1. Introduction

These days the climate is changing rapidly, and we should recognize that changing climate has tremendously affected and will continue to affect societal growth and sustainable progress across the globe. As per estimates, the entire expenses and hazards of changing climate will be comparable to dropping at minimum of 6% of world GDP every year, with this cost potentially rising to 21% of world GDP if a broader variety of effects and dangers are considered [1]. To reduce the enormous hazards caused by changing climate, a much additional ecologically approachable growth plan should be implemented. The Chinese management did, in fact, pay consideration to this issue a small number of ages ago. According to the economic white paper [2], China is experiencing huge problems from changing environment and may face an energy source problem by 2030, with the nation potentially relying on energy imports for 75% of its overall primary energy demands. Since its inception, the low-carbon industry has been regarded as a promising development pattern capable of reducing carbon emissions while addressing climate change issues.

Presently, cities are becoming the epicenters of social-economic growth and human deeds. They play crucial roles in local, state, and worldwide growth [3]. Cities, which house fewer than half of the worldwide people, are responsible for the vast majority of manufacturing and everyday human activity and, as a result, consume a great deal of energy. It is also predicted in [1] that cities contribute around 76% of worldwide emissions of carbon. Consequently, low carbon adoption in cities is crucial to the total objective of the clean energy economy, particularly in emerging nations with fast urbanization such as China. With yearly GDP progress rates of less than 11% in current times, China has to turn out to be one of the world’s main major users of energy and carbon emissions [4]. It has also been projected that the atmospheric carbon emission rate of each unit GDP of China is substantially higher than that of other nations [5]. Global consideration is increasingly focused on Chinese energy use, changes in the environment, and adaptation to climate
change initiatives. Despite increasing pressure to combat climate change, China seriously needs a low-carbon industry, by creating low-carbon cities as a critical priority [6].

Guangzhou is located in the southern part of China. It is not only the leader of our coastal port cities but also the leader of South China’s economic zone. However, cities lacking energy in our country also contain this city. The total amount of consumption of energy is comparatively huge, and its energy depletion structure is mostly created by oil and coal. Among them, the total ratio of oil consumption reaches 1%, while the total proportion of coal consumption is 1%, which is the same as the overall development of China. Owing to the increasing development of China’s economy, the progress of urbanization has been gradually promoted, which has resulted in the growth of total consumption of energy brought by economic growth. To better address the present economic development limits in Guangzhou, greater emphasis should be made on the low-carbon economy. According to this research direction, this paper examines and researches the growth of a low-carbon economy in Guangzhou by deeply analyzing the existing difficulties and problems and finally makes an empirical study to provide better ways to encourage the growth of the economy of low carbon in Guangzhou.

1.1. Key Contributions of This Paper. The innovations of this paper are as follows:

(1) This study defines the concept of low-carbon financial growth and explains the connotation of low-carbon financial growth from the perspectives of sustainable development, circular economy, and the environment. In addition, it explains the theoretical basis, modeling steps, technical characteristics, and data validity analysis methods of structural equation models.

(2) Apart from that, it discusses the measurement and assessment index design of low-carbon economic development levels, as well as the rationale for selecting relevant indicators. It investigates the concepts and techniques of constructing an assessment index system, ideas, and framework, as well as the collecting and screening of low-carbon economic development indicators. Finally, it develops a framework for measuring and evaluating the amount of low-carbon economic growth in Guangzhou.

1.2. Layout of the Remaining Sections in the Paper. The remaining portions of this research study are as follows: related work in our selected subject may be given in Section 2. Section 3 explains the materials we utilized and the technique we employed. Section 4 presents the design of our suggested system for low-carbon economic growth. Our experimental work and the results of that effort are discussed in Section 5. Finally, in the final portion of this paper, the intended work is finished.

2. Related Work

The first discovery of a relevant meaning for a “low-carbon economy” was in the 2003 British Government Power White Paper “The Future of Our Electricity: Building a Low-Carbon Economy,” which stated that a low-carbon economy is defined as achieving more social growth by using relatively small resource consumption and environmental pollution emissions, thereby improving human standards of survival and quality of life and providing more jobs and employment [7]. Subsequently, the authors of [8] proposed that the increasing global greenhouse effect is certain to disturb the sustainable growth of the global economy. Cooperation among countries must be more efficient and fair to prevent the serious consequences of human social production on climate change. The researchers of [9] pointed out that the growth of the low-carbon economy is a public and financial growth layout with the expansion mechanism of the market economy as the core content. This mode focuses on achieving higher energy efficacy, lower consumption of energy, and lower emissions of carbon in the development of the national economy through the comprehensive use of all saving of energy and reduction skills of emission with the promotion of relevant market mechanisms and government means. Since the viewpoint of the influence factors of low carbon abroad on the national economy level, the authors of [10] conducts Granger causal test on five variables including CO2 emissions and total energy consumption in European countries. The results show that there is a continuous correlation between CO2 emissions and fuel consumption, and the two are causal. The US per capita income and CO2 emissions are in the downward “U” form of the Kuznets curve of the Chinese economy and environment. Similarly, the early work of [11] used the Lotka–Volterra equation and prey–predator model to analyze the effect of population size changes on emissions of carbon.

Since the advent of the “low-carbon economy,” Chinese scholars have discussed and studied its connotation and characteristics from various perspectives. The authors of [12] believe that a low-carbon economy means more effective use of energy, that is, the production of the same products with less energy to achieve the same social goals. The theoretical core of a low-carbon economy is the issue of energy effectiveness and energy arrangement. The importance of solving this issue lies in system improvement and technical growth. In this regard, the scholars of [13] highlighted that the development design of economy for low carbon is a fresh financial development design based on “three small and three high,” aimed at low-carbon economic growth, and based on preservation of energy and emission decrease as the main means. While the study of [14] believes that low-carbon economic growth should be identified based on three qualities such as strategic, comprehensive, and global. The low-carbon economy is a long-term global economic development concept that involves numerous social layers. The early work of [15] once advocated that people should get rid of four kinds of misconceptions if they want to understand the low-carbon economy correctly: a low-carbon economy is a poor economy. The development of a low-carbon economy
means the complete disappearance of high energy-consuming industries. A low-carbon economy will decrease the quality of life. The technology and new energy costs needed to develop an economy of a low carbon are too high. Meanwhile, they believe that given China’s existing national circumstances, initiatives such as altering the manufacturing construction and energy construction would have no substantial impact. From the viewpoint of foreign low-carbon economic-level influencing factors, the common methods used by Chinese scholars in the study of low-carbon financial growth level influencing factors include the STIRPAT model or its extended model, panel data linear regression, interpreting structure model, and so on [16]. The work of [17] used the STIRPAT model scheme to examine the main manipulating factors of emission of carbon in China’s manufacturing industry. The results show that both the population structure and social wealth factors play a positive role, technology plays a negative role, and the inverted U-curve theory of environmental Kuznets does not apply to the current situation in China. The authors of [18] built an enhanced STIRPAT model. The data analysis of various factors impacting carbon emissions from 1990 to 2009 was conducted using China’s relevant statistical data of the period. According to the findings, the change in per capita GDP is the most significant positive factor influencing the rise of carbon emissions, whereas the change in energy consumption intensity is the most significant negative factor. Inspired by these, we have analyzed and examined the important components driving the establishment of a low-carbon economy in Guangzhou. Our work provides the present situation of low growth in Guangzhou and the obstacles it confronts. Furthermore, the structural model is fitted and updated depending on the data reliability analysis and testing using the data analysis application LISREL 8.80.

3. Materials and Methodology

3.1. Low-Carbon Economic Development. The growth of a low future can result in significant economic advantages that will be visible shortly. Revenue could be increased by improving energy efficiency. Low-carbon skill has the possibility to generate fresh forms of development and service. They can help even the poorest states in jumping outdated methods. Furthermore, they can eliminate some of the expenditures of huge networks in the same way that smartphones reduced the need for telephone connections. Furthermore, smarter grids can enhance energy productivity and enable technological advances while lowering transmission costs.

3.1.1. Low-Carbon Economic Concepts. A low-carbon economy relies on sources of energy that emit less greenhouse gas (GHG). Since about the mid of twentieth century, human-caused GHG emissions have been the major source of climatic variation. Ongoing greenhouse gas emissions would cause long-term global changes, increasing the possibility of serious, widespread, and irreversible repercussions on ecosystems and humans. Globally shifting to a low-carbon economy might have substantial advantages both for developed and emerging nations. Many countries are developing and implementing low-emission policy initiatives. These methods aim to meet social, financial, and environmental strategic plans while lowering long-term gas emissions of greenhouse and building resilience to climate transformation consequences.

Under the background of global warming and the change from a high-carbon era to a low-carbon era, the growth of the economy emerges a low carbon as the times require. The idea of developing a low-carbon economy first appeared in government documents, and a corresponding definition was given in the UK book The Upcoming of Our Sources: Generating a Low-Carbon Economy. developing a low-carbon economy means economic growth with less means and less ecological pollution [19].

The growth of a low-carbon industry is a type of economic growth that prioritizes environmental sustainability while reducing the use of high-carbon energy sources such as coal and oil. With technical innovation implemented nationwide, modernization and renewable power growth minimize greenhouse emissions and produce a win-win scenario in economic growth and environmental protection. The low-carbon economy development methodology is founded on the notion of “three lows and three highs,” with low-carbon advancement as the development agenda, energy efficiency and reducing emissions as the path of development, and carbon-neutral new tech as the path of development [20].

The growth of the low-carbon economy is based on low-carbon technology, low-carbon energy, low-carbon industry, low-carbon market, and low-carbon operation. Low-carbon technology is the power of low-carbon economic growth. Low-carbon development has rich connotations, which involve global changes in production methods, production methods, values, and national interests [21]. Low-carbon economic development is the basic concept of economic development. It takes low consumption of energy, low pollution, low emission, and high efficiency as its primary goal. Its core is to achieve the basic goals of low carbon, low emission, high efficiency, and high efficiency. Its core is to focus on low carbon to achieve the health and rapid and supportable growth of the economy and culture [22].

3.1.2. Possibilities for the Growth of China’s Low-Carbon Economy. China, as a fast-rising economy, offers various opportunities for low-carbon economic growth. China must embrace energy-saving, emission, and clean renewable energy technologies by bolstering technology and development in key sectors with significant and competitive advantages [23]. In China, there are numerous opportunities to create low-carbon technologies, including carbon intensity management, emission reduction, and integration of renewable and energy saving [24]. Because of lower power concentration and energy efficiency, China’s industrial and consumption design is constructed on high power consumption and poor saving energy technology [25]. As a result, it introduces vulnerability in energy management. Through
technical innovation, administration, and reorganization of technologies in various industries, China may readily seize chances for energy savings and low carbon emissions [26]. Low-carbon technology costs substantially less in China than in other wealthy countries. As a result, China may effectively take advantage of this opportunity to rehabilitate old industries using low-carbon technologies and establish new industries using low-carbon innovation [27]. China has a lot of promise in terms of carbon emission technology innovation and collaboration. Because of reduced technology acceptance, China lags much behind other emerging countries [28]. China must strengthen international collaboration and exchange technological achievements with foreign partners to obtain low-carbon technologies and develop a low-carbon industry [29]. Figure 1 explains a theoretical structure for China’s low-carbon economy.

3.2. Scanning Electron Microscopy (SEM) Model. A scanning electron microscope (SEM) is a scientific instrument that generates a high-resolution image by scanning the part of a theme with focused energetic electrons. SEM generates images that deliver info about the surface construction and geometry of a material.

3.2.1. Fundamental Phases of SEM Model. As per [2], the fundamental processes of SEM modeling may be represented by the flowchart in Figure 2. This figure shows that even after collecting data and choosing suitable indicators, a variety of fundamental assumptions concerning the size of the sample, normalization, independence, outliers, and linearity are frequently made.

The model must then be described, which entails defining all causal pathways between variables based on some theory and fundamental theoretical understanding. The phases in the procedure include model identification and estimate. Over-recognition should be avoided during model identification that indicates that there are more parameters accessible than the set of parameters we wish to predict. A good technique for estimation should be selected for model estimation to accomplish effective model validation, which is the following stage in the SEM approach. The model has been tested, and its match efficiency is evaluated in this section, where various indexes can be used. If these indexes suggest poor match quality, post hoc alterations to the proposed model must be made. Otherwise, the model is able for proper interpretation and reporting of findings.

3.3. Structural Equation Model. Structuring equation modeling (SEM) is a quantitative analysis-based research tool that may be utilized to examine and evaluate complicated, multivariate topics [30]. Compared with the traditional regression analysis method, the structural equation model can handle multiple dependent variables at the same time. In addition, it can compare and evaluate various models, so there are not too many hypothetical constraints on the development of a low-carbon economy in Guangzhou. In addition, for some variables that cannot be directly measured, the structural equation can identify these possible variables to process the observed variables, process measurement errors during analysis, and analyze the structural relationship between the variables. SEM is a concept of SEM analysis proposed by Joreskog for the estimation of maximum probability parameters. LISREL software has been developed for complex computing processes. SEM has become a major research example in the field of social and behavioral sciences.

Variables of structural equation models include structural variables and dominant variables [31]. In structural equation models, variable relationships can be divided into internal and external relationships, that is, the relationship between recessive and recessive variables and measurement variables. A general structural equation model can be expressed by three basic matrix equations as shown in the following equation:

\[
\begin{align*}
\eta &= B\eta + \Gamma\xi + \zeta, \\
Y &= \Lambda_y + \epsilon, \\
X &= \Lambda_x + \delta. 
\end{align*}
\]

According to equation (1), the first part is a structural equation that reflects the influence of each latent variable, where \(\eta = \eta_1, \eta_2, \ldots, \eta_m\) denotes the corresponding endogenous latent variable. Similarly, \(\xi = \xi_1, \xi_2, \ldots, \xi_m\) denotes the corresponding exogenous latent variable, while the endogenous and exogenous latent variables are determined by the inclusion coefficient matrix \(B\). Besides, \(T\) and error vectors \(\xi\) are connected by linear equations, where \(B\) represents the effect of some endogenous latent variables on others, \(T\) Indicates the effect of exogenous potential on endogenous potential, and \(\xi\) represents regression residuals, which means unexplained parts of the model.

In addition to equation (1), the second and third parts define the measurement model of a latent variable based on the measurement variable (identification variable/measurement index). Here, the second part represents the endogenous measurement variable \(y\) and the endogenous latent variable such as \(\eta\). Finally, the third part represents the relationship between the exogenous measurement variable \(x\) and the exogenous latent variable. Furthermore, the endogenous measurement variable \(y\) and exogenous measurement variable \(x\) utilize factor load \(\Lambda_y\) and \(\Lambda_x\), respectively. The corresponding endogenous latent variables \(\eta\) and exogenous latent variable are \(\xi\). The exogenous measurement variable \(x\) and the exogenous latent variable \(Y\) are represented, respectively. \(\xi\) is the associated measurement error that represents the portion that cannot be explained by the latent variable. If \(E(\epsilon) = 0\) and \(E(\delta) = 0\), measurement error \(\epsilon\) and \(\delta\), latent variables \(\eta\), and \(\xi\) there is no corrections between measurement errors \(\epsilon\&\delta\) and latent variables \(\eta\&\xi\), but if there may be possibly relationships between measurement errors and latent variables themselves.

Due to the universality of the structural equation model, the modeling process also needs to follow its rules. In this connection, Figure 3 shows specific analysis steps for structural equation models.
4. Design of Measurement System for Low-Carbon Economic Development Level

4.1. Energy System Design. Energy consumption is an important indicator to measure the degree of low-carbon economic development in a country or region. As a result, the development status of China’s energy system is examined from three perspectives: energy supply and demand, energy consumption, and carbon emissions. The relationship between energy supply and demand includes the ratio of energy supply and demand and the elasticity of energy supply and demand.

4.1.1. Energy Supply-Demand Ratio. The ratio of energy supply to demand can reflect the dynamic change in energy supply and demand. When the ratio is greater than 1, it indicates that the energy supply is greater than the demand. The supply exceeds the demand. When the ratio is less than 1, the supply of energy is less than the demand, that is, the supply exceeds the demand. This can be calculated using the following equation:

\[ \text{Energy Supply-Demand Ratio} = \frac{\text{Energy Supply}}{\text{Energy Demand}} \]

Figure 1: Theoretical framework for China’s low-carbon economy.

Figure 2: Flowchart of SEM modeling.
where $Q_S$ represents the amount of energy supply, $Q_D$ represents the amount of energy demand, and $SDR_E$ represents the proportion of energy supply to demand.

4.1.2. Energy Intensity. Energy intensity and the energy consumption per unit of gross national product (GDP) can directly reflect the energy consumption and energy utilization of a country or region’s economic output value. At the same time, it can also indirectly reflect the carbon emission of a country or region’s economic development. Energy intensity is an important index to measure the development of the low-carbon economy. The energy intensity can be calculated using the following equation:

$$EI = \frac{EC}{GDP}, \quad (3)$$

where $EC$ represents the total energy consumption.

4.1.3. Carbon Emission Intensity. The intensity of carbon emission, which is the number of carbon emissions generated by the growth of the gross national product per unit, is mainly used to measure the relationship between a country’s or region’s economy and carbon emissions. If economic growth is accompanied by a decline in CO$_2$ emissions per unit of gross national product, then the country has achieved a low-carbon development model. The calculation procedure of carbon emission intensity measurement is represented in the following equation:

$$SDR_E = \frac{Q_S}{Q_D}, \quad (2)$$

where $Q_S$ represents the amount of energy supply, $Q_D$ represents the amount of energy demand, and $SDR_E$ represents the proportion of energy supply to demand.

4.2. Economic System Design. Economic development needs to consume a large amount of energy as a support, and energy provides continuous power for economic development, which is mutually complementary. Compared with the traditional development model of “high energy consumption, high pollution, and high emission,” the development of a low-carbon economy has the advantages of “high efficiency, high output value, and high efficiency.” To visually reflect the level of low-carbon economic development, this study selects five indicators to measure the level of low-carbon economic development: green GDP index, per capita GDP, economic growth rate, and the proportion of tertiary industry output value, the proportion of foreign direct investment.

4.2.1. Green GDP Index. Compared with the previous GDP accounting system, green GDP is an index that considers resources, environment, and other aspects comprehensively. The larger the number, the greater the net positive effect on economic growth and the smaller the negative effect. Green GDP indicators can reflect the coordination between the ecological environment and economic development, which not only promotes economic development but also enhances the protection of the environment and the healthy development of society. The calculation procedure may be explained in the following equation:

$$I_{green} = \frac{GDP_{green}}{GDP} = \frac{GDP - C_{re} - C_{ep}}{GDP}, \quad (5)$$

where the green GDP index is represented by $I_{green}$, green GDP is denoted by $GDP_{green}$, environmental resource cost is denoted by $C_{re}$, and environmental protection service cost is represented by $C_{ep}$.

4.2.2. The Proportion of Tertiary Industry Output Value. The proportion of industrial structure is the proportion of the first, second, and third national industrial structures. Overall, the higher proportion of tertiary industry output value to the total national economy output value indicates that its economic structure tends to be reasonable. The development of the tertiary industry can increase the national income, but relative to the first and second production, the damage to the environment is minimal, so to develop a low-carbon economy, it is necessary to promote the development of the tertiary industry. The following equation is used to calculate tertiary industry output value:
4.3. Environmental System. To develop a low-carbon economy, we must correctly recognize the role of the 3E system. Energy is the primary driving factor behind economic development, and economic growth supports energy development while simultaneously emitting a substantial amount of greenhouse gases.

4.3.1. Reaching Standard Rate of Industrial Solid Waste. The compliance rate of industrial solid waste reflects the degree of its treatment, and the higher the index, the greater the amount of industrial solid waste discharged into the environment, the less the impact on the environment, and vice versa. The compliance rate may be calculated using the following equation:

\[
ISWR = \frac{ISWD}{ISWP}
\]

(7) where the amount of industrial solid waste disposal is ISWD and the amount of industrial solid waste production is ISWP.

4.3.2. Standard Acceptance Rate of Industrial Wastewater. The up-to-standard rate of industrial sewage refers to the degree of wastewater treatment. This number indicates the scale of industrial sewage discharged into the environment. The larger the number, the lower the degree of wastewater treatment, and the lower the industrial sewage discharged into the environment, and vice versa. The standard acceptance rate of industrial wastewater can be calculated using the following equation:

\[
IWWR = \frac{IWWD}{IWWP}
\]

(8) where industrial wastewater treatment is represented by IWWD and industrial wastewater production by IWWP.

4.3.3. Acceptance Rate of Industrial Exhaust Gas. The industrial exhaust compliance rate reflects the level of treatment of industrial exhaust. The value of this index indicates the value of harmful gases directly discharged into the atmosphere. The industrial exhaust compliance rate can be obtained using the following equation:

\[
IWGR = \frac{IWGD}{IWP}
\]

(9) where IWGR represents the industrial exhaust compliance rate.

4.3.4. Carbon Sink. Carbon sink generally refers to the process, activity, and mechanism of removing carbon dioxide from the air. Mainly refers to how much carbon dioxide the forest absorbs and stores or the ability of the forest to absorb and store carbon dioxide. The carbon sink can be obtained using the following equation:

\[
CS = \rho_i \times S_i
\]

(10) where the carbon absorption coefficient of a plant is expressed by \(\rho_i\) and the total area of a plant of class \(i\) is represented by \(S_i\).

5. Experimental Result and Simulations

5.1. Calculation of Comprehensive Score of Low-Carbon Economic Development in Guangzhou. In Guangzhou, a comprehensive evaluation index layer is being developed to accurately track the growth of a low-carbon economy. This study intends to build a trend, face up to its merits and downsides, and give a theoretical framework for the environmental sustainability of a low-carbon industry in Guangzhou in the future. Based on the low-carbon economic, scientific, and technological systems, and low-carbon social and environmental systems, we have chosen a representative index layer to perform a thorough review and analysis of the development of a low-carbon economy.

Four indexes are selected, and the membership function is calculated. The relative to the forward indicator can be described by

\[
\mu(x) = \begin{cases} 
1, & \text{suf}(f) \leq f(x), \\
\frac{f(x) - \text{inf}(f)}{\text{suf}(f) - \text{inf}(f)}, & \text{inf}(f) \leq f(x) < \text{suf}(f), \\
0, & f(x) \leq \text{inf}(f). 
\end{cases}
\]

(11) Relative to the forward indicator can be described by

\[
\mu(x) = \begin{cases} 
1, & f(x) \leq \text{suf}(f), \\
\frac{\text{suf}(f) - f(x)}{\text{suf}(f) - \text{inf}(f)}, & \text{inf}(f) \leq f(x) < \text{suf}(f), \\
0, & \text{suf}(f) \leq f(x). 
\end{cases}
\]

(12) where \(\text{Sup}(f)\) and \(\text{inf}(f)\) are the upper and lower bounds of hair \(f(x)\), respectively. Similarly, the evaluation vectors \(R_1\), \(R_2\), and \(R_3\) for every single factor can be obtained by equations (11) and (12).

Through a comprehensive multifactor evaluation of one-year low-carbon economic development in Guangzhou, its comprehensive score is obtained. Figure 4 highlights the
trend map of a comprehensive score of Guangzhou’s low-carbon economic development level.

From Figure 4, we can see that the overall low-carbon economic development index of Guangzhou shows an increasing trend from 2011 to 2020, and the overall level of low-carbon economic development is also increasing. Except for the inflection points in 2013 and 2016, significant growth has occurred in the remaining years. The UK took the lead in introducing a low-carbon economy in 2002. Since 2008, the boom in the development of a low-carbon economy has continued. Figures 5–7 also demonstrate that the low-carbon development of Guangzhou during 2010–2016 displays considerable fluctuation, particularly during 2016–2020, which is strongly connected to energy saving and emission reduction, as well as the robust growth of Guangzhou’s low-carbon economy.

5.2. Analysis Results Compared with Other Coastal Cities. Through comparison, three representative coastal cities, Tianjin, Shanghai, and Qingdao, are comprehensively analyzed by using the same index and calculation method. Guangzhou is selected as one of the four most developed cities in the coastal area because they are important trade ports in the country. Under similar economic development patterns, there are also problems such as energy shortage and environmental pollution. The overall scores of the four cities are shown in Figure 5.

From Figure 5, we can see that the low-carbon economic development of the four coastal cities shows a fluctuating growth trend. Guangzhou has a strong postdevelopment advantage in low-carbon economic development. After 2016, its development speed gradually surpasses Shanghai and Tianjin and is on the same level as Qingdao’s comprehensive score. This shows that the low-carbon economic development of Guangzhou in recent years is on the track of healthy development and has a trend of continuous upward development.

In order to better evaluate the advantages and disadvantages of Guangzhou’s development, the economic, technological, social, and environmental system scores of each city are analyzed, and a comparison chart of each system score is obtained.

5.2.1. Comparison Map of Economic System Scores among Cities. The comparison chart of each system score is shown in Figure 6. From this figure, it can be seen that the economic system score of Guangzhou shows a significant positive upward trend compared with the economic system score of the other three cities. Tianjin was ranked second before 2014, and there was an extraordinary growth in 2015, which was attributed to the completion and operation of a significant number of infrastructure projects in Guangzhou in 2014. However, the rate of economic development has been dropping since 2016, due to the distinctive moment wherein Guangzhou has become a new tourist destination. However, the rate of economic development has been dropping since 2016, due to the distinctive moment wherein Guangzhou has become a new tourist destination.

5.2.2. Comparison of Scores of Science and Technology Systems among Cities. Figure 7 shows the scientific and technical system scores. From this figure, it is clear that Guangzhou’s degree of scientific and technological development has been steadily rising, from a backward position before 2017 to first place in 2017 and has been there ever since. Guangzhou’s scientific and technological advancement plays a significant role in promoting the development of its low-carbon economy in this period of fast scientific and technological development.

5.2.3. Comparison of Scores of Social and Environmental Systems among Cities. From Figure 8, we can see that the social system of Guangzhou is generally stable, while the other three cities continue to decline. This demonstrates that Guangzhou still has a significant edge in terms of the living environment, but we must be vigilant in light of the continuous decline in recent years.

The ecosystem of Figure 9 is evaluated. The results show that the score of ecological environment quality in Guangzhou has been declining continuously, and the other
three cities have shown fluctuating declines, indicating that the ecological environment problems in the development of Guangzhou are becoming more and more serious.

6. Conclusions

Dealing with the significant strain generated by climate change, low-carbon cities are becoming a development trend of urban ecosystems in China, notably in Guangzhou. It is essential to consider the levels of urban low-carbon growth to promote the establishment of low-carbon cities. Therefore, one must evaluate the executive impact to guarantee that low-carbon building is a constant emphasis and detect current difficulties and offer suitable legislation. To solve these issues, this study proposes an assessment indicator system for urban low-carbon development levels, energy structure and use effectiveness, living usage, and growth environment. In addition, this paper analyses and examines the important components driving the establishment of a low-carbon economy in Guangzhou. It provides the present situation of low growth in Guangzhou and the obstacles it confronts. Furthermore, the structural model is fitted and updated depending on the data reliability analysis and testing using the data analysis application LISREL 8.80. Lastly, it creates model data for measuring and evaluating Guangzhou’s low-carbon economic growth level.

Data Availability

All the data used to support the findings of the study are available within the article.

Conflicts of Interest

The authors declare that there are no conflicts of interest for the publication of this paper.

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