. The impact of this level on local collaborative governance needs to be observed from a number of complex perspectives.¹⁶ China’s economic development zones not only serve as a goal of economic development, but also provide basic public services. In the Sino-German metal Eco-park, social organizations that play a great role in coordinating governance have an enormous influence in the park’s construction management system, international cooperation and exchange, industrial upgrading and transformation policy evaluation and other aspects, and play an irreplaceable role in the institutional reform and improvement of the system efficiency of the whole local governance. On the one hand, social organizations are at a parallel governance level with the government and enterprises, and on the other hand, they communicate and coordinate between the two sides. As a result, the implementation efficiency of governance policies has been greatly improved at all levels.

The Sino-German Metal Eco-park is located in the city of Jieyang, in Guangdong Province. Jieyang is known around the world for metal products manufacturing, a polluting industry. According to the Central government’s 2010 national environmental protection requirements, local governments have to promote high-tech industrial upgrade drives and close companies with poor environmental records. The industrial park’s total land area is 2,341.66 hectares, with a planned investment of 150 billion RMB from the provincial government. It is estimated that the investment output from non-state investors has exceeded 100 billion Yuan. The project has been executed under a green industrial city plan in which the main features of institutional arrangement are strengthening the international cooperation and market orientation, establishing complete industrial chains based on upgrading technology to protect the environment, and assimilating the Park into Jieyang.

In June 2012, the local metal products manufacturers applied to register an industrial association. The Jieyang Metal Enterprise Association (JMEA) was established by the merger of the former Jieyang Metal

Materials Association, the Hardware Chamber of Commerce, the Stainless Steel Products Association and the Wucheng District Iron and Steel Industry Association. The total output value of member companies now exceeds RMB 40 billion, accounting for 70% of the total output value of Jieyang’s metal industry. JMEA’s charter states that the association’s purpose is “to promote the healthy and orderly development of the Jieyang metal industry, to upgrade the industry, to introduce advanced technology and production methods from both home and abroad, to transform the Jieyang metal industry’s dispersed, inefficient production, to solve metal industry pollution problems, and to achieve sustainable development of the entire industry.”

In February 2013, Guangdong governor Zhu Xiaodan and former German Social Democratic Party Chairman and Defense Minister Rudolf Scharping came to a consensus that the construction of the Sino-German Metal Eco-City pilot project would be led by Jieyang. The project was then jointly deployed by the Jieyang municipal government and the German government. It was developed and managed by German-China Metal Group Co. which was established by Jieyang Metal Enterprise Association. It also received capital investment from German-China Metal Group Co., Ltd. The project started in March of 2013, and is expected to be completed in 2020. It is the first German-China development zone approved by China’s Ministry of Industry and Information Technology.

The park has adopted a new management plan: The Party committee holds the leadership; the government advises the developmental plan; the industrial associations lead project planning; enterprises in the Park conduct market-oriented operations. The Park promotes energy conservation and environmental protection, advanced equipment, and metal products manufacturing. It has designed six platforms in order to combine metal manufacturing and materials trading, to attract young professionals and capital to Jieyang, and to promote trans-regional product sales. There is a sector focused on recycling and reusing scrap metal products. The project is divided into the construction of three units: a Sino-German “Co-creation Town”, a “Power Town”, and a “Factory Town”. By the middle of 2018, the first phase of the park had been completed, and the second phase of construction was underway. The completed projects include the park’s main road, the “zero emission” surface treatment center, the Sino-German joint innovation base, the Beethoven Forest, the “Four centers” (a comprehensive park service center, a technology research and development center, an industrial design center, and a financial services center), and a Sino-German cross-border e-commerce industrial zone and residential area. In addition, the University of Applied Sciences Esslingen and the Guangdong University of Technology plan to establish the Sino-German Shuangyuan University of Applied Sciences. At present, there are at least 42 Sino-German joint ventures and German-owned enterprises in the park. After completion in 2020, 300 Sino-German (European) joint enterprises will have been initiated.

The blueprint of the Park has carried out the national “One Belt and One Road” development strategy, and the Park construction is under the deployment of the Guangdong Provincial Party Committee and the provincial government. It is expected to strengthen the cooperation with developed countries in Europe and the United States. The project has also received attention and support from leaders of the Central and Provincial governments. Following up with the master plans “Made in China 2025” and “German Industry 4.0”, this local project has utilized the strategic cooperation opportunities between China and Germany, and has created an important platform for collaboration between Guangdong Province and the Central government. JMEA has also become a member of the Sino-German Economic Cooperation Advisory Committee. The park has been nominated to be a Sino-German SME Intellectual Property Protection Pilot Zone and the Sino-German Intelligent Manufacturing (Industry 4.0) Innovation Base, which has been recognized by the Guangdong Provincial Economic and Information Technology Commission as part of the fourth round of provincial and municipal co-construction cycles. The park was also recognized as part of “the 17th round of international science and technology cooperation bases” by the Guangdong Provincial Department of Science and Tech-

nology. In December 2014, it was recognized as a “Guangdong Annual Economic Summit Park”.

Jieyang Metal Enterprise Association was picked to be the local operator of the Sino-German Metal Eco-park by Jieyang municipal government. In early 2013, city leaders led a team to Beijing to seek partnerships with Germany, a manufacturing power. A joint effort with the German Foundation for Family Businesses turned out to be a chance for local government to strengthen JMEA's role in the project. The collaboration with the German industrial association has driven the local government to organize and mobilize local industrial associations to join in development zone governance. A local official told us “the German partner is an association, we also need to have an association to build up the partnership”. As explained by a local official “the institutions involved in the German project are associations and companies, and we also use associations and companies to connect with them.” JMEA was then considered and justified an agent for the Sino-German partnership.

However, this is not merely a story of “China learning from Germany” in this institutional innovation. In June 2012, the Jieyang Metal Enterprise Association was established on the basis of the Municipal Metal Materials Association, the Municipal Hardware Chamber of Commerce, the Municipal Stainless Steel Products Association and the Wucheng District Iron and Steel Industry Association. Through the platform of the federation, the Jieyang metal industry's potential was explored. Subsequently, Jieyang's pollution problem, its electroplating and pickling enterprises, and how to rectify industry and benefit the people's livelihoods, have become the focus of the local government.

The drive to adjust the governance model in development zones comes from the local government's anxiety in dealing with government-enterprise relations. A local official told us the local government bureaus treat the project as an opportunity to “develop new projects without loss”. In the mindset of local government and entrepreneurs, the state's promotion of industrial upgrades means the state is highlighting environmental protection and shuttering polluting enterprises. This would bankrupt exiting metal product manufacturers. The strategy of provincial- and city-level governments thus is to converge the state, the enterprises, and the associations.

3.2 Associating Multiple Collaborative Governance: The Convergence of Local Government, Enterprises, and Associations

The authors' investigation revealed that the governance of the Sino-German Metal Eco-city differs from the government and enterprise integration governance model. There is a clear distinction between government dominance and government guidance. Under this co-governance model, the government is no longer the dominant player in governance. The association becomes the dominant player of governance, while the government only plays the role of public policy guidance and support. It is a typical case of collaborative innovation between governments, associations and enterprises. It is innovative in terms of governance subjects, governance mechanisms, governance tools, park construction management systems, international cooperation and exchange methods, and the transformation and upgrading of traditional advantageous industries. These new changes can be summarized as the multiple collaborative governance model. In the management and operation of the development zone, the government no longer plays a leading role, even in the traditional work of attracting investment, it is also led by the association. The association often organizes communication meetings between Chinese and German enterprises, and the government just participates in summarizing experience and gives policy support, rather than dominating the whole process of the meetings. The government was only invited to attend the summit forum and seminar on cooperation and exchange between enterprises of the two countries hosted by the association.

3.2.1 Government-led to Government-guided: a description of the governance subject

The government has taken the lead in the development and construction of the park as a guide, coordinating resources and providing policy support. In doing so, it has begun communicating and coordinating with governments at all levels. In order to realize the industrial transformation and upgrading of the jurisdiction, the Jieyang Municipal Party Committee and Municipal Government launched the “6166” Action Plan and selected the metal industry as the forerunner to conduct industrial upgrading. In early 2013, city leaders led a team to Beijing to seek partnerships with Germany. This bold bureaucratic move was highly recognized and supported by the Ministry of Foreign Affairs of the CPC Central Committee. The Ministry of International Cooperation introduced the Metal Eco-City project as a pilot of inter-party pragmatic diplomacy to Germany, and received positive responses from major German political parties and industrial associations. The Chinese Embassy and the German Consulate General in Guangzhou each listed it as a key project.

In addition, the Jieyang Municipal Party Committee and Municipal Government also reported and communicated to the Guangdong Provincial Party Committee and the Provincial Government. This was highly regarded by the provincial party committee and the provincial government. In the investigation, the provincial party secretary, Hu Chunhua, proposed that “the Sino-German Metal Eco-city will be built in Guangdong and will be an important platform for German cooperation.” Former governor Zhu Xiaodan called for “building a key exploration project for the construction of a management system for innovative industrial parks in our province, innovative international cooperation methods, and innovation and transformation of traditional industries.”

The city government supported the planning of the park. The Jieyang Municipal Party Committee and the Municipal Government allocated land for the park from the town of Yujing in Jiedong District. It selected farmland that had originally been the site of the Jieyang provincial prison. The prison was relocated, and the government designated the site as land for the planned park. The former prison site has maintained a decent ecological environment. It does not have a residential area and is suitable for large-scale development and construction. Because the land ownership is simplistic, it avoids the administrative procedures and maintenance costs that can result from large-scale demolition and land acquisition. For the small amount of land acquisition, house demolition, and supporting plan involved in the vicinity of the park, the local government has also set up a command department, which is the executive deputy commander of the township officials and is responsible for coordinating related issues. In addition, the Jieyang Municipal Party Committee and the Municipal Government have also combined park development with urban transformation. The newly planned parks not only include industry, financial services, research and development, design and other blocks, but also include the “Rhein Township” and the Sino-German cooperative University of Applied Sciences and the Beethoven Forest Park. Together, they form a new town that combines production, services, daily life, educational and leisure functions.

The third function is to provide policy support for the construction of the park. The approval of the Jieyang Municipal Government is in accordance with the Guangdong Provincial People's Government's requirement on supporting the construction of Jieyang Metal Eco-city. It is also in accordance with the Ministry of Industry and Information Technology's approval of the establishment of a Sino-German (Jieyang) SME Cooperation Zone”. This has been formulated in accordance with the Opinions of the Jieyang People's Government on Strengthening the Construction and Development of the Sino-German (Jieyang) SME Cooperation Zone's Start-up Zone. It provides support for operational policy, land policy, fiscal policy, financial policy, science and technology policy, talent policy, and industrial policy. For example, it stipulates the mode of running a park and clarifies the primary components of operations, prioritizes the use of parkland, and arranges special funds to support the construction of park infrastructure and industrial platforms. It also advises financial institutions as they set up branches in the park, and

manages advisory funds from the government. Additionally, it allocates funds for science and technology to support technological innovation in the park, enacting preferential policies to attract talented individuals. It also formulates project guidance catalogues to attract enterprises to the park and facilitate their interaction.

3.2.2 Bridging Government and Enterprises Through Association: a description of governance mechanism

It began spontaneously, with their own investment capital, and was the first industrial fund in China. It was established by the JMEA in order to solve problems pertaining to the decentralized operations of the Jieyang metal industry: low-end products, and high levels of consumption and pollution.

The first phase raised 1 billion RMB, laying a foundation to promote international collaboration. On this basis, the Association used inter-party pragmatic diplomacy to organize Jieyang entrepreneurs to conduct exchanges in Germany. This facilitated cooperation with 12 European trade associations such as the German Chamber of Commerce and Industry. The Federation has been recognized by the German political and business community in an association-led cooperation model. Eric Schweitzer, chairman of the German Chamber of Commerce and Industry, said, "The Jieyang Metal Industry Federation dominates the Sino-German Metal Eco-city project, the government is supportive. It is very similar to the relationship between the government and the market in Germany. The German Chamber of Commerce and Industry represents the government on the one hand and the interests of the company on the other. We have very good relationship with local sectors. This will allow us to do things more smoothly."

The second is to build a new platform for starting a park. Regarding park start-up and operations, the Guangdong Provincial Government has stated "supporting the Sino-German Metal Eco-City in the innovation of the park system will be the first test, according to the requirements of accelerating the transformation of government functions, to deepen the reform of the administrative examination and approval system, and several government functions that can be undertaken by industrial associations. According to the principle of 'first easy and then difficult,' it will be gradually transferred to the JMEA." Based on this guiding outline, the JMEA has adopted the innovative park mode, and built a large platform to lead the planning and construction of the park. Leading the five sectors of the Sino-German Metal Eco-City innovative service model is the country's first zero-emission electroplating park. The Sino-German innovation is based on the transformation and upgrading of the service industry, a well-equipped employee community and commercial center, and the commitment to ecological protection. Under the joint promotion of the Federation and the political and economic circles of China and Germany, the Sino-German Metal Eco-City and the German park management institutions, educational institutions and scientific research institutions have implemented advanced German management, technology and human resources. Doing so, they have jointly established a large platform for Sino-German cooperation.

The third is to establish a normal mechanism to broaden the scope of cooperation. According to the industrial positioning of the park, the JMEA selected the world's metal manufacturing power Germany as a partner. The Jieyang Municipal government and JMEA provided funding and land, built factories, purchased equipment and developed technology, management and brands. This facilitated cooperation with enterprises and expanded the market. It also created benefits and other cooperation models, with the goal of creating a win-win situation for China and Germany. The JMEA has set up European offices in Munich, Berlin, Stuttgart, Frankfurt, Düsseldorf and Dresden, and has established a Sino-German Metal Group in Stuttgart to consolidate the Chinese-German joint efforts. The headquarters of the German company will consolidate the important channels of Sino-German cooperation and expand the cooperation field. This will normalize the cooperation between Jieyang and Germany. Dieter Hundt, former president of the German Federal Employers' Association, said "we will use the advantages of the human resources in Germany to connect with the Sino-German Metals office in Germany and fully cooperate with the Sino-German Metal Eco-city project." In Germany, marketing, investment promotion, and

other activities have enabled the project to launch a German brand, and have attracted German enterprises to settle in the eco-city.

3.2.3 Market-orientation Operation Dominated by the Association: a description of governance tool

The park has a market-oriented mechanism that is responsible for its planning, construction and operations. The first goal of the mechanism is to build a "One Association-Three Level" organizational structure. The Sino-German Metal Group has been funded, sponsored, and built by China's first industry association (the Jieyang Metal Industry Investment Fund). Yet, this is not the equivalent of an industry association. Rather, it is an independent enterprise. In accordance with the management philosophy of "One Association-Three Level", a new organizational structure was established. At the management level, with the president as the core, the Group Office, Strategic Development Department, Human Resources Department, Financing Management Department, Audit Law Department, Financial Management Department, Information Technology Department, Project Management Department, China Merchants Service Department, and Real Estate Marketing Department were established. At the same time, it has jurisdiction over Guangdong Zhongde Construction Engineering Co., Ltd., Jieyang Surface Treatment Ecological Industrial Park Co., Ltd., JieyangZhongke Metal Technology Research Institute Co., Ltd., JieyangZhongde Industrial Design Institute Co., Ltd., Guangdong Zhongde Metal Technology R&D Co., Ltd. Company, Sino-German Metal Group Property Management Co., Ltd., Sino-German Metal Group Trading Co., Ltd., Sino-German Metal Group Warehousing Co., Ltd., Sino-German Metal Group Incubator Co., Ltd., Sino-German Metal Group Talent Exchange Co., Ltd.

The second goal of the mechanism is to strengthen strategic cooperation by means of marketization. Through the market-oriented mechanism, the Sino-German Metals Group seeks to cooperate with Germany as well as other European countries with ties to Germany. The goal of this cooperation is to build up a training platform to cultivate talent in science and technology, education, finance, and management. For example, at the 7th Sino-German Economic and Technical Cooperation Forum, held in Berlin in October 2014, the Sino-German Metal Group became the only entity at the forum to sign two projects. The Sino-German Metal Group was established by Sino-German cooperation. Germany has a 51% ownership stake, while China receives 69% of the profits: a combination of management and capital. The group established a branch office in Germany and set up offices in cities such as Berlin, Munich and Frankfurt to explore the German market and attract investment from German companies.

The third goal is to adhere to the parallel construction of industrialization and urbanization. In terms of industrialization, the Sino-German Metal Eco-city will implement international advanced technology and management concepts. This will form economies of scale, rationally allocate resources, realize the agglomeration and development of the metal industry, enhance the regional branding of the Jieyang metal industry, and alter its planning. Previously, the Jieyang metal industry had been small-scale, scattered and weak. The Sino-German Metal Eco-city has expanded its influence and market competitiveness. It has also introduced advanced German technology, and has centralized treatment of sewage, exhaust gas and solid waste. This has mitigated industrial pollution problems and developed green metal industrial chains, thus revitalizing the metal industry. Germany's Obermeyer Company has participated in the planning and design of the Sino-German town.

In terms of urbanization, the city-level government asked the Obermeyer Company from Germany to participate in the planning and design of the Sino-German town. The architecture was designed according to German neo-classicism from the 18th century. The local planners named a new park the Beethoven Forest Park to highlight the cultural significance of the industrial cooperation. The local government has even renovated the local higher education system and learned from Germany to establish an applied technical university and vocational schools to train two groups of potential laborers to fit this wave of totalized urbanization and industrial upgrading. One official mentioned to us "the present urban planning is for the good of the people (*yi ren wei ben*). We are attempting to build up a working and living environment

in which 'the workshop is under the big tree, the family is next to the factory, and the children are around the parents. The park is surrounded by 10,000 acres of forest, and the new mode of production, life and ecology is integrated'. We hope to develop the area to meet people's everyday needs."

Local scholars have summarized the operations of the Sino-German Metal Eco-city as "the consultant of Sino-German Metal Eco-city is the government, the director is the industry association, the script is written by the market, and the last actor depends on the enterprise." This new model enables a better role for the local government, and is expected to become a model for the transformation and upgrading of traditional industries in local area. It can be said that this model illustrates the operational logic of the multiple collaborative governance model, and has become a new trend in district governance.

4. Discussion and Conclusion

In the theory and practice of modern local governance, the cooperation between government and non-government sectors is extremely important. More important, of course, are the mechanisms by which they work together.¹⁷ As the government is no longer the sole undertaker of all of the work, it can extend its collaboration with actors outside the bureaucratic system. The local government shall note that good governance requires more than an executive capacity based on command-and-control. It is necessary to develop the ability to work with stakeholders outside the bureaucratic system.¹⁸ China's local governments have demonstrated the effectiveness and stability of such a pluralistic collaborative governance approach with decades of rapid growth and enhanced social comprehensive governance capacity. Under the current economic structure of China, local economic development is still closely related to the government and its policy agenda. Although the governance policy of the development zones can play the greatest role of social organizations, it is still inseparable from the guidance and help of the government. But the government no longer dominates everything. Enterprises are no longer just passive participants in the governance process. The coordination function of social organization plays a very important role in this governance effect. The present governance mechanism is the combination of social organization leading, government guidance and market operation. The relationship between enterprises and social organizations is closer under this institution. This makes the existing multiple collaborative governance mechanism more efficient.

Since the reform of the tax-sharing system, the conversion of government-operated enterprises into operating land has triggered discussion on the development zone governance model. This has provided new ideas about the integration of government and enterprises. It is instructive to understand the behavioral logic and action strategies of local governments. However, in recent years, changes have occurred in the governance of development zones. These have occurred along with the advancement of industrialization and urbanization, accelerated transformation of government functions, and the pressure of industrial transformation and upgrading. This study has used local government's innovative measures to promote local economic and social development as an observation window. Through this view on the governance model for government and enterprises, a new "government-industry association-enterprise" three-way collaborative governance model has been proposed.

This model has advantages, but also limitations. It changes the integrated management system, organizational structure, and power distribution form to the administration committee-company under the integrated governance model. Doing thus avoids the phenomenon of "intrusion into private law" caused by the dual identity of government and enterprise. It also lessens the political risk caused by dependence on political achievements, integration of power, and the limits of democratic supervision. Enterprises that integrate their industries with industry associations will focus on the production and management of similar enterprises through the construction of industrial parks. They will share the costs of large-scale production and pollution control, and will improve industry, the economy, and the environment. This method is called the "internalization of externalities" in economics, that is, through

the voluntary cooperation of enterprises, the tasks that a single enterprise cannot undertake can be completed. Furthermore, the costs of individual enterprises can be reduced, while simultaneously cutting externalities. By combining park development and urban transformation, park planning includes not only plots of land for industry, finance, research and development, and design, but also for residential areas. Taken together, this constitutes a new town which integrates production, services, daily life, education and leisure functions. In other words, it is conducive to improving the production capacity of material products, and also to improving residents' quality of life. This is a direct response to China's strategy of promoting industrialization and urbanization.

The model is limited in that local governments have been affected by their role in park and economic development. Local governments have left the "project system" platform and have lacked effective administration committees. By organizing resources, the mutual promotion of power, will, and performance within the jurisdiction is difficult. It is also difficult to ensure that enterprises promote the transformation and upgrading of their respective industries, while also considering the public goods needed for urbanization. From the behavior of local industry associations to transnational strategic cooperation, there is much interaction between different levels of government. The International Liaison Department provides an intermediary and a bridge for communication between the local, provincial, and Central governments. In comparison, other local governments have difficulty obtaining support from such organizational resources. It is therefore difficult to raise the "self-rescue behavior" of enterprises represented by an industry association, into a national strategy to obtain Central support. Additionally, the planning and construction of parks should consider not only economic, but also public interests. This can be done under the government-led enterprise integration governance model, in which the "administration committee-enterprise" organization can integrate inter-departmental resources. Doing so, it can overcome the institutional contradictions engendered by the responsibilities of the same structure, and can coordinate the relationships between multiple interests. However, if industrial associations are to undertake such responsibilities, it will be difficult for them to coordinate the relationships between enterprises and grassroots governments. Problems due to comprehensive social governance will also present challenges.

This survey of a Sino-German Metal Eco-City has revealed a new trend in the development of the development zone: under government guidance, industry associations are leading park development. They have promoted economic exchange through inter-party diplomacy, and ultimately have been successful. This innovative approach is different from the mainstream model of government-enterprise integration or integrated governance in the governance of development zones, (i.e. the multiple collaborative governance model). This innovation is manifested in the park management system, international cooperation mode, industrial transformation and upgrading mode, and sustainable urbanization construction. This underscores the park's adaptability. However, the multiple collaborative governance model also reveals operational problems. For example, does the government play other indirect influences besides guiding, supporting, and providing resources? How can enterprises use their own resources to realize their own interests in the Party-government relationship network? How can they maximize them? How does the industry association-led park deal with social and social security issues such as public and social security? How does the multiple collaborative governance model exemplified by Sino-German Metal Eco-City respond to challenges? Can it continue to innovate? How much can it be promoted? These issues all warrant the attention of future studies.

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Challenges and Exploration of Cross-Regional Environmental Governance: A Case Study of the Guangdong-Hongkong-Macao Greater Bay Area

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KEYWORDS

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ABSTRACT

Emerging urban agglomerations are increasingly grappling with the challenge of cross-regional environmental governance. The Guangdong-Hong Kong-Macao Greater Bay Area (GBA), which is the most economically active region in China, is also facing the challenge of balancing economic development and environmental pollution. This study aims to examine the current state of environmental governance in the GBA, and identify the dilemmas and challenges faced by the region. The study also proposes corresponding solutions to address these challenges. Through a case study, the research finds that the region struggles to achieve effective cross-regional governance due to factors such as uncoordinated economic conditions, complex administrative divisions, conflicting legal systems, and inadequate governance mechanisms. To address these issues, this study suggests four key areas for improvement, including strengthening government leadership, adjusting the roles of cities, leveraging the power of science and technology, and establishing a cooperative mechanism for collaborative governance. The findings of this study have important implications for policymakers and practitioners engaged in cross-regional environmental governance in the GBA, and other regions facing similar challenges.

1. Introduction

With the rapid development of industrialization and urbanization, environmental management has become a critical factor impacting regional development. This is especially evident in economically developed regions, where urban construction has led to significant environmental pollution and has adversely affected the well-being of local residents. In the late stages of urbanization, when the industrial structure and regional space have solidified, balancing economic development and environmental justice has become a critical topic that regions must address to achieve high-quality development. Additionally, the emergence of urban clusters presents a new challenge for environmental governance. The cross-regional construction represented by the phenomenon of urban agglomerations requires a new environmental governance model that accounts for differences in administrative system, legal system, ideology and culture, social structure, and other aspects. Therefore, addressing how to carry out cross-regional environmental governance is a new proposition that merits our rethinking.

China has been the fastest growing economy in the world since the 1980s and has become the second largest economy globally. As a major

manufacturing country, China is also grappling with the challenge of excessive environmental destruction. Environmental protection policies have become one of the major national policies in China, and the governance of urban agglomerations has emerged as one of the most complex issues. The governance of urban agglomerations requires consideration of various actors, including local governments, social organizations, private enterprises, and urban residents, as well as different social elements, such as legal, cultural, and economic structures. This necessitates the government to update the environmental governance model in a timely manner to enable a transition from a single-region model to a cross-regional one. In recent years, China's major environmental governance policy, "Waste-free City Construction," has shifted from single-city construction to city cluster construction, serving as a clear example[1].

Among China's urban agglomerations, the GBA is a unique region. As the most urbanized and economically active region in China, Guangdong, Hong Kong, and Macau in the GBA have their own administrative systems, legal systems, and civic cultures. This uniqueness has spurred significant development, but has also forced the region to confront complex public governance dilemmas, especially in the area of environmen-

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tal protection, where cooperation is essential. In fact, the GBA is facing severe environmental problems, such as air pollution, water pollution, and solid waste pollution[2], all of which require cross-border cooperation in governance[3]. Although a cooperative framework for environmental governance has been established in the GBA, the efficiency of governance is low due to factors such as the stage of economic development, environmental demands, and management models[4,5]. Therefore, using a systematic policy collection and case study approach, this paper summarizes the basic situation and experiences of previous cross-regional environmental governance in the GBA. It also discusses the dilemmas and explorations of environmental governance in the region within the context of specific practices of each city, and attempts to provide a referable thinking path for environmental governance in developing countries.

2. Literature Review

Regional governance refers to the coordination of vertical and horizontal transformation processes by state and non-state actors on a regional scale that transcends administrative boundaries[6,7]. On the other hand, regional environmental governance refers to the governance of the environmental field by multiple actors at the regional scale, where formal and informal coordination mechanisms are established and operated to manage natural resources and mitigate environmental damage[8,9].

As environmental issues have taken on a trans-regional and international character since the 1990s, there is a need for strong special institutions in certain regions to manage conflicts and improve regional environmental quality[10]. Regional environmental governance is a unique form of rescaling that responds to the phenomenon of ecological interdependence[10-12]. As legal norms are established and public awareness of environmental issues grows, the importance of addressing regional environmental problems has become more apparent, leading to increased interest in research on this topic[13].

The various types of regions have a significant impact on the environmental governance framework. In the case of transnational regions, the formation of unified environmental governance goals among different countries within a region can facilitate the coordination of environmental actions among member countries to enhance the regional environmental situation. Moreover, the environmental sustainability of the region can lay the foundation for the establishment of a global environmental governance system[14,15]. In the context of regions within countries, cross-regional environmental governance initiatives can not only promote coordinated development among regions, but also provide effective assistance in integrating elements within regions[16].

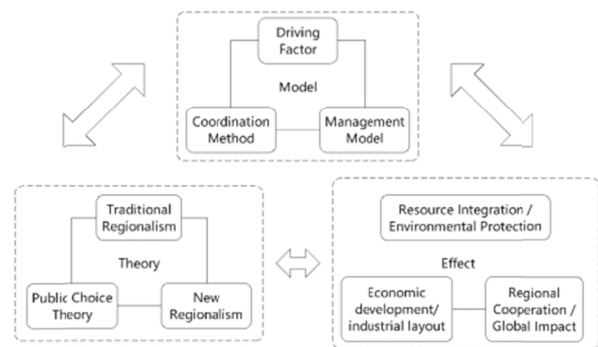
Numerous studies have highlighted the challenges in establishing effective regional environmental governance mechanisms. For regions within countries, a number of issues such as an unreasonable distribution of power, inadequate accountability mechanisms, unscientific decision-making, and insufficient integration of resources, have been identified as potential obstacles[17]. Similarly, for regions that span across countries, factors like mistrust between nations, conflicting national interests, the weakness of non-state actors, and the lack of coordination mechanisms among countries' governance behaviors, pose significant challenges for cross-regional environmental governance[12].

The study of regional environmental governance has undergone a complex and extensive evolution. Figure 1 provides an overview of the main research themes on regional environmental governance in the Western literature. Current research on regional environmental governance in the West can be broadly categorized into three main perspectives. The first perspective is the theory of regional environmental governance. Scholars have applied various theoretical frameworks, such as traditional regionalism, public choice theory, and new regionalism, to explain the theoretical development in the field of environmental governance. The second perspective is the models of regional environmental governance, which focus on analyzing the drivers of environmental governance behavior and the patterns of interaction between state and non-state actors. The third perspective examines the effectiveness and impact of regional environmental governance, and analyzes its multifac-

eted effects on environmental, economic, political, and social aspects. Both qualitative and quantitative research methods are widely used by scholars to investigate regional environmental governance. These methods provide a sound basis for research and enable scholars to gain deeper insights into the complex dynamics of regional environmental governance.

In the study of cross-regional environmental governance in the GBA, scholars have adopted various perspectives. Firstly, scholars have proposed the establishment of a cooperative network for environmental governance and the development of a collaborative governance model to improve the regional governance structure[18,19]. Secondly, scholars have conducted research on the ecosystem of the region from multiple dimensions, such as air pollution[20], water pollution[21], and forest resources[22], to describe the current environmental situation. Thirdly, some scholars have explored the legal system[23] and urban construction of the region and summarized its experiences in urban development[24]. However, none of these studies has taken a holistic approach to cross-regional environmental governance in the GBA. There is a lack of a systematic summary of the region's development experiences and governance dilemmas, and the studies fail to provide comprehensive policy recommendations. Therefore, this paper aims to address the gaps in the previous research by examining the environmental governance of the region, discussing previously unexplored issues, and providing valuable inspiration and reference for future studies.

Figure 1 Research themes in regional environmental governance



3. The Development of Environmental Governance in the GBA

3.1 Current Status of Environmental Governance in the GBA

The GBA boasts a diverse ecosystem with abundant biological and environmental resources. However, the region's unique features pose challenges to environmental governance due to its three distinct ecological types: terrestrial, riverine, and marine. Each type presents different forms of environmental pollution, and addressing them in a holistic manner poses a formidable task for environmental management in the region. The merging of different types of ecological pollution problems further compounds the challenges faced in the implementation of effective environmental governance.

Since the 1980s, the GBA has undergone rapid economic development, resulting in a gradual increase in the amount of pollutants discharged into the sea. This development has also included large-scale sea enclosures, uncontrolled sand mining, and wharf construction, which have caused significant damage to the environment of the Pearl River Estuary and severe degradation of wetland functions[25]. Among the environmental issues faced by the region, marine pollution is particularly severe. According to the 2021 China Marine Environment Status Bulletin, the Pearl River Estuary waters are heavily eutrophic and have the worst water quality in the South China Sea[26]. The main pollutants in the sea contain reactive phosphate and inorganic nitrogen. Eutrophication has led to a decrease in macrobenthic organisms in Daya Bay and a low density of plankton. The marine pollution problem is due to poor waste disposal practices in the area. During the period of rapid econom-

ic growth, people disposed of all kinds of garbage in the ocean instead of exploring scientific ways to dispose of garbage. For example, in 2016, there was a "spurt" of illegal dumping offshore in Guangdong Province. Between January and August 2016, local governments investigated and dealt with 30 cases of illegal dumping, twice the number of the same period in 2015, including construction waste, industrial waste, and household garbage. This poses a significant threat to the marine ecological environment[27].

In terms of forest ecology, the GBA is facing a serious problem. In recent years, rapid urban and grassland growth has led to a significant decline in the area of forested wetlands. Urban construction in the area has increased about 14 times compared to other ecosystems, and the conversion of agricultural and ecological space into urban land continues. The excessive urbanization has led to a drastic reduction in the area of natural ecosystems and corresponding decline in ecosystem services. Cities such as Shenzhen and Dongguan have experienced land development intensities nearing 50%, which has caused the fragmentation and isolation of green areas, leading to an increased risk of ecological corridor breakage and heightened ecological risk in the region.

To effectively manage environmental pollution, Guangdong, Hong Kong, and Macao have implemented joint environmental protection measures, leading to significant improvements in air pollution prevention and control in the GBA. As a result, the air quality in the region has surpassed that of the Yangtze River Delta and Beijing-Tianjin-Hebei region[28]. However, as shown in Table 1, compared to the other three world-class bay area city clusters, the environmental governance level in the GBA still has significant gaps.

Table 1 Basic data of the four large bay areas

Indicators (2018)	GBA	San Francisco Bay Area	New York Bay Area	Tokyo Bay Area
Land area (km ²)	56,098	17,887	17,312	36,898
Population (Million)	7116	765	2285	3503
GDP (USD Trillion)	1.64	0.8	1.5	1.24
GDP per capita (USD Million)	2.3	10.46	6.56	3.54
GDP Growth Rate (%)	7.9	2.7	3.5	3.6
Urbanization Rate	86.6	>96	>90	>94
Share of tertiary industry (%)	65	82.8	89.4	82.3
Port Container Throughput (Million TEU)	6520	227	465	766
Number of Fortune 500 companies	20	11	22	39
PM2.5 (µg/m ³) for the last 5 years	25-30	<15	<10	<15
Forest coverage (%)	52	35	40	45
Black And Odorous River Water (%)	8	0	0	0
Energy consumption per unit of GDP (Kg TEU/USD)	0.214	0.129		0.09

3.2 Practice and experience in environmental governance

The GBA is a crucial driver of China's economic growth, but it should not prioritize economic expansion over development quality in its collaborative development efforts. In pursuing high-quality development, environmental factors are more salient than population and transportation, as exemplified by the Tokyo Bay Area, New York Bay Area, and San Francisco Bay Area, which boast better ecological environments. With the further advancement of "one country, two systems," cross-administrative environmental problems have increasingly emerged in the GBA, which cannot be effectively addressed by any sin-

gle government. In the past, local governments often found themselves helpless in dealing with cross-regional issues, such as air and water management, due to financial, talent, and technological constraints. However, the establishment of the GBA has created closer connections among the three regions, providing opportunities for environmental management cooperation in the area.

Environmental cooperation between Guangdong and Hong Kong has a long history, dating back to the 1980s with information and technology exchange. Today, it has evolved into a model of cooperation across decision-making, coordination, and implementation levels through various mechanisms such as the Guangdong-Hong Kong Cooperation Joint Conference, the Sustainable Development and Environmental Protection Cooperation Group, and expert groups. In the 1990s, environmental cooperation between Guangdong and Macao was established, leading to the annual Guangdong-Macao environmental cooperation meeting mechanism in 2008 under the Guangdong-Macao Joint Conference cooperation framework. The trilateral cooperation was realized in 2014, when the environmental protection departments of the three regions jointly signed the Regional Air Pollution Joint Prevention and Control Cooperation Agreement. This marked a significant step towards normalizing environmental governance cooperation in the GBA.

The management of atmospheric pollution has emerged as a relatively successful model of cooperation in the GBA. The region has established a relatively robust framework for collaboration through bilateral cooperation among cities. For instance, eco-city cooperation has been established between Guangzhou and Shenzhen, while air pollution management cooperation has been initiated between Guangzhou and Zhuhai. Other cities are also involved, albeit to a lesser extent. Nonetheless, the current practice of air pollution control in the GBA remains dominated by bilateral cooperation between cities in Guangdong, Hong Kong, and Macao. While bilateral cooperation has the advantage of enabling effective monitoring of each other, and the establishment of cooperation mechanisms is consistent with the development status of both sides, it can limit the development of surrounding areas to a certain extent. To address this limitation, in 2005, eight provinces and cities, including Guangdong, Hong Kong, and Macao, signed the Pan-Pearl River Delta Regional Environmental Protection Cooperation Agreement, which established the Pan-Guangdong, Hong Kong, Macao, and Taiwan Regional Environmental Protection Cooperation Platform, achieving a certain degree of regional cooperation in ecological management.

4. The Dilemma of Cross-Regional Governance

4.1 Differences in Economic Development

Table 2 illustrates significant variations in the level of economic development among the cities in the GBA. The four cities of Hong Kong, Shenzhen, Guangzhou, and Foshan, as the most economically active, have a GDP of more than one trillion RMB each, constituting 75.88% of the total GDP of the Bay Area. These cities hold a dominant position in the region. Although Macao and Dongguan are also economically developed, their GDP is slightly weaker than the aforementioned cities. In contrast, Zhaoqing, Zhongshan, Jiangmen, and other cities exhibit a noticeable lag in their economic development, with Shenzhen's total GDP being 12 times greater than that of Zhaoqing, accentuating the issue of uneven development among the cities.

Such differences in economic development have implications for cities' voices in regional public affairs, often leading to policies that favor the interests of a few mega-cities. This weakens the efficiency and scientific nature of environmental governance in the Greater Bay Area. Furthermore, the issue of human-land conflict also influences environmental protection efforts. Such conflicts show a decreasing trend from the eastern wing of the Pearl River Delta to the central and western parts of the region, where the economic volume is typically inversely proportional to the amount of resources. The concentration of a large population and economic activity in a few mega-cities increases the pressure on the environment, making it more susceptible to risks and less resilient to potential damages.

Table 2 Basic information of the cities in the GBA (2020)

	Popula- tion (10 Thou- sand)	GDP (CNY 100 Million)	Per- Capital Dispos- able Income (CNY 1)	% of Primary: Secondary: Tertiary	% Urban- ization Rate
Hongkong	748.18	23,915.60	334,232	0.1:6.5:93.5	100
Macau	68.31	1764.12	526,096	0.8:7:91.3	100
Guangzhou	1874.03	25,019.11	68,304	1.2:26.3:72.5	86.19
Shenzhen	1763.38	27,670.24	64,878	0.1:37.8:62.1	99.54
Zhuhai	244.96	3481.94	55,936	1.7:43.4:54.9	90.47
Foshan	951.88	10,816.47	56,245	1.5:56.4:42.1	95.20
Huizhou	605.72	4221.79	39,745	5.2:50.5:44.3	72.80
Dongguan	1048.36	9650.19	56,533	0.3:53.8:45.9	92.15
Zhongshan	443.11	3151.59	52,754	2.3:49.4:48.3	86.96
Jiangmen	480.41	3200.95	33,667	8.6:41.6:49.8	67.63
Zhaoqing	411.69	2311.65	34,752	18.9:39:42.1	51.02

4.2 Complexity of Administrative Divisions

The intricacy of administrative divisions in the GBA poses significant challenges to collaborative environmental management across regions. Not only do the cities in the Greater Bay Area have multiple administrative divisions of different natures, but they also have distinct administrative hierarchies, resulting in formidable administrative barriers to cooperation. Such barriers represent conflicts of power and interests, which impede the free flow of resources and factors within the region, thus increasing the difficulty and cost of governance. At present, the communication mechanism for environmental affairs in the Bay Area is restricted to bilateral dialogues or post-facto consultations among the three governments, and there is a lack of direct dialogue channels between the Bay Area Environmental Protection Committee, which is coordinated by higher-level governments, and the governments of the nine cities in Guangdong Province, Hong Kong and Macau. The complexity of the administrative structure and the communication network results in "information islands" characterized by poor information exchange and information asymmetry, which limits the progress of cross-regional environmental cooperation and governance.

4.3 Differences in Legal Systems

The GBA is characterized by two political systems and three legal systems, which create significant differences in environmental protection governance policies across the three regions. Hong Kong adopts the Anglo-American common law system, Macau follows the Portuguese legal system, and the nine cities in Guangdong Province employ the civil law system. The courts in these regions lack jurisdiction over each other, which makes it challenging to establish a unified governance system with respect to standards, procedures, and supervision for collaborative and joint environmental enforcement in the Greater Bay Area. Additionally, the administrative units within the Bay Area are unable to establish unified environmental protection indicators and enforcement standards. Currently, environmental governance cooperation relies on inter-governmental cooperation agreements and development plans, which lack legal compulsion and cannot enforce accountability and monitoring power in concrete implementation. Successful policies developed so far have their own limitations. For example, the "Guangdong-Hong Kong-Macao Cooperation Joint Conference" based on economic cooperation serves as a good communication platform but is difficult to promote

decision-making on key issues and ensure the long-term nature of the policy. The "one-off" model of cooperation is useful for planning specific issues and events, but lacks an overall environmental strategy and policy research for sustainable development of the GBA.

4.4 Limitations of the Collaborative Model in Decision Making

4.4.1 Existing mechanisms lack decision-making functions

Urban public policies are often influenced by differences in development philosophies. In the Pearl River Delta (PRD) city cluster, long-term development planning is prioritized, whereas Hong Kong and Macau follow a concept of free development. These contrasting development philosophies have resulted in incompatible policies among the three regions, impeding synergistic ecological governance. Ecological governance requires the transformation of natural resources into natural capital by following the laws of ecological economics, which can promote ecological sustainability. However, the lack of policy convergence has led to disorderly development in terms of industrial development, infrastructure construction, and ecological environmental protection. Despite the establishment of collaborative ecological governance as a top-level project and the initial establishment of a framework for cooperation among governments in the Greater Bay Area, the weakness of decision-making power has resulted in significant time and communication costs associated with policy formulation, which has hindered environmental governance efficiency. Although the Guangdong-Hong Kong-Macao Environmental Cooperation Alliance has established a mechanism framework of "Guangdong-Hong Kong-Macao Cooperation Joint Conference" through the Guangdong-Hong Kong-Macao Economic Cooperation Alliance, this decision-making act is mainly driven by the central government. The governments of the cities in the Greater Bay Area still lack initiative and decision-making capacity. Thus, the cooperative mechanism of ecological management in the GBA requires further improvement.

4.4.2 Collaborative model does not facilitate decision making

The influence of geopolitical factors presents challenges to the implementation of cooperation mechanisms, despite their necessity. Current cooperation models in ecological management tend to focus on short-term planning for specific events, with little consideration for the long-term effects of policies. Consequently, there is a tendency towards quick successes and profits at the expense of sustainable development, which results in more serious ecological problems in the future. Although the existing environmental protection cooperation model among Guangdong, Hong Kong and Macau addresses current regional environmental problems, it lacks a long-term vision and a prompt response to new environmental challenges. For instance, the Shenzhen National Sustainable Development Agenda Innovation Demonstration Zone Construction Program (2017-2020) offers a systematic approach to modernize environmental and social governance, but has a short planning time and fails to address the ecological synergistic governance of the entire Greater Bay Area. Ecological synergistic governance involves various fields and departments, including natural resources, agriculture, forestry, water conservancy, ocean, and finance, among others. As a result, it is prone to fragmentation and multiple management of synergistic governance, which creates difficulties in coordinating work due to unclear attribution and authority and responsibility among various departments and regions. This leads to inter-departmental shirking of responsibilities, lack of project supervision, unapproved and unauthorized construction, lax management, and rough construction in the collaborative governance process. These issues demonstrate the current cooperation model's inability to promote comprehensive decision-making across the region.

5. Suggestions for Cross-Regional Governance

5.1 Empowering Local Governments to Play a Leading Role

The GBA differs from the three major international bay areas in that it is a cross-regional integration of one country, two systems, and three administrative regions. Thus, achieving ecological environmental protection governance and infrastructure convergence requires overcoming the restrictions imposed by system differences and administrative divisions. A scientific and unified planning and layout of ecological environmental construction is necessary to establish a perfect regional ecological environmental protection cooperation mechanism. Such an effort would not only enhance the efficiency of eco-environmental governance and protection in the Greater Bay Area and enable joint prevention and treatment of air, water, soil, and solid waste, but also effectively coordinate the interests and needs of the three regions to promote common development.

To establish a comprehensive ecological environmental protection system in the Greater Bay Area, there are several steps that need to be taken. The first step is to establish institutions and systems. The Greater Bay Area could consider creating an eco-environmental resource sharing center to overcome the institutional differences and data sharing issues among Guangdong, Hong Kong, and Macao. This center would facilitate common information sharing in the areas of water environment, atmosphere, soil, and eco-spatial environment and promote the construction of environmental information technology in the Greater Bay Area. Moreover, a strict ecological environmental protection system should be implemented, and a sound environmental governance system should be established.

The second step is to optimize the industrial structure. By optimizing and adjusting the existing energy structure and layout in the Greater Bay Area, the region can accelerate the development and utilization of green and low-carbon energy sources, such as natural gas, wind energy, solar energy, and biomass. Additionally, the area should build a clean, safe, low-carbon, and efficient energy supply system. The optimization and upgrading of industrial structure is also crucial, as the Greater Bay Area should reduce the proportion of high energy consumption and low output value industries. The region should focus on building a modern green industrial system that is low consumption, low emissions, and low pollution, while also promoting the development of a green circular economy.

Finally, it is necessary to promote the concept of environmental protection. The government should promote the concept of environmental protection in two dimensions: enterprise and society. In terms of production, the government should encourage enterprises to establish a green corporate culture and to actively assume social responsibility for ecological and environmental protection by adopting green and low-carbon production methods. In terms of society, the government should advocate for a green lifestyle that emphasizes saving and environmental protection. It should also enhance the role of social groups in ecological and environmental protection and strive to build an environmental protection culture system with the participation of the whole society.

5.2 Adjusting the Roles of Cities within the Region in a Systematic Manner

The establishment of a scientific mechanism of urban division of labor is urgently needed to clarify the division of labor among the administrative regions in the Bay Area and to ensure effective ecological synergistic governance. The first step is to leverage the leading role of the regional central city, such as Guangzhou, the capital city of Guangdong. With its strong influence and radiation power on the other eight Bay Area cities in Guangdong, Guangzhou can assume the responsibility of leading cross-regional environmental collaborative governance. This involves timely coordination based on the industrial development, pollutant emission, and treatment effectiveness of the nine cities in Guangdong. Additionally, the metropolitan areas formed by Guangzhou-Foshan-Zhaozhai, Shenzhen-Dongguan-Huizhou, and Zhuijiang-Zhongjiang can collaborate to promote regional environmental governance, mobilize participation in environmental governance, and acceler-

ate the integration of peripheral cities into collaborative environmental governance.

The second step is to establish a model of environmental governance. Hong Kong and Macao have advanced environmental governance technology and experience, which can serve as a model for environmental protection in the Greater Bay Area.

Lastly, innovation of communication models between cities is necessary. For instance, the nine cities in Guangdong Province can be represented by Guangdong Province and communicate matters through the "Internet+official" form. Furthermore, peer-to-peer communication among members of other administrative regions in the Bay Area can be facilitated by Hong Kong and Macao, who can provide guidance on advanced environmental governance technology and experience according to the actual situation.

5.3 Establishing a Collaborative Mechanism for Networked Governance

The establishment of a network-type inter-governmental relationship in the Greater Bay Area is essential to form an environmental protection mechanism that fosters interoperable information and consistent actions. Cross-regional public affairs governance, which requires inter-governmental contracts, cannot be met by the traditional "administrative district" system that relies on fragmented governance by local governments. Given the complexity of administrative divisions in the Greater Bay Area, the decentralization of environmental pollution transfer, and the weakness of inter-governmental cooperation agreements, building a network-type inter-governmental relationship is an urgent requirement. This relationship implies that local governments are equal in status and interdependent, with each having its own goals and achieving them through cooperative strategies rather than competition.

To implement this relationship, cooperation mechanisms can be built in three ways. First, inter-governmental cooperation within the Guangdong-Hong Kong-Macao Bay Area should be strengthened, and a cross-domain platform should be built to break through administrative boundaries and raise the overall level of regional cooperation. This authoritative platform can enable timely negotiation of governance solutions and help resolve cross-regional governance environment challenges. Second, the boundaries of inter-governmental authority and responsibility should be clearly defined so that each government in the Bay Area has clear rules of action in regional coordination and governance. Governments should fulfill their obligations based on trust and participate in collaborative environmental protection governance with the concept of equal and mutually beneficial cooperation. Third, the central government should take the lead in formulating an environmental protection mechanism based on the goal of common interests, standardizing the procedures of cross-regional cooperation among governments in the GBA, and unifying environmental protection indicators.

5.4 Harnessing the Power of Technology to Enhance Efficiency

Cities that have a high degree of green development tend to have a relatively stronger innovation capacity. Moreover, innovation capacity has an expanding and circular cumulative effect and gradually becomes a key factor in determining green development. Innovation activities with technology as the core can trigger quality behaviors such as product innovation, business model innovation, and system innovation. Therefore, science and technology innovation can provide solid support and strong power for the green development of the Greater Bay Area.

On one hand, the government should precisely grasp the direction and focus of the development of the Greater Bay Area city cluster and establish a green innovation support system that covers various factors such as talents, R&D, products, and markets. To promote technological innovation in urban construction, the government should conduct cutting-edge technology research in the field of ecology and environment, actively promote manufacturing intelligence, and promote low-carbon technology and process changes. Furthermore, the government should leverage Internet technologies such as big data and cloud computing.

On the other hand, the government should establish an open regional innovation system. Specifically, the Greater Bay Area should lev-

erage the innovation-led and radiation-driven functions of cities such as Hong Kong, Shenzhen, and Guangzhou. The government should support Hong Kong in building a world-class service industry innovation center and facilitate the integration of the Bay Area with the world's top innovation resources and networks. Additionally, the construction of national engineering and innovation platforms in the Greater Bay Area, the establishment of laboratory and engineering center systems in the Greater Bay Area, and the cooperation between industry, academia, and research institutions in green industry enterprises and research institutions are all important directions for the development of the regional innovation system.

6. Conclusions

Cross-regional environmental governance is a multifaceted and intricate project that is intricately tied to the comprehensive governance and sustainable development of a region. The GBA presents a particularly complex case, and effective cross-regional governance in this context requires attention to various aspects, such as administrative division, legal system, governance pattern, and urban division of labor, as well as an analysis of the challenges and countermeasures associated with cross-regional governance. This study focuses on the environmental governance situation in the Greater Bay Area, explores the collaborative governance network within this complex region, and summarizes corresponding countermeasures. The findings of this study have practical implications and provide valuable insights for regions that are grappling with the tensions between economic development and environmental justice.

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The fundamental way out of global public crisis management in the Internet era

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KEYWORDS

ABSTRACT

The COVID-19, which is still raging, shows that a major public crisis on a global scale is an extreme problem that all of the humanity faces together. The COVID-19 is only one of the major public health crises, and mankind also needs to work together to deal with many other global public crises such as climate, economy, war, and terrorist attacks. Countries around the world that have experienced the era of globalization have further opened up a survival and development model in which information technology and globalization are superimposed. The Internet has greatly boosted human production and living standards, but this biggest driver of human development has not proven to have the effective ability to solve problems in the face of various global crises. On the contrary, due to the existence of huge obstacles such as digital monopoly and digital divide behind the capital, the Internet sometimes even becomes the cause of global inequality and reduced efficiency in crisis resolution. The capitalist system, which holds the most advanced medical level and technological productivity in the world, coupled with its monopoly on Internet technology, should have better benefited the world, but if there is a lack of a good institutional rule to regulate the drawbacks of this technological superposition effect, then humanity cannot fundamentally get rid of the inequity of resource distribution, which in turn amplifies the tension between technological advancement and the inefficiency of disaster emergency governance, ultimately affect the well-being of humanity as a whole. The idea of a community with a shared future for mankind is a useful exploration of the fundamental way out of global public crisis governance in the Internet era, but it requires countries, especially the major powers, to eliminate the sense of confrontation and enhance the sense of community with a shared future for mankind to deal with global public crises through extensive consultation, joint contribution and shared benefits.

The Coronavirus pandemic, which is still raging, shows that a major public crisis on a global scale is an extreme problem that all of the humanity faces together. The New Coronavirus is only one of the major public health crises, and mankind also needs to work together to deal with many other global public crises such as climate, economy, war, and terrorist attacks. Countries around the world that have experienced the era of globalization have further opened up a survival and development model in which information technology and globalization are superimposed. The Internet has greatly boosted human production and living standards, but this biggest driver of human development has not proven to have the effective ability to solve problems in the face of various global crises. [1] On the contrary, due to the existence of huge obstacles such as digital monopoly and digital divide behind the capital, the Internet sometimes even becomes the cause of global inequality and reduced efficiency in crisis resolution. The capitalist system, which holds the most advanced medical level and technological productivity in the world,

coupled with its monopoly on Internet technology, should have better benefited the world, but if there is a lack of a good institutional rule to regulate the drawbacks of this technological superposition effect, then humanity cannot fundamentally get rid

of the inequity of resource distribution, which in turn amplifies the tension between technological advancement and the inefficiency of disaster emergency governance, ultimately affect the well-being of humanity as a whole. [2] The idea of a community with a shared future for mankind is a useful exploration of the fundamental way out of global public crisis governance in the Internet era [3], but it requires countries, especially the major powers, to eliminate the sense of confrontation and enhance the sense of community with a shared future for mankind to deal with global public crises through extensive consultation, joint contribution, and shared benefits [4].

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1. The nature of global public crises

Over the past few decades, humanity has seen first and foremost the economic prosperity and dramatic improvement in living standards that globalization has brought. But the new coronavirus epidemic, which has profoundly affected the world for two years, relentlessly shows that major human public crises have fully demonstrated their global nature. The dilemma of pandemic control shows that in today's Internet era, the international governance pattern based on statism and nationalism is still unable to better address the catastrophic consequences of major global public crises for humanity. The basic logic behind this paradox is that while the Internet has greatly increased the productivity of human labor, it has deepened the reproduction of monopolistic relations of production, posing an unprecedented challenge to the fundamental attributes of humanity as a community of destiny. The most obvious of these is the phenomenon of large platform monopolies in the field of Internet technology itself. Instead of improving the equality among individuals within the community, the exclusive properties of the Internet have exacerbated inequality and high levels of differentiation on a global scale.

There is a significant difference between the internationalization of crises, which is mainly reflected in the transnational (border) character of crises, and global public crises, which emphasize the borderless nature of crises. Internationalized crises generally refer to crises in which more than two countries are actors, and their resolution depends on the union of multiple actors. A global public crisis, on the other hand, means that the crisis knows no national boundaries, spreads extremely widely, and is extremely difficult to control. Global public crises fundamentally threaten the security and common interests of all mankind, and cannot be solved by mere consultation between countries, but require a more comprehensive and complex community mechanism to control their effects. The neoliberal-dominated capitalist system has promoted the process of globalization at full speed and has also taken advantage of Internet technology to enhance the efficiency of global allocation of capital and the general level of labor productivity. However, the global public crisis that has coincided with the material production of life has shown that the logic of capital still cannot break out of the historical limitations of the capitalist system.

2. The "false community" is incapable of solving global public crises

Globalization and digitalization are intertwined, making the world run faster, which is the progress of human history. With the rapid development of the Internet, the developed Western countries, led by the United States, have formed a "false community" of the capitalist system^[5].

But this community has not reflected its global communal value at all in the face of the new epidemic. While the community has spared no effort in controlling global economic interests through high-tech means such as the Internet, its internal regulatory mechanisms have clearly failed in responding to a major global public health crisis. Moreover, even within developed countries such as the United States, the United Kingdom, and France, the monopoly system characterized by the privatization of public services has, on the one hand, prevented society as a whole from forming a joint effort to contain the epidemic. In the politico-administrative system of the UK, also lacking a written constitution, the prerequisites for centralizing government, not just in the event of a crisis, are also in place. In fact, given the strong position of the executive within the British Westminster model, with its system of majoritarian democracy, (radical) policy changes are relatively easy to undertake. However, the strong civic culture tradition, within which differences between the state and the socio-economic sphere have not become very pronounced, as well as the devolution policy of recent decades, can be seen as particular challenges.

In Italy, Spain, France, and Belgium, as part of the Napoleonic tradition of the state, have contributed to fundamental changes in some elements of this tradition—an evolution that has become a relevant context for crisis management in these countries. The centralization of the state

has been greatly diminished in both Italy and France, albeit to different extents. In the case of France - known for its single centralized system, politically entrenched in its acceptance of (central) government's regulatory powers and strong bureaucracy - subnational governments, especially at the regional and departmental levels, have acquired some new competencies in recent decades. However, decentralization in France has also been accompanied by a process of devolution, due to the even increased powers of the central state in different policy areas (e.g. health). In turn, the Italian regions share decision-making capacity with the central government in sectors such as health and civil protection, while having autonomy in the economic, tourism and agricultural areas. Spain has a "quasi-federal" nature, with autonomous communities enjoying independent political and spending powers. Since 2010, regional governments in both countries have become weaker than in previous decades due to fiscal and political factors. In contrast, Belgium's regions have become stronger, even though they share competencies for health policy with the federal/national level. Not surprisingly, the fragmentation of competencies did hinder a rapid response to the COVID-19 pandemic.

But in China, the centralized intergovernmental system quickly conveyed a political commitment to the brim of the system. High citizen trust figures provided further social legitimation for tough epidemic control. The past economic performance of the Chinese government, in combination with a tradition of strong government, has sustained high citizen trust statistics. Antivirus measures were largely based on these culturally embedded high trust levels, while, at the same time, implementation relied on limiting individual freedom and onerous compliance.^[6]

On the other hand, it has even intensified the ideological division among different social classes and races within it^[7]. The public health system under the monopoly of capital has experienced massive supply failures within the country, not to mention the global sharing of health care resources^[8].

With the developed capitalist country systems in control of advanced medical technology productivity and the United States alone almost monopolizing the entire Internet system, it is logical that humanity should be able to work together to solve a global public health crisis like the new coronavirus epidemic more quickly and efficiently^[9]. But in fact, not to mention the Western system's lack of will and ability to assist poor countries in dealing with the epidemic, even the developed Western countries are internally overwhelmed, and the epidemic is still not under full control. However, the stock market value of a few pharmaceutical companies and Internet monopoly platforms kept soaring during the epidemic, which reflects the narrowness of the logic of capital distribution under the capitalist system. About 2,750 billionaires' control 3.5% of the world's wealth, the Paris-based Global Inequality Lab said in a report Tuesday. That's up from 1% in 1995, with the fastest gains coming since the pandemic hit, the group said. The poorest half of the planet's population owns about 2% of its riches.

"Big Pharma's business model - receiving billions in public investment, charging exorbitant prices for life-saving drugs and paying little in taxes - is gold dust for wealthy investors and corporate executives, but devastating for global public health." More than 200 million people have been infected in the pandemic and more than 4.5 million have been infected. Ahead of the United Nations General Assembly and the virtual COVID summit hosted by President Biden, activists are mobilizing around the world, including the United States, the United Kingdom, Brazil, Germany, South Africa, and India, to demand the immediate elimination of the vaccine monopoly and the sharing of vaccine formulas to save lives. They are joined by more than 140 former leaders and Nobel laureates, including François Hollande, Helen Clark, and Gordon Brown, who wrote an open letter to German candidates ahead of the Sept. 26 national elections calling on them to reverse Germany's opposition to abandoning patents and support the immediate transfer of vaccine technology to manufacturers in developing countries.

Based on recently released second-quarter financials, the People's Vaccine Alliance estimates Moderna brought in more than \$6 billion in revenue this year, \$4.3 billion of which was profit - an astronomical 69 percent profit margin on its vaccines. Moderna expects total vaccine

sales of \$20 billion in 2021. Meanwhile, Moderna is paying a single-digit tax rate - despite earning billions in profits, it paid only \$322 million in taxes in 2021.

Given that Moderna and BioNTech have no significant commercial products other than the COVID-19 vaccine, the total profit margin comes almost entirely from the vaccine. Although Pfizer is not a start-up company and sells multiple products, the COVID vaccine is also a huge windfall for Pfizer. With millions of people around the world deprived of protection, it is not only morally wrong for rich countries to stockpile vaccines and for rich pharmaceutical companies to profiteer, but it is short-sighted and dangerous.

"This is truly a virus of inequality. We have created billionaires in vaccines, but we are not vaccinating billions of people who desperately need them. Given the enormous public investment in developing these vaccines and the overwhelming public health needs around the world, these life-saving vaccines must become a global public good."^[10]

While technology and the Internet are developing at a rapid pace, the overall level of human health and protection is more fragile and imbalanced, and major global public health crises have caused a major setback in the globalization that humanity has developed. Imagine, under such circumstances, if humanity is unable to form a more macro and thorough community of destiny mechanism, what is the use of capital even if it continues to be concentrated in the most economically efficient areas of science and technology?

This contradictory tension is not at all promising in other areas as well. It is difficult to develop a truly communal global mindset to guide the achievement of solidarity with regard to the climate environment, natural disasters, economic crises, etc. Global wealth is concentrated in very few countries, even precisely in a very few monopolistic oligarchies and families, yet the negative global effects on the natural environment and economy due to globalized production are spreading in a large number of poor and developing countries. And do these countries have the ability and possibility to escape from the globalization, standardization and concentration of production under the logic of capital? For the time being, there is no such possibility. The profound contradictions of capitalist relations of production, which manifest themselves mainly in the form of antagonistic and ideologically polarized manifestations between different classes within the developed countries, force the prevalence of nationalist and statist thinking on a global scale. Developed country systems often organize alliances or agreements within "false communities" in an attempt to solve the underlying problems of global public crises, but the reality is that human beings are increasingly vulnerable to the chain of major public crises and the overall damage to their own living environment is becoming more and more serious. These realities are not conducive to eliminating the dangers of global public crises such as global climate change, pandemic crises and global economic crises^[11].

3. The concept and value of the community with a shared future for mankind Program

Although competition under capitalism is constantly improving the technological level and economic efficiency of mankind, the serious consequences of the new coronavirus epidemic fully demonstrate that the competitive model dominated by zero-sum game thinking is not the way out for mankind to solve global public crises. China's influence in the global political and economic landscape has changed dramatically, and a responsible community with a shared future for mankind solution has been proposed for this major issue that concerns the future of humanity.^[12] The idea of a community with a shared future for mankind calls for all countries in the world, especially the great powers, to first of all have a sense of collaborative and win-win crisis governance, the fundamental idea of which lies in transcending the socialized mass production and international governance pattern dominated by the logic of capital. In the contemporary world, the rate of return on capital is much higher than the economic growth rate, the unequal possession of the means of production has led to the gap between rich and poor and polarization, while capital is still rapidly concentrating to the big bourgeoisie, and the unevenness and vulnerability on a global scale are increasing. As a re-

sult, the current world governance mechanism can barely cope with basic development needs, but when faced with major global public crises, the monopoly mechanism under the rule of capital will consciously hinder the balance of the common good. In the case of the new Coronavirus epidemic, the tension between the capital-monopolized health care system and the rights of individual citizens has been stretched to its limits, even within the developed world system^[13].

Human life and freedom are equal, and it should be easier to pursue this valued goal in the Internet era, because the Internet can theoretically lead to less resource consumption, lower costs, less differences, and more convenient and real-time social interactions in modern societies, but the current global monopoly on capital, technology, and information, as well as nationalism, statism, and zero-sum game thinking together restrict this equality. Especially when major public crises occur, the divide created by monopoly and protection thinking becomes more and more obvious. The continued negative impact of the New Coronavirus epidemic has proven that the ultimate human problem cannot be solved by competitive mechanisms, and that only through the mechanism of building a community with a shared future for mankind can we embark on the path of solving this major problem. The building of a community with a shared future for mankind is not a special claim of any country, but the result of the interaction of the interests of all countries, but it must be formed by large countries with highly developed productivity and social organization capabilities, such as China and the United States, taking the lead and gradually leading small countries to participate together^[14]. The community with a shared future for mankind is not a unipolar transfer, not a transfer of power between China and the United States, if so it is bound to encounter the same difficulties.

The community with a shared future for mankind must first establish the concept of solidarity rather than confrontation widely among countries, and let the principles of peace, development and mutual benefit penetrate into the thinking of the community members' interactions, which is a transcendence of the existing international relations with the capitalist system as the main bond, and cannot be fully realized in the short term^[15]. Common weight in the establishment and improvement of resources as well as information-sharing and collaboration mechanisms, which can be complemented by multiple subordinate communities at different levels. The community is a collaborative win-win mechanism based on common interests, not to the exclusion of productivity and science and technology, and even requires the logic of capital to play a positive historical role. Under the community mechanism, the world will still face common problems of disease, hunger, pollution, etc., and will still need food, energy, and medicine to solve major crises, but the response to global public crises urgently requires information sharing mechanisms under the concept of solidarity and collaboration among countries. Advanced science and technology are the basis for the effective functioning of the Community, but the science, technology, and critical information used to respond to crises are often controlled by private companies and platforms, so strong state intervention is necessary to ensure the effective functioning of the Community's collaborative mechanisms.

4. The resistance of monopoly and compartmentalization to the community with a shared future for mankind and its overcoming

Before the new coronavirus epidemic, globalization was already showing its weakness. Britain was on the path of leaving the European Union and its staunch ally, the United States, was on the prowl for a trade war with the world's major economies. The two top powers of the capitalist system, which dominates neo-liberal values, were the first to show their pessimism about globalization.

They are the biggest beneficiaries of the global capitalist system, so why do they choose to go against globalization? Because the capital-dominated system is unable to solve the crises it generates and sees the need to pay a huge price for overcoming global public crises, it has no choice but to shift the contradictions and costs. The greatest consequence of the neo-liberal domination of the world's growth for almost half a century is that specific capital or specific enterprises have increasingly mastered the ability to monopolize profits, and are even gradually

replacing the functions of the state, making the distribution of wealth between countries and within countries very poor, and with it the ability to equalize social security is also declining. Even within the world's most developed and top capitalist powers today, the proportion of poor people is growing, and their basic medical and health care coverage is astonishing. It is in this historical situation that the United Kingdom and the United States have opened their actions against globalization. Radical forces on the left and right wings of European and American politics began to speak out against globalization, and the United States took the lead in undermining global multilateral coordination and cooperation mechanisms^[16].

At the same time, however, the global climate, economic, energy, food, war, health and refugee crises are intensifying. The growing climate and environmental problems that accompany industrial mass production have long plagued the world, and neither rich nor poor countries are immune to them. A new coronavirus epidemic has left all countries in the capitalist system facing severe shortages in their supply chains and unable to stop the relentless destruction of the health of their populations, let alone those in less developed countries.

Several of the world's largest pharmaceutical companies have seen their market value balloon under the aegis of vaccines, and there is still no effective vaccine distribution mechanism in place globally. More worryingly, Western countries have not only failed to establish crisis prevention and control mechanisms with developing country systems, but also erected barriers between different camps through ideological differences, and are still keen on geopolitical confrontation in times of major epidemic crises. Relatively speaking, emerging market countries are instead more interested in a community with a shared future for mankind based on resource and information sharing mechanisms. Despite the radical unilateralism of the United States, international organizations and multilateral mechanisms have not been destroyed in this epidemic, with China, Germany, France, Japan, and other countries reaching commitments for the global sharing of vaccines. China's timely launch of the "Belt and Road" initiative clearly proposes to build a new high ground for multilateralism and global governance with the aim and basic principle of building a community with a shared future for mankind, focusing on productivity development, infrastructure development and poverty reduction to compensate for the lack of developing countries^[17]. This purpose has been confirmed by the United Nations in the form of a document, and more than 140 sovereign countries and 32 international organizations, including developed countries and developing countries, have joined the plan with great interest, making the innovation of the "Belt and Road" community mechanism a useful supplement to the existing international system.

Humanity has entered the irreversible Internet era. Under the superimposed effect of globalization and digitalization, human production and life have achieved a radical change^[18]. But the growing tension between the public nature of the way the digital sphere is used and the monopoly of the way it is operated has seriously affected the resolution of the global public crisis. The global Internet technology sector has been monopolized by a few platform companies that hold more information about the global basics of data than national governments do, and they essentially manipulate the daily information exchange of all people, so much so that when an instant messenger owned by the U.S. company Facebook goes down for a short time, it affects the daily lives of residents in many countries around the world^[19]. Data has become the greatest asset in the world today, and Internet technology platform companies have found ways to monopolize exclusive access to data and information through various technical thresholds, thus reaching a de facto oligopoly status. Platforms and countries that have reached digital monopoly can easily create a global digital divide, which can fundamentally lead to global inequality^[20]. Internet monopoly is also a fuel for ideological antagonism, and the resulting ideological divide among major powers can hinder the construction of a community with a shared future for mankind. In the absence of a community with a shared future for mankind, the disadvantages of the Internet will become apparent, and the monopoly of data, like the monopoly of capital over the means of production, will sow the seeds of inequality^[21]. When the next major

global public crisis comes, I am afraid that humanity will still not be able to deal with it calmly.

In the post-globalization era with highly developed network information, China has made efforts to build a community with a shared future for mankind, but such exploration needs the support of all countries, especially to avoid the "Thucydides trap" and social Darwinism among the great powers^[22]. Kissinger has repeatedly called on the world not to have a monopoly on science and technology, and on major powers not to focus only on their own interests, but to work together to solve global public crises^[23]. The international academic community has also repeatedly called out that there can be no real and effective solutions to major crises that affect the future of humanity, such as climate change, if the West does not cooperate with China^[24]. In fact, the U.S. has comparative advantages in technology and networking, and China has advantages in manufacturing and infrastructure construction, so China and the

U.S. can work together under the principles of peace, development, and mutual benefit, in conjunction with the "Belt and Road" initiative^[25], to strengthen the construction and protection of global information infrastructure, improve international connectivity, and work to bridge The United States and China can work together to strengthen the construction and protection of global information infrastructure, improve international connectivity, and bridge the global development divide, laying a solid foundation for building a community with a shared future for mankind to effectively respond to major global public crises.^[26]

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Political function development of global city in the age of globalization

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KEYWORDS

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ABSTRACT

As a political entity distinct from the nation-state, global cities can participate in cross-regional and cross-national coordination actions, starting from the local, national, and even regional levels, relying on their own material and cultural influence, and integrate into the global governance system, thereby strengthening the international influence of the country in which they are located. The article explained the background of the development of city from metropolitan to global city with the expansion of the political function due to further involvement in international politics through global networks. The article also makes an in-depth discussion on the political economy system of global cities and city diplomacy.

1. Introduction

The flourishing development of information technology has shattered the geographical limitations that once existed throughout the world, facilitating the more rapid and free circulation of production factors, and further accelerating the pace of globalization. As a result, the development of global cities has entered a new stage. A group of global cities are rising rapidly, all of which are leaders in their respective countries or regions of origin, and have a certain degree of internationalization in various aspects of social development. These cities shoulder different international functions, meaning that they have already gained a place in global governance and possess the capacity to participate in and even influence global affairs in politics, economics, and social culture. This is a new height reached by cities in the process of internationalization.

The subject matter of this article can be interpreted in at least two ways based on the literal meaning of the title: global urban politics or the politics of global cities. This article elucidates the political developments of global cities as a specific urban form, rather than as a general or unique form of urban politics at the global level. Cities not only bring about tremendous changes to human economies and social life, but also constitute a particular type of socioeconomic and political relationship. Cities are not merely a geographic condition, but a logic of action. There-

fore, with the continuous development and evolution of cities, until the formation of global cities, the political logic of global cities exists and develops in a completely new state, exerting a huge influence on world politics. The reason why the political development of global cities is becoming increasingly important is that the status of global cities in the global political and economic system is becoming increasingly significant, and their logic of action as sub-national entities poses a certain challenge to the established modern state political ideology.

2. The Development of Global Urban Political Theory

Global cities have played a significant role in the development of urban civil society and have attempted to create new urban political systems, which have become increasingly complex due to global labor migration and multicultural integration. Global urban theory, from the perspective of the Neo-Marxist theoretical paradigm, reveals not only the operational mechanisms within the global urban system, but also explains the economic motivations and social and political consequences that shape global cities. Urban space is not merely an object of science distorted by ideology or politics, but rather possesses political implications and strategic implications. When space becomes subordinate to politics, urban space also displays strong political traces. The concrete

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manifestation of spatial politics is the occupation and division of space. Urban socioeconomic development is achieved, by producing and occupying urban space. The conflicts and contradictions within cities often begin with resistance to control over space.^[1]

Castells further analyzes the city as a "system" from a structural perspective. He regards urban space as a form of social structure expression and analyzes the many elements contained within urban space. The objective is to study the various elements of social structure and the connections between them, as well as the social practices that shape space.^[2] The source and actual operational mechanisms of power in the urban system are the core issues in urban political research. Power relations must be subordinate to social structure and defined by the overall social structure, including politics, economy, and ideology. Castells believes that when power relations within the city are defined as relations between social classes, and class relations are a combination of the positions of all entities defined in the social structure, power then becomes the ability of a class or group to achieve its goals at the expense of the opposing class or group. While class relations and class struggle are fundamental factors in understanding urban conflict, they are not the only main causes of urban social change.^[3] The state's autonomy, gender relations, ethnic and national movements, and various citizen movements all play important roles. The different roots of urban change and power relations become specific class relations.^[4] Therefore, urban politics is actually the political practice activities of various classes to achieve their various goals and interests. Political practices can be divided into two interrelated domains: state intervention in urban planning or regulation and control by the state machine over the social system, and urban social movements.

Harvey achieved a perfect integration of empirical geography and Marxist political economy. In his theoretical framework, Harvey consistently adhered to a critical discourse of political economy, closely linking critiques of capital and capitalism with political economy. His analysis of capital circulation, spatial production, space-time compression, spatial fixes, as well as class structures and urban justice under the backdrop of Neo-liberalism, all reflect this point. Some scholars even refer to Harvey's urban theory as "urban spatial political economy". Harvey believed that the focus of understanding urban processes is the fundamental issue of capital accumulation, which was Marx's greatest concern. He affirmed the power relations between capital and labor analyzed by Marx, which are the basic social relations of capitalism and the main force forming the class structure of capitalist society. However, Harvey also pointed out that the main force constituted by the power relations between labor and capital does not necessarily lead to the "Dualistic class structure" of capitalist society as a whole. He believed that "social constructions can manifest in many different ways in real life." In addition to the basic relationship between capital and labor, class interests and social structures can also form around other forces, leading to the issue of urban justice. In the view of some new Marxist urban political scientists, justice is a political force that can be presented through social structures, and this structure is the city. Ellis Marion Young believed that in a just and civilized society, the standard idea of urban life should be "social relations composed of various short-term interactions without exclusivity. Different groups can live together in the city, of course, they will interact with each other in the urban space. If urban politics is democratic and not dominated by the views of any particular group, this policy will definitely consider and prevent violence against those different groups who do not have a fixed community in this city."^[5]

Since the economic crisis of the 1970s, a new political climate has emerged in the Western world. Neo-liberalism has become the mainstream development strategy of developed capitalist countries in the West. Bob Jessop pointed out that although Neo-liberalism appears in different aspects such as the economy, society, and international politics, "the truly existing Neo-liberalism is mainly reflected in urban politics."^[6] Urban restructuring as the "Neo-liberal space" has stimulated the emergence of new Marxism, while attempting to demonstrate the broader characteristics of Neo-liberal urban space by highlighting the diversity of "Neo-liberalism" across the globe. Jessop believes that "the potential conflicts between local economic and capital flows, local sustainable development and well-being, international competitiveness,

social exclusion challenges, and the sustained development of global polarization in the interface regulation require the role of cities to call for the implications of Neo-liberalism such as liberalization, deregulation, and privatization."^[7] Karl argues that "the reconstruction of local government institutions is the integration and connection of two forms of world city formation, which externally integrates the global economy and internally integrates the social fragments." They call this reconstruction the "Neo-liberal urban space" and present it as a process of "neoliberal localization."^[8]

The global forces of capitalism are becoming increasingly powerful, with cities and regions becoming new centers of power. This means that urban politics serves as a vehicle for independent nations to redefine themselves. The modern nation-state project no longer seeks to redistribute resources across the entire country to ensure balance, but instead chooses successful urban regions to provide resources and ensure their economic growth.^[9] Research on cities has shifted from traditional urban autonomy to the interrelationship between cities, regions, and globalization, with urban politics increasingly being associated with globalization under the banner of "new regionalism." Unlike previous studies, "new regionalism" places regionalism within the context of globalizing transformations, calling for the examination of regionalism and regional plans for revitalization from a global perspective. Scholars are using a systematic approach to analyze the development of "regionalism" and changes in regional systems, with the multi-level interactive analysis being a prominent feature. The most famous method is the "three-level game" analysis of global-region-domestic, used by David Lake and Patrick Morgan.^[10] While others such as Bjorn Hettner use the five-level analysis of global-region-region-nation-local interaction, and Barry Buzan and others use the four-level interaction model of domestic-regional-inter-regional-global.^[11] This multi-level interactive analysis not only provides the possibility of linking internal factors, unit relationships, regional relationships, regional dynamics, and global behavior within a region, but also supports Hettner's view of the "state-market-society complex."^[12] They believe that it is the interaction among various actors, including the state, market, and civil society, that drives the formation of an independent regional role.^[13]

3. Global City Development and the Formation of Global Networks

Since the 1970s, with the continuous progress of globalization and urban development has been endowed with new meanings. In the broad process of globalization, some cities that have become the centers of the world economy gradually play more comprehensive roles. For example, super international metropolises such as London, New York, San Francisco, Los Angeles, Paris, Tokyo, Singapore, Beijing, etc., are not only considered as world economic, financial, and transportation centers, but also as political and cultural centers in the eyes of the world. All kinds of information in these urban areas are quickly known worldwide. These cities are the headquarters of most of the world's large enterprises and international organizations, have global securities and futures trading institutions with huge trading volumes, receive massive numbers of business travelers and tourists from around the world every year, and regularly host the world's largest sports and cultural events. The popularity of these cities is almost on par with their respective countries and, to a certain extent, even replaces the overall functions of their countries.

Cities are replacing nations as the territorial infrastructure and spatial ontology of capitalism. Cities have become the infrastructure and spatial ontology of the global system in the new economic system, indicating that (1) cities have become important nodes of the world economy organization; (2) the diffusion of national authority and decentralization of power have enabled cities to obtain extensive autonomy, and people are more willing to rely on cities rather than nations for global activities; (3) cities have moderately detached from sovereignty, and some countries have experienced overall decline while cities have become remarkable. As the concentration of resources in the global system, cities have been empowered by globalization. Although the importance of geographical location still exists for cities, which has broken through the technical restrictions on external actions, making cities important nodes of various contacts and connections.

With the further transformation of the world economy and society, these central cities have gradually become global cities, and their roles played on a global scale must be explained using the global city theory.^[14] American scholar John Friedmann initially created the basic theory of global cities, stating that under the deepening influences of globalization, global cities are the basis for global capital to organize and coordinate its production and market, the main gathering place for international capital, the destination for a large number of domestic and international immigrants, and also the center for the production and dissemination of information, entertainment, and other cultural products.^[15] American scholar Saskia Sassen applied Friedmann's theory of global cities more comprehensively for the first time and analyzed the global city features of New York, London, and Tokyo using empirical methods.^[16] She believes that the dispersion and integration of economic activities occur simultaneously geographically, and the more capital flows globally, the more capital management and control are needed, and the higher the concentration of central cities in the world. Global cities are also centers for product and innovation markets. The rapid advancement of economic globalization has led to the accelerated transformation of the world urban system, and the status of global cities in the world's political and economic system is increasingly important. Global cities have become the "engine" of today's world political and economic development, and their existence meaning has surpassed the economic and social development functions of a single city. They largely represent the level of development and ability to participate in global affairs of the country where the city is located, and more deeply and widely integrate into the global governance system, possessing the potential to become economic drivers, creators of a new political order, and builders of diplomacy.

Since the 1980s, the academic community has gradually developed the theory of global cities based on new Marxist political economy. Compared to simply economically developed cities, global cities have a broader connotation. They are not merely a spatial result of economic globalization, but are shaped by various actors, institutions, and more broadly, national urban systems, cultural habits, political institutions, and other factors.^[17] In the latter half of the 20th century, globalization brought epoch-making, revolutionary changes to human society, and had a profound impact on urban development. Even at the level of traditional world cities, they were greatly influenced by the international division of labor system and the politically and economically related connections of globalization, and were no longer developing independently. Instead, they increasingly sought to occupy the center of global industrial development through the absorption of more development resources, gradually transforming from world cities to global cities. The urban political attributes of global cities have a stronger global character, and even affect the structure of national power.

4. Global City Networks and Political Implications

Cities are moving towards becoming global cities, fundamentally challenging the state-centric political perspective. As mentioned earlier, the political nature of global cities breaks the isolation, seclusion, and absolute dependence on the state caused by geographical location and ethnic differences. Global cities make politics no longer primarily channeled through centralized states, but rather exhibit more self-governance processes with multiple centers.

Global cities have stronger openness and inclusiveness and gradually form a global city network, which exhibits the characteristics of inter-connectivity and multi-level governance. Regular and platform-based cooperation between cities, especially major global cities, has become a new highlight in the global governance system, and the policy network established among global cities has increasingly become an important component of the global governance system. The diversification of economic and social development within global cities themselves indicates the complexity of the urban environment, making policy evaluation, formulation, and implementation significantly different from before. This is mainly manifested in the following aspects: Firstly, the powerful flow of information means that uncertainty is increasingly prominent. Secondly, the autonomy and external extension capabilities

of various urban organizations have been enhanced, and the effectiveness of intervention and governance relying on traditional policy designation and execution processes has weakened. Thirdly, policy correlation: the government increasingly relies on the cooperation of stakeholders to gather the necessary action resources, making coordination between the government, various social organizations, enterprises, individuals, and other relevant actors more important. The integration of various resources for the government can ultimately form a complete policy network through negotiation and agreement. In the context of global cities, this policy network is not only closely related to the purpose of the issue itself but also has a dual impact on the national system and other regions of the world, ultimately forming a double impact that allows cities to more effectively integrate resources and enhance their overall strength. By integrating resources, cities can attract more resources and actors to participate in specific issues, build suitable policy frameworks, and introduce relevant experience for their own use. For example, cities are more likely to handle the relationship between economic recovery and emissions reduction than countries, and can optimize their own economic development models by setting low-carbon development goals. As a global city, using the city network endows the city with a dual identity of domestic and international, which provides convenience and greater room for the city to expand its influence. In addition, global cities can enhance their organizational capacity for international and global political interests. For example, some developing countries such as China use cities to effectively link the country and the global mobility space, while also using cities to promote economic transformation and social change, thereby obtaining new international strategic space. (2) The complexity of the global city network brings with it a multilevel character. The network advantage of cities lies in their horizontal extensibility and openness. With the acceleration of the network's weaving speed in cities, various activities and events within cities are directly exposed to other cities and the global system, making the internal differentiation of cities more apparent. Castells believes that globalization and information have led to the rise of local activism worldwide. Localities also link horizontally through technology. Localities can use such links to execute old strategies, such as nationalism, or to extend new organizations and operational methods, such as public diplomacy. Saskia Sassen points out that urban spaces do indeed accommodate a large number of activities that have not been filtered by formal political systems, such as sit-ins, demonstrations, and marches, in which immigrants, marginalized groups, ethnic minorities, the homeless, and even terrorists and political factions appear selectively in the political space of the city. These activities can be divided into three categories according to their goals: First, local goals, such as environmental protection and factory strikes, but these activities, especially those that occur within global cities, are more or less influenced or supported by similar global movements. Second, national goals, such as the "Capitol Hill insurrection" that occurred after the 2021 U.S. presidential election, the "anti-coup" marches in Myanmar, and even the anti-Putin marches in Moscow, have obvious national political characteristics, but cannot be separated from external system influences such as the global economic recession caused by the COVID-19 pandemic and external interference. Third, systemic goals, such as the WTO, IMF, or other multinational corporations, in which local actions become part of the global network while still maintaining a focus on local goals.

5. The Role of Global Cities in Global Politics

"Global cities" have a direct impact on global affairs in political, economic, social, and cultural spheres. They represent the highest form of international urban development and are the central nodes in the global city network system. As Peter Hall suggests, world cities are typically important centers of international politics, the seat of national governments, the location of international political organizations, as well as various professional organizations and manufacturing company headquarters. World cities are centers of international communication, possessing significant diplomatic influence and international political discourse, and are typically the venues for major international conferences.^[18] Currently, global cities are increasingly demonstrating their

tremendous potential as drivers of national development, which is largely attracting developing countries and urban leaders who view the development of global cities as a symbol of their economic and political success. As resources, networks, creative hubs, and engines of economic growth, global cities exhibit a trend towards "DE-nationalization" in the process of participating in global governance, that is, global cities are gradually deconstructing the political development path that relies solely on the nation-state. By participating in global governance, global cities amplify their own material power in world politics. For example, Saskia Sassen suggests that global cities not only serve as engines of global economic growth but also possess a significant initiative network force in world affairs, which has a bright future in multilevel global governance. Stefan N analyzed the transnational city network in two regions of Eurasia and concluded that cities cooperate independently across national borders and have "liberated" themselves from the level of national governments as symbols of the Westphalian nation-state, which has lost coherence in Europe and Asia to a certain extent.

By studying the economic, political, demographic, cultural, and democratic effects of global cities on world politics, Benjamin Barber pointed out that global cities have become a new force for good governance, which is urban rather than national, and can rise to the challenge of climate change.^[19] Although cities differ in wealth, development, and culture, they can find common measures to address climate change by transferring national sovereignty through global cooperation.^[20] Tang Wei, an assistant researcher at the Shanghai Academy of Social Sciences, examined the transformation of cities and the international system and believes that global cities have become "economic shapers, political innovators, diplomatic promoters, and changers of the international system" in an unequivocal manner. Global cities are more often involved in global governance through various cross-border city networks and possess normative power in numerous global governance issues. Kristin Kuhn studied the role of European cross-border city networks in global climate change governance and believes that such networks are "an effective model for promoting global climate change governance and an organic component of European integration," which has deeply embedded the values of "European integration" into numerous local governments.

Patrick Geddes and Peter Hall noted that the ability of global cities to allocate global resources can represent the geopolitical power of their home countries. The geographic distribution and growth of such global cities have become a symbol of the transformation of the international system.^[21] Scholars such as Immanuel Wallerstein argue that the world system is divided into core, periphery, and semi-periphery, and that the urban network is also affected by this division, resulting in an uneven distribution. The geographical distribution of New York, London, and Tokyo seems to confirm this view. However, the global city network, like the world economic cycle, is full of dynamic imbalances, alternating between the polarization of the core and the diffusion of the periphery. When polarization occurs, the control of the global city network increases significantly; when diffusion occurs, production structures shift from developed countries to developing countries, and control resources flow from global cities to semi-periphery and periphery. The "multinational nodes" and "important national-level nodes" within the network move towards "global nodes," and a group of cities that operate along this trajectory and aim to become global cities emerge within the network. These emerging global cities indicate that urban relationships within the network can transcend the North-South divide and simple competition, leading the international system towards equality.

6. The International Political Economy System and Global Cities

As a powerful actor in the political, economic, and cultural spheres, a global city possesses material power represented by economic strength and spiritual power represented by its attractiveness. First and foremost, global cities have economic advantages in global governance and maintain an open tendency towards long-term free trade. The financial, organizational, and legal resources that global cities possess, as well as their ability to integrate resources, are unmatched by ordinary sub-national actors. Global cities such as Tokyo, New York, Los Angeles,

and London have a GDP that far exceeds other cities, and they have the largest number of headquarters of the world's top 500 companies. Multinational companies set up regional headquarters in these global cities, occupying the high end of the global industry chain and value chain, forming a strong headquarters economy, and contributing a significant amount of tax revenue and additional economic benefits to the local city. This enables global cities to use their economic influence to achieve global governance objectives. Moreover, global cities have a talent aggregation effect. In addition to the general manufacturing and service industries, global cities include the vast majority of symbol analysts in a country or even a region, including scientists, university professors, engineers, investment advisers, lawyers, publishers, writers, musicians, and TV and film producers. Their work and interests are more closely linked to global sectors. According to Hobbes Baum, the decline of national differences can be better understood from the symbol analysis community. Although national identity will not be replaced, it will form a new form of identity. This form of identity is most likely to be generated in global cities where various cultures mix and blend, forming various identities and global citizens, who then form various transnational actors. Thus, the main actors in the external communication of global cities include a city communication network composed of local governments, non-governmental organizations, media, multinational companies, social groups, academic groups, and even individuals. The flow of talent in this network contributes to global governance proposals between global cities and other actors.

Global cities contribute new institutionalized solutions to global problems. For example, in 2017, the Global Sustainable Development Standardization City Alliance was established with the joint efforts of ISO, the United Nations Environment Program, the French National Standardization Agency, and Hangzhou City, to promote the establishment of a global sustainable development standardization city alliance, research and promote advanced city sustainable development standards, improve the international standard system for serving city sustainable development, and promote economic growth, social progress, and environmental protection as the three pillars of sustainable development among member cities, promoting "standard co-construction, policy sharing, and win-win cooperation" among member cities.

7. The Polarization of Global Urban Development and Political Conflict

Global cities are a double-edged sword: the first challenge facing the construction of global cities is that these cities, which are in fierce competition in the process of globalization, are difficult to avoid social polarization while becoming economic powerhouses.^[22] As a research fact, global cities have become "spatial strongholds" for social and political conflicts. Global cities do not bring more benefits to ordinary residents living in these cities, as they are places of socioeconomic polarization, which only bring more profits to global capital. These "battlefield command centers" of the world economy have more and more low-income laborers, isolated and politically marginalized residents, and vulnerable ethnic minorities. The phenomenon of social and geographical fragmentation is becoming increasingly serious. Mike Douglass studied the polarization of mega-cities in the Asia-Pacific region, which is caused by structural changes brought about by globalization and foreign direct investment. The polarization in economies such as Thailand, Indonesia, and the Philippines is directly related to the territorial tendency of foreign direct investment in the core urban areas. This phenomenon is also evident in Tokyo.^[23]

Many major Asian cities in the globalization process have shown a trend of relative poverty and income inequality that is increasing in all cities. Susan Fainstein studied the social inequality in five cities, including New York, London, Tokyo, Paris, and Rotterdam. These five cities have very different forms and degrees of inequality, especially for the plight of the lower strata, with the gap between New York and Rotterdam being the largest.^[24] In other words, economic globalization does bring social differentiation to some global cities, but its situation is still influenced by multiple factors and has different forms of expression. This social polarization also manifests as imbalanced development be-

tween urban and rural areas within cities, which is more pronounced in third world countries. Smith and others pointed out that these cities are dependent on the world economic system while also being on the edge of this system, and these cities also generate and exacerbate this center-periphery structure within their own countries and internally.^[25] For example, in Indonesia's population of 260 million, over 10 million people live in Jakarta, and the polarization between the rich and the poor in Jakarta became worse after the Asian financial crisis. Similarly, in Ho Chi Minh City, Vietnam, there are many motor vehicles, commercial centers, and Western corporate headquarters, but the wealth gap is even wider. Regarding the consequences of social and political polarization, global city theorists believe that political conflict will be difficult to avoid. Sassen and Friedman both believe that social polarization in global cities leads to spatial polarization of social geography, and the overlap of space and social polarization will lead to more serious urban problems. Due to the trend of social and political polarization in global cities, they are seen as a collective gathering place for "anti-system" behavior. Sassen further extends the political consequences of social and political polarization to many aspects such as gender, race, and immigration: the social and political conflicts of global cities are multifaceted and have both modern and post-modern aspects.

8. The Diplomatic Function of Global Cities

Globalization has reconstructed the world's political and economic map, activating the diplomatic role of cities with complex cross-border flows and social participation. The rise of urban internationalization and global cities has made city diplomacy increasingly become a relatively independent form of diplomacy. Compared to national diplomacy dominated by central governments, city diplomacy has a more diverse range of actors, more flexible goals, more abundant means, and more complex rules of the game. It is a new form of diplomacy that to some extent makes up for certain shortcomings of national diplomacy in the new era. In the 1990s, with the dissolution of the Soviet Union and the end of the Cold War, there were tremendous changes in the global political order, the confrontational situation of superpowers collapsed, globalization accelerated, and local governments and cities became more active in their external activities.

James Rosenau proposed the "Two Worlds" theory in 1990. He believed that world politics had undergone fundamental changes, and one of the two worlds was still dominated by sovereign states, while the other was dominated by non-sovereign actors without constraints, creating a multi-centric world where both worlds would coexist for a long time.^[26] Sub-national governments are one of the non-sovereign actors in the multi-centric world. Corresponding to Rosenau's "Two Worlds" theory is the "Parallel Diplomacy" theory proposed by Yves Ducheck. Ducheck believes that local governments can influence foreign relations by influencing the central government's policy-making, or they can take action directly on the international stage, without the central government as an intermediary, to promote local interests. Some local governments establish permanent institutions in other countries' capitals or economic centers to promote local trade and investment.^[27] After the end of the Cold War, this type of protest activity developed along two paths: First, typical of European countries, local governments established independent diplomatic agendas, coordinating international activities in different areas such as economy, society, culture, and environment towards specific countries and regions to achieve urban strategic goals. Although these city-initiated activities are trans-regional and transnational, they are neither representative of national diplomacy conducted under the auspices of the central government nor supported by clear legal and international rules. They are only efforts to exert influence on a country's foreign policy in pursuit of a common set of values or specific interests and can only be considered part of urban foreign affairs activities rather than city diplomacy. However, it is different from ordinary people-to-people diplomacy, and its relationship with national-level diplomacy is not complementary but competitive. By cooperating with other regional cities and organizations at the national level, it seeks political influence different from that of the central gov-

ernment's policy, exerts pressure on the central government, promotes intercity exchanges, and seeks to expand its diplomatic influence.

The term "city diplomacy" originated from the Global Localization Forum, an organization that emphasizes a global perspective and recognizes the important role of cities in international relations. The organization believes that mayors of major cities around the world have been given the mission of diplomats, occupying a unique and advantageous position to mobilize resources and the goodwill and expertise of civil society organizations to better serve in conflict resolution and dispute resolution. The organization has also launched a series of projects to encourage local communities to actively participate in conflict resolution, participate in post-conflict community reconstruction, and maintain peace and development.

In a report on "Local Internationalization" released in 2003, the concept of "local internationalization" was first used. Local internationalization refers to the close link between global technological, information, and economic globalization and local reality. Cities are a hub of bottom-up global governance systems and are diplomatic tools for global localization. In the report's view, city diplomacy is a natural product of decentralized diplomacy and interaction between cities. In 2007, the Netherlands Institute of International Relations proposed a broad definition of city diplomacy, stating that "city diplomacy is a system and process through which cities or local governments develop relationships with other actors on the international political stage in order to represent the interests of the city or region they represent." In their view, the field of city diplomacy covers areas such as security, development, economy, culture, networks, and representation.^[28]

Since the beginning of the 21st century, although national governments have taken on the main work of diplomatic affairs, at least in theory, they are no longer the only diplomatic subjects. Non-governmental organizations, transnational organizations, and especially global cities are constantly participating in diplomatic affairs. World cities have greatly improved in the breadth and depth of their participation in international affairs, participating more in "advanced politics" issues, and actively participating in global governance. In many diplomatic affairs, such as counter-terrorism and non-proliferation, world economic recovery, global climate change, controlling large-scale infectious diseases, and regulating migration, cities around the world are increasingly emphasizing the promotion of international cooperation and transnational coordination to enhance urban competitiveness and address urban governance challenges. The main purpose of cities carrying out diplomatic activities is to better advocate for their international interests and avoid the impact of uncertainty factors in the international environment on cities. For example, cities can actively join some international city organizations to seek more economic opportunities. On the other hand, cities' diplomatic activities also respond to the needs and satisfaction of city residents and society. For example, global cities such as Beijing, London, and Tokyo have successively hosted the Olympic Games and other major international events, which not only stimulate economic growth but also enhance the international image of the city, thereby enhancing the pride and sense of identity of city residents towards their city.

9. Diplomatic Functions of Global Cities

From the perspective of promoting global balanced development, global cities can make up for the neglect of local levels in current international development aid. With their diverse development experience, global cities understand local needs better than other actors, which has led to their increasing recognition and attention in international development aid. Development assistance provided by cities mainly includes human rights development aid and emergency development aid. Human rights development aid mainly addresses long-term problems, while emergency development aid is aimed at addressing sudden events. City development assistance is mainly carried out through international agreements between mayors of participating cities or social organizations representing municipal governments.

In terms of economic diplomacy, cities mainly seek to maximize their own interests at the global level. Economic activity is not only the most important content of city diplomacy but also the main motivation for its development. City economic diplomacy includes attracting foreign tourists, multinational companies, international organizations, international events, as well as exporting services and technologies, promoting city image, and participating in international city organizations. Cultural diplomacy is another important content of city diplomacy, such as strengthening understanding and communication among young people from different cities, organizing mutual visits between city officials, and jointly holding cultural exchange activities. At the same time, cultural diplomacy is still the most promising and prospective activity in city diplomacy, and it is an important channel for future city participation in international affairs. Cooperation is not only one of the goals of city diplomacy but also an important way of city diplomacy. The formation of "sister cities" among cities in different countries is the most traditional form of city cooperation diplomacy. Currently, city cooperation diplomacy is gradually shifting towards a networked model, mainly including some international and regional city cooperation networks. City diplomatic activities represent that cities are an international organization, indicating that cities can participate in and influence policy-making at the supranational level.

For general cities, the nodal cities in the global city network are based on globally integrated urban areas. Therefore, the network centered on global cities is not formed by isolated points connecting with each other. Not only the metropolitan centers in the regions, but also other large and medium-sized cities highly globalized are connected to the global activities through the global city network. This means that most cities can be linked to global activities through the global city network. As a result, complex and extensive supranational relationships are formed between global cities and other cities. Urban diplomacy, as a special form of diplomacy, is a systematized communication activity that is conducted around non-sovereign affairs by the authorized and guided city authorities and their affiliated institutions with legitimate identity and representational ability to execute the foreign policy of a country and seek urban security, prosperity, and values of interest with official and non-official institutions of other countries. Specifically, urban diplomacy has the following characteristics:

Firstly, it is different from the state's subject. Diplomacy is an independent sovereign foreign behavior and a symbol of state power. This limits the scope of urban diplomacy. The subject of urban diplomacy is not the institution dispatched by the state government to the city, nor is it the local community without political power, but the city administrative authority elected by the local people and responsible for the locality, including elected officials and administrative heads. When carrying out urban diplomacy, it must have legitimate identity and representational ability, and all activities conducted can have legal effect.

Secondly, it has a clear purpose. Compared with state diplomacy, which aims to promote national interests and execute established foreign policies, urban diplomacy aims not only to execute foreign policies but also to strive for more diverse international interests for the city, enhance social cohesion within the city, and expand the city's international development space. Especially in the era of globalization, most cities face problems such as diverse ethnic groups, cultural collisions, terrorism, transnational crime, and economics. They not only need to maintain close communication with the national government on foreign policies but also need to maintain close contact with local governments of various countries, transnational enterprises, various non-governmental organizations, and other entities to create a favorable environment for the city's security, prosperity, and development. Politically, the concept of urban diplomacy is based on the recognition that cities have the potential and capability to contribute to global governance and international relations. It acknowledges that cities are important actors in shaping the international system and can work together to address global challenges. Urban diplomacy can also be seen as a way for cities to assert their autonomy and position themselves as key players in global politics, especially in situations where national governments may not be fully responsive to local needs and concerns.

Thirdly, limited diplomatic content. Compared to national diplomacy, even if urban diplomacy is further "nationalized", it still carries distinct non-sovereign characteristics. Urban diplomacy cannot involve sovereign affairs, but can only engage in non-sovereign affairs such as promoting trade exports, attracting investment, promoting culture and tourism, coordinating urban policies, and reducing environmental emissions. Even international metropolises like London, New York, Tokyo, and Hong Kong must obtain permission from the central government when dealing with sovereign affairs, especially when it comes to "advanced politics" affairs such as mediating regional conflicts, participating in post-war reconstruction, and maintaining international peace and security. Such affairs must be handled with caution, strictly within the policy scope of sovereign states, to prevent crossing the sovereignty red line.

Fourthly, flexible communication methods. Unlike national diplomacy with explicit political and ideological colors, urban diplomacy emphasizes institutionalized and equal communication. It must be based on recognizing a series of international laws, international systems, and diplomatic conventions, with the aim of communicating information, seeking cooperation, and building trust. All diplomatic activities such as visits, negotiations, consultations, mediation, contracting, participating in international conferences and organizations, etc., must comply with relevant laws, systems, and norms, especially avoiding violating the laws of other countries and interfering in their domestic affairs by illegal means. Urban diplomacy is more flexible in form and does not need to be bound by strict diplomatic etiquette. It emphasizes social, secular, and even daily-life characteristics. The rise of urban diplomacy means that cities, especially global cities, have acquired diplomatic functions traditionally only undertaken by central governments and professional diplomats. Urban diplomacy has become a relatively mature diplomatic form and an important component of a country's overall diplomacy.

10. The Impact of Global Urban Development on Countries

In the process of globalization, global cities continue to increase their political and economic power, and there is even a certain trend towards "DE-nationalization". Therefore, when studying the relationship between global cities and countries, it is often assumed that the sovereignty of the state will be affected by the development of global cities. The increase in the economic role and influence of cities necessarily accompanies the need for more political activity, and cities also require adjustments to power relations between cities and between regions. In the national system, urban power does not exist independently, but rather relies on the national institutional system and is influenced and constrained by it. The adjustment of power and the transformation of institutions are inseparable, and the adjustment of urban power requires a corresponding adjustment of the national institutional system, thus posing a profound challenge to the modernization of national governance.^[29] Conversely, the rise of urban economic status and the growth of urban power are important results of national institutional adjustments and governance reforms. However, urban power is inherently expansionist. In the process of expansion, it requires the state to constantly adjust power and institutional changes, and thus the adjustment of urban power is full of game-like characteristics between cities and countries. Sassen points out that the new international economic activity has raised a problem that the relationship between contemporary global cities and their host countries is a "systemic interruption": promoting the development of global cities may not necessarily lead to the growth of the country. She believes that global cities are a stronghold of "extraterritoriality", and the country itself has been changed by its own participation in globalization and globalization pressures. If globalization is viewed as a tightly connected, multi-level interwoven system, various forces will reconfigure territorial space, including not only sovereign states but also "local" and supranational organizations of subordinate states. According to Brenner, the territorial space controlled by the state has not been eroded, and globalization only reconnects and redistributes "domains" at the sub-national and supranational levels, ultimately resulting in the reconfiguration of terri-

torialized organizations (such as the European Union) at new levels, which are temporarily labeled as a "global localization" of the state. In other words, globalization must adapt to localization in order to achieve its purpose, and localization also changes in the process of globalization, and there is a "mutual gradient" process between the two. Brenner proposes that the global urbanization and the reconfiguration of national sovereignty domains in the process of global capital restructuring are fundamentally no different, but highly correlated in form.^[30]

Taking it a step further, scholar Leo.Panitch argues that the state remains a central player in the global economic restructuring process. He believes that it is the state that sets global trade rules and leads the direction of global trade, and the United States has long played a leadership role in this regard.^[31]He points out that the globalization led by the United States is actually a manifestation of American imperialism. In other words, the dominant force behind the global economy is still the state, and the power of the state has not been weakened. Global cities are still under the control of the state. The state coordinates different levels of governance bodies such as cities, nation-states, and the global community, and organizes global collective action that involves multiple entities such as sovereign states, non-governmental organizations, and global cities. Although the state is no longer the absolute ruler and supreme authority, it continues to be responsible for designing institutional systems, proposing visions, and playing the role of "self-organizing organizer" in global governance. Sovereign states regulate the self-organizing activities of other governance bodies in different fields of global governance, balance the interests of different governance bodies, and coordinate different goals, values, and choices in the governance process. Although cities are increasingly prominent in global governance, their diplomatic powers are exercised under the authorization or transfer of power by the state. Cities participate in global affairs to maintain their own interests, and if their global activities harm the interests of sovereign states, the latter will not hesitate to take back the power granted to the cities to maintain national interests and sovereignty. On the other hand, if there is a risk of failure for cities in the global governance process, the state will be their ultimate rescuer and helper.

11. Conclusion

Global cities are not only important providers and consumers of public goods, but also represent the comprehensive development status and international status of the countries in which they are located. As a political entity distinct from the nation-state, global cities can participate in cross-regional and cross-national coordination actions, starting from the local, national, and even regional levels, relying on their own material and cultural influence, and integrate into the global governance system, thereby strengthening the international influence of the country in which they are located, either tangibly or intangibly. Additionally, relying on the agglomeration effect of talent and social resources, global cities can to a certain extent break down the barriers that exist in social culture among ethnic nations and generate new forms of cultural fusion and new forms of identity. Therefore, global cities have formed their own unique political environment.

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The Path to Global City Creation under the Theory of Urban Sociology in China ——from the perspective of social capital and urban culture

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KEYWORDS

Global city;
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ABSTRACT

The global city is the advanced form of urban development. Today, China is the main advocate and promoter of deep globalization, and has the reality and development needs to build some global cities. The surface features of a global city are economic and productive, but its essential features should be social and reflect a kind of civilization in a deep level. Whether a global city can be built and maintained as a magnet for sustainable development is determined not by economy but by culture. To build a global city, China should pay more attention to the strategy of economic and cultural integration that combines the world with the local. The central government has set the goal of building Shenzhen and other international metropolises into global cities. When building global cities in the new era, we should focus on the combination of industrial civilization and open civilization in traditional global cities, and more importantly, implanting the genes of Chinese civilization into the construction of global city.

Globalization has led to the accelerated transformation of the world's urban system. Global cities have become the "fulcrum" of political and economic development in today's world. The significance has gone beyond the economic and social development function of a city itself, and to a large extent, it represents the development and leading ability of the country. The governments participate extensively and deeply in the global governance system through global cities, which have gradually become economic shaper, political innovator, diplomatic promoter, and international system changer. In its efforts to dominate the new global order, China has made building a number of global cities an important part of its national development strategy. In August 2019, the Chinese government issued an important document, *Opinions on Supporting Shenzhen in Building a Pilot Demonstration Zone of Socialism with Chinese Characteristics*. The document focuses on Shenzhen's goal of transforming from an economic hub to a competitive, innovative, and influential global city, and becoming an example of a modern power. Many emerging countries are trying to promote an open economic system. In the future, there will be no shortage of international metropolises with highly developed economy in China, but in order to build some world-class global cities, China must examine the important role of civi-

zation in the construction of global cities from the perspective of urban sociology.

1. The international metropolis from the perspective of global city theory

Globalization, world economic center and global city. Globalization has given new meaning to urban development. In the process of extensive globalization, the world economic center cities have played more and more comprehensive functions. London, New York, Paris, Tokyo and other super international metropolises are not only the world's economic, financial and transportation centers, but also the political and cultural centers in the world. All kinds of information about these cities will be known to the world at the fastest speed. They are home to the headquarters of most of the world's largest enterprises and international organizations. They have global securities and futures trading institutions with huge trading volume. They receive a large number of business travelers and tourists from all over the world every year, and often host the world's largest cultural and sports activities. These cities are

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almost as famous as their countries, and even replace some national functions.

After these central cities become global cities, their role in the world must be fully explained by the theory of global cities. John Friedman initially created the basic theory of global city, holding that under the influence of deepening globalization and informatization, global city is the basis point for global capital to organize and coordinate its production and market, the main place for international capital to gather, the destination of a large number of domestic and international immigrants, and the production and dissemination center of information, entertainment and other cultural products. [1] Saskia Sassen applied Friedman's global city theory for the first time in a relatively comprehensive way, and empirically analyzed the global city characteristics of New York, London and Tokyo. [2] She believes that the geographical decentralization and integration of economic activities occur at the same time. The more global the flow of capital, the more the need for capital management and capital control, and the higher the degree of concentration in several central cities around the world. Global cities are also market centers for products and innovation.

A successful example of creating a global city. To build a global city, China must first improve the rule of law in cities, standardize the boundary between the government and the market with the rule of law, and create a world-class law-based business environment that is stable, fair, transparent and predictable. In the documents issued by the Chinese government to support the construction of Shenzhen into a global city, the specific development goals of Shenzhen include world-class scientific and technological research and development, industrial innovation capability, modern international and innovative city, and a capital of innovation, entrepreneurship and creativity with global influence. This construction path is clearly not only in China's local vision, but also under the global vision. China has a vast territory and a comprehensive economic and industrial structure. Only by building a number of global cities in every important region of the country can it lead the modernization of the urban governance system of the whole country.

The successful construction of a modern global city model cannot be confined to its own coordinate of urban construction, but must be placed in the integration trend of China and the world. To build a group of global cities, China aims to provide a broader platform for the new globalization and promote greater economic and trade, scientific and technological innovation and multicultural exchanges. When summarizing the five characteristics of global cities, Greg Clark especially emphasized the two characteristics of diverse population with pioneering spirit and geopolitical opportunities in addition to the traditional trade and transportation network, product and market exploration, etc. [3] Global cities are not only about the control of the network among economy, finance and trade, but more importantly, the influence, attraction of urban civilization and the ability to participate in the global governance system.

Global city theory and the construction of model city. In the era of deep globalization, global cities, as sub-national actors, are the convergence points of global economic, cultural, capital and talent elements, and deeply participate in the international division of labor and factor management. The function of the global city in the global network is physical, that is, the economic control which Sassen emphasizes; The second is institutional, that is, institutional contribution to the global governance system. There is considerable scope for the second function of global cities, especially in areas where countries cannot fully agree on positions. Global cities must participate in the global governance system, not only in the economy and services, but also in city diplomacy and global city networks.

At present, the development of global cities has turned from element agglomeration to cultural identity. In 2015, New York formulated the "One New York" Plan, which emphasized building a "strong, strong and just New York". In the London Plan formulated in 2016, London summarized its development vision as: a diverse, developed, safe and inclusive city. How to deal with the relationship between economy and culture is the biggest test for the development of global cities. From the perspective of economic and trade centers, global cities must meet the

basic requirements of the rule of law to create an international business environment. At the same time, maintain the modernity brought by globalization and information technology to ensure the continuous advancement of scientific and technological innovation. Finally, urban civilization attracts the global concentration of various resource elements.

2. The challenge of global and local integration of modern global cities

Information technology has greatly accelerated the transformation of modern urban society into postmodernity. The industrial upgrading and transformation with information technology as the core makes the industrial development of global cities to high-tech and financial services excessively and gives birth to the dual differentiation within cities. The high degree of data in people's social and lifestyle puts forward higher requirements for the government to improve the equalization of public services. Much of what the world's major global cities still produce relies on high-tech and highly educated labor. The highly technological urban landscape is different from the past. The top technological innovations tend to be in the newly industrialized areas, or the re-industrialized areas based on new business models. This trend is increasingly dividing communities within cities around the world. The most valuable and lowest level functions exist in different areas with the same urban system, with no contact with each other or even in person, and the excluded social groups exist on the margins of government.

The impact of the Internet on basic urban life and exchange is unprecedented. [4] It has given cities around the world the ability to share information and technology more easily and is constantly updating the means of urban governance. [5] Shenzhen has the world's largest Internet communication equipment enterprises, as well as the largest social media application enterprises. The unit labor productivity of these information-intensive enterprises is very high, which provides an important foundation for the city to control the global industrial chain. But the demand for labor is limited, and the people who work for these enterprises are not necessarily well integrated into the culture and traditions of the city. They lack a natural bond with the city's disadvantaged groups. While they travel around the world to master markets and technologies, but they even just work and live in buildings in Shenzhen. This dual urban characteristic, mainly manifested by income gap and cultural gap, is a dilemma that almost all global cities suffer from.

Social governance challenges in modern global cities. Since the 1970s, the trend of globalization, marketization and information technology has become more obvious, and the global economic and social environment has become more integrated, diverse, dynamic and complex. The social problems of many global cities are obviously global, and their effective governance must change from closed national governance to global governance based on cross-border cooperation. In the three international systems of global market system, global management system and global civil society, the role of global cities as the main body of global governance has been paid more and more attention. The growing civil society and non-governmental organizations within global cities will be complicated by global labor migration and multicultural integration, which will bring greater challenges to modern urban governance.

China's metropolises are already deeply involved in the international economic system. The movement of labor across borders is becoming more common, and international communities are growing. In order to build a global city, China's requirements for the modernization of urban social governance should not only be limited to providing a modern and international public service system, but also consider the deep-seated cultural integration, which is the biggest problem in the provision of public goods in global cities. In terms of the public service supply mechanism of international community, they should not blindly emphasize its internationalization while ignoring the local nature of the city. Only through the improvement of cultural integration mechanism can international communities not only bring international elements to global cities, but also enable foreign residents to take root in local cities and coexist with the whole city governance.

Culture, not economics, is the decisive factor in global cities. Inside the world's cities, economies and cultures are inextricably linked, despite the surface tensions. The very superficial view is that the economy is global, and culture is local, and even the inherent cultural attraction of a city can be sacrificed in order to cater to the global economic development. In fact, the decisive factor in whether global cities can be built and maintained as extremely attractive is not economic, but cultural. Economics is an effect, not a cause. Culture is the soul of a city, and the historical and cultural relics of a city are the accumulation of predecessors' wisdom and an important symbol of the connotation, quality and characteristics of a city. Compared with simply economically developed cities, global cities have broader connotations. They are not the spatial result of economic globalization, but are jointly shaped by different actors, institutions and even national urban system, cultural habits and political foundation system in a broader sense. [9]

Global cities cannot avoid the spatial consequences of the coexistence of poverty and affluence caused by the capitalist system. On this issue, scholars from different perspectives have serious conflicts. [7] Gottdiener has some criticisms of Sassen's view of global cities. [8] Indeed, cosmopolitan cities around the world are not as rigid in their pace and shape as Sassen suggests. Friedman acknowledges that his study did not include cities in India, China and the former Soviet Union. As a matter of fact, since the 1970s, a large number of cities in Asia have become extremely influential international cities either internationally or regionally with the rapid economic and social development. China's latecomer metropolises need to have the productive capacity of urban cultural capital, adopt the high-end intervention strategy of global city value, and cultivate the endogenous mechanism and internal power of global cities.

3. The widely accepted modern urban civilization is the greatest social capital

Modern city is a kind of civilization complex, which is both global and local. Global cities are often emphasized for their non-national character. The biggest attraction of global cities for global resources and talents lies in civilization, including system and culture. Only when a city protects its historical and cultural heritage and continues its civilization can history and contemporary times complement each other. The cultural value of global cities must be widely recognized whether by entrepreneurs, tech innovators, international business travelers, or even the local middle class and idle labor force. While the modern city is a "growth machine", in which all its inhabitants try to reap the benefits of continued growth, global cities are the generators of advanced productivity as well as restaurant workers and laundry workers, core urban areas as well as suburbs, urban villages and slums.

The greatest social capital of a global city is that all its inhabitants share a common love for its civilization. The guideline issued by the Chinese government is the right remedy for the case, requiring Shenzhen to further promote an open, diverse and inclusive urban culture, take the lead in building an inclusive, high-quality and sustainable urban public cultural service system, and build a modern urban civilization that demonstrates the flourishing of socialist culture. Comprehensive universities, think tanks and research institutes are the intellectual high ground of contemporary global cities. Shenzhen should strengthen cooperation between Internet and high-tech enterprises and these institutions, especially humanities and social science scholars in universities, to add long-term intellectual support to this young and innovative city.

In light of the characteristics of urban development, China should carry out urban diplomacy and participate in the global governance system. Clark summarizes the characteristics of global cities into five elements, the most important of which is geopolitical opportunity. [7] With geopolitical opportunities, global cities have the foundation and bonds to participate in global governance through global city networks. By giving full play to the function of city diplomacy, global cities can deeply participate in the global governance system in such fields as global development issues, scientific and technological progress, ecological and environmental protection, and migration status. Global cities

are home to a large number of headquarters of international organizations, multinational corporations, global media, non-governmental organizations and other institutions. The "global public sphere" constituted by global cities leads the trend of the times in almost all fields of social life and exerts a direct and profound impact on other countries and regions. The increasing engagement of global cities is bypassing the strategic transboundary geography of the nation state and providing space for various local actors to construct a new global politics and its subjectivity. [10]

In the framework of global governance, new changes have taken place in the diplomatic pattern, with sub-national entities gradually getting involved in many international political and economic issues. China's world-class cities should step into the ranks of global cities, relying on the national strategy, and gradually realize the promotion from the geo-center to the global center. Cities continue to join the global network by participating in various issues and making their voices heard, thus contributing to the competitiveness of their countries. [11] The guideline issued by the central government explicitly calls for more international organizations and institutions to settle down in Shenzhen and supports the city in hosting major diplomatic events. [12] Shenzhen can be closely connected with the rest of the world through trade, science and technology, information technology and other links, play the role of "One Belt, One Road" strategy, and promote the country to better participate in the international governance system. [13]

Global cities are generally shared by domestic and international migrants. Migration and cultural integration caused by high mobility are great challenges for modern urban governance. After World War II, global cities in Europe and the United States ushered in a wave of industrial immigrants, followed by the explosion of the huge middle class and lower middle-class population, which has been constantly affecting the community governance policies and even the cultural and political integration of their countries. The public nature and public spirit of global cities can attract more professionals and workers to settle down. However, fostering shared values and a common sense of belonging between different cultural groups in the same city is not easy. Shenzhen is a typical immigrant city, and the government's slogan "If you come, you are from Shenzhen" is a reflection of this global inclusive spirit.

With the free trade zone system fully functioning, an increasing number of overseas professionals are moving to Shenzhen. There are already hundreds of thousands of expatriates among Shenzhen's resident population, as well as many frequent overseas business travelers. The international community has quietly grown in size in this city. By embedding the legalized business environment into the construction of international communities, foreign residents' deep recognition of local urban society can be enhanced. However, in terms of the public service supply mechanism of international community, we should not blindly emphasize its internationalization while ignoring the local nature of the city. The government should pay more attention to improving the mechanism for migrants to participate in the public through communities, and establish and improve a consultative, democratic and fair urban governance system. Only through the improvement of the mechanism of cultural integration can the international community not only bring international elements to the global cities of our country, but also enable foreign residents to put down roots in local cities, and symbiosis with the whole city governance.

4. Theory and practice of building modern global benchmark city in China

The important role of modern urban civilization identity. On the surface, the characteristics of global cities are economic, productive and even financial, but the real inherent characteristics of global cities should be social and deeply embodied in a civilization. It is not highly developed economic performance that creates a global city, but social civilization and social structure. This is why there is no single standard for global cities, but rather a strong local identity. The recognition of civilization is the essence of global cities. Even with abundant capital, investors, entrepreneurs and high-tech practitioners from all over the

world, these people, technology and capital elements are fundamentally the cultural identification of cities.

The research of global city has turned from element agglomeration to cultural identity. China's construction of global city should pay attention to the economic and cultural integration strategy combining the world and the local. Mark Gottdiener, one of the representatives of the study of global urban sociology, raised many questions on Sassen's "global urban control function" and believed that the focus of global city construction should be the causes of urban growth and cultural soil, rather than the high control of global resources. China's developed cities still have a lot of work to do in terms of providing public goods such as urban diplomacy and international communities commensurate with their economic status.

Modernization of governance system and capacity of global cities from the perspective of new urban Sociology. New urban sociology focuses on the crisis of urban governance in Europe and the United States since the 1960s and 1970s and emphasizes the relationship between globalization and the contemporary process of urban change. Modern global cities integrate the role of capital, the influence of international economic order on urban construction, the accumulation of wealth and power, the relationship between social classes and the management function of the state. They are the places where production factors and consumption factors gather, and also the main places for capital accumulation and labor reproduction or collective consumption. Different classes have different ideas about the function of the city and the corresponding investment. Global cities are generally faced with such problems as social polarization, unbalanced development, polarization between rich and poor, ethnic gap, deteriorating security, frequent political conflicts, and social movements.

The new urban sociology theory encourages the state to solve the major dilemmas of modern cities by strengthening its capacity regarding urban spatial layout. Specifically for advanced cities in later-developing countries, national strategy and national strength become an important part of urban initiative. The development resources of the city depend on the strong support of the state, and the developed governance system and ability of the global cities still depend on the country. Such a city must form a benign interactive relationship with the state or the central government, so that the state can receive positive policy feedback from the city, and the state will continue to support the city in various forms to play a greater role in the world.

The civilized demonstration effect of building Shenzhen into a global benchmark city. Shenzhen is a modern international metropolis built completely on its own in China. It is a good combination of international and local. It can not only better publicize the Chinese civilization, but also coexist with the outstanding civilizations of the world. The development goal of becoming a global benchmark city is the best example of Shenzhen's urban development for the whole country. The construction of China's global city is not only a process of integrating into the global production network and participating in the competition of global value chain, but also a process of matching the political, economic and social structure of the city with the emerging production mode.

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