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Research on the Evaluation of the High-Quality Development of the Modern Service Industry under the Background of Reduction Development: A Case Study of Beijing

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Abstract: With the popularization and practice of the concept of reduction development, how to accurately and comprehensively evaluate the high-quality development effect of the modern service industry has become crucial. This paper combines the concept of reduction development and high-quality development. According to the specific background of reduction development, this paper constructs the evaluation index system of high-quality development of the modern service industry in the context of reduction development from the four dimensions of total scale control, urban function strengthening, economic quality improvement and livable environment optimization and puts forward the evaluation model of high-quality development of the modern service industry based on the entropy weight TOPSIS method. Taking Beijing's modern service industry as an example, our empirical analysis showed that from 2008 to 2021, its high-quality development level showed a steady upward trend. The total scale has been effectively controlled, and the service industry has performed well in employment absorption. Scientific and technological innovation and cultural functions have developed significantly, but the level of openness needs to be improved. Economic quality maintained stable development, and the livable environment also showed a good development trend.

Keywords: reduction development; high-quality development; modern service industry



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1. Introduction

With the rapid development of the global economy and the increasing shortage of resources, reduction development has become a new idea of development, which aims to achieve coordinated and sustainable development of the economy, society and environment by reducing resource consumption, optimizing industrial structure and improving development efficiency [1]. In this context, as the leading industry in the era of knowledge economy, the high-quality development of the modern service industry is of great significance to promote the transformation and upgrade of economic structure and enhance national comprehensive strength and international competitiveness [2].

However, the high-quality development of the modern service industry is not a simple scale expansion or speed improvement, but needs to achieve coordinated development in many aspects, such as the improvement in service quality [3], the enhancement of innovation ability [4], the optimization of industrial structure [5] and the improvement in resource utilization efficiency, while maintaining moderate growth. Therefore, how to accurately and comprehensively evaluate the high-quality development effect of the modern service industry under the background of reduction development has become an important issue to be solved in the current academic and practical circles.

In order to accurately evaluate the high-quality development level of the modern service industry under the background of reduction development, this paper will start from the connotation of the high-quality development of the modern service industry,

combined with the requirements of reduction development and build a set of scientific, reasonable and operable evaluation index systems, aiming to solve the balance problem between the reduced and high-quality development of the modern service industry. The construction of this index system is based on the relevant research of industrial economics, service management theory and sustainable development [6]. It also comes from the realistic needs of the modern service industry in promoting economic transformation and upgrades, meeting the diversified needs of consumers, using information technology to improve service efficiency and quality, and paying attention to sustainable development [7]. The index system will cover the total scale, service quality, innovation ability, industrial structure, resource utilization efficiency and other aspects to comprehensively reflect the high-quality development level of the modern service industry under the background of reduction development. At the same time, this paper will also make an empirical analysis of the high-quality development of Beijing's modern service industry, in order to provide useful reference for relevant policy-making and industrial development.

Through this study, we hope to deeply analyze the development trend and existing problems of the modern service industry under the background of reduction development, reveal the internal laws and influencing factors of its high-quality development, and provide a scientific decision-making basis and practical guidance for promoting the sustainable and healthy development of the modern service industry. At the same time, this study will also make positive contributions to enrich and develop the theory of the modern service industry, expand the research field of the modern service industry, and improve the research level of the modern service industry.

The remainder of this paper is organized as follows. In Section 2, we discuss the relevant literature and highlight our contributions in this regard. In Section 3, we conduct theoretical analysis. In Section 4, we lay out the evaluation index system. In Section 5, we construct the evaluation model. Section 6 evaluates the high-quality development level of Beijing's modern service industry for 2008–2021. Finally, we conclude our work in Section 7.

2. Literature Review

This paper combs through the existing literature from the connotation of high-quality development of the modern service industry, the evaluation of high-quality development of the modern service industry, and the dialectical relationship between reduction development and high-quality development.

2.1. High-Quality Development

In relation to the research on the connotation of high-quality development, Li [8], Wu [9], Zhang [10], Qiu [11] and Zhou et al. [12] started from the economic concepts of "quality" and "basic quality" and believed that high-quality development should take into account "quality" and "quantity", unify the development of productive forces and the transformation of production relations, and realize people-centered development.

Some scholars study high-quality development from the perspective of new development concepts and social contradictions. Zhao [13], Gao [14] and Zhang [15] pointed out that high-quality development is a high convergence of new development concepts, and its goal is to meet the growing needs of people for a better life. According to Chen [16], high-quality development is a new way of development, which provides people with more happiness and can bring more welfare effects. Zhang et al. [17] pointed out that high-quality development is the integration of five elements of economy, politics, culture, society and ecological environment to achieve efficient and sustainable development.

In addition, some scholars analyze its connotation from the characteristics of high-quality development. Shi et al. [18] interpreted it from the perspective of new momentum and new economy, believing that high-quality development is a development with a stable growth rate and reasonable economic structure and one that is friendly to the

ecological environment and society. Liu [19] pointed out that high-quality development is manifested in intelligent, platforming, ecological and international ways. Wang [20] believes that the main characteristics of China's high-quality development stage should include quality improvement, structural upgrade, innovation, common prosperity and green development.

2.2. High-Quality Development of the Modern Service Industry

Many scholars have also studied the connotation of the high-quality development of the modern service industry. Liu et al. [21] put forward that the core task of the high-quality development of the service industry mainly focuses on three aspects: industrial integration, service innovation and transformation and upgrade of the traditional service industry. Pan [22] pointed out that the high-quality development of the service industry should pay attention to the innovation driving force of the service industry economy and the optimization of its internal structure, as well as the improvement in the economic benefits of enterprises, the coordination between the service industry and other industries, and the contribution of the service industry to the whole economy and society. Lu [23] defined the connotation of the high-quality development of the modern service industry as a way of combining economics and management, that is, the degree to which the inherent characteristics of the development of the modern service industry can meet social needs. Scholars such as Lu et al. [24], Jiang [25] and Hong [26] all mentioned that the high-quality development of the modern service industry should fully reflect the developmental concepts of "innovation, coordination, green, openness and sharing". Zhang et al. [27] decomposed the high-quality development of the service industry into four parts: high-quality structure, high-quality efficiency, high-quality scale and high-quality brand.

2.3. Evaluation Index System and Evaluation Model of the High-Quality Development of the Modern Service Industry

With regard to the construction of an evaluation index system and evaluation model for the high-quality development of the modern service industry, Lu [24], from the perspective of input efficiency and output quality, introduced six dimensions: industrial scale, technical structure, organizational performance, product structure, openness and ecological civilization. Along with this, an analytic hierarchy process was adopted to build an evaluation index system for the high-quality development of the modern service industry and made into an empirical analysis. Chen et al. [28] proposed an evaluation index system based on innovation, coordination, sustainability, openness and sharing and used the entropy weight method to evaluate the high-quality development level of China's modern service industry from 2004 to 2018. Cui et al. [29] proposed an index system composed of structural optimization, innovation, coordinated integration and scale efficiency and evaluated it by using the analytic hierarchy process, combining qualitative and quantitative methods.

2.4. Dialectical Relationship between Reduction Development and High-Quality Development

In terms of the dialectical relationship between reduction development and high-quality development, Diao [30] believes that Beijing's reduction development should focus on three key areas: old city stock renewal, ecological space management and control, and regional collaborative reduction. Lu [31] proposed that an urban core area should use the method of reduction to provide a high-quality service guarantee, while a new area should enhance the economic strength of Beijing in increments. Zhao et al. [32] believe that the key to achieving high-quality development in Beijing is to properly handle the multiple relationships between reduction development and high-quality development and achieve the purposes of a structural upgrade and spatial optimization in reduction development. Lu [33] believed that Beijing should not only take the development of high-end industries as an important focus to promote high-quality development, but also continue to promote

environmental improvement, layout optimization, carrier construction and collaborative development. Wang et al. [34] took reduction development as one of the indicators of Beijing's high-quality economic development evaluation system to assess the relationship between reduction development and high-quality development.

2.5. Discussion

Combing the above literature, it was found that the connotation of high-quality development has not formed a unified definition or concept, but these connotations have some common points: ① take the “five development concepts” as the basic principle and pay attention to the organic synergy of innovation, coordination, greenness, openness and sharing; ② adhere to the organic unity of the combination of scale, speed and quality benefits; ③ taking “high quality” as the fundamental requirement, it should include micro service quality, meso industrial development, macroeconomic benefits and social welfare effects; ④ follow the law of regional development and meet regional development goals; and ⑤ take “meeting the people's growing needs for a better life” as the core goal. In addition, as reduction development is a new development idea, the connotation of reduction development has not formed a unified definition or concept, and there is no evaluation model for a high-quality development index system of the modern service industry under the background of reduction development. Based on this, this paper attempts to build a set of high-quality development evaluation index systems of the modern service industry from the perspective of high-quality development research under the background of reduction development, so as to evaluate the high-quality development of the modern service industry more objectively and comprehensively, and then provide a reference for policy-making.

3. Theoretical Analysis

Reduction development is a new development concept, a new concept and new thing that has not yet formed a unified and clear definition, and its development path and mode are still being explored. The connotation of reduced development can be roughly defined as the following: by controlling the total population and the boundary of urban development, relieving non-urban functions and optimizing the allocation of resources, a high-quality development mode can be achieved to improve economic quality, enhance the core functions of a city and make an urban environment livable. The ultimate goal is to achieve high-quality development. Four key points should be paid attention to in reducing development. First, control the total scale, control the total scale of the population and construction land, improve the land utilization rate, and optimize a balanced layout of spatial resources [35]. Second, strengthen urban functions, strengthen the construction of the “four centers”, improve the ability to have scientific and technological innovation [36], enhance the construction of cultural centers [37], and promote the improvement in the ability to open the development to the outside world [38]. Optimize and upgrade urban development by appropriately reducing non-urban functions and enhancing and optimizing urban core functions. Third, to improve the quality of the economy, build a modern economic system consistent with the strategic direction of a city by relieving low-end industries and actively developing high-end and sophisticated industries [39]. At the same time, reduce resource consumption, improve factor efficiency and gradually shift from relying on resource growth to innovation [40]. Fourth, optimize the livable environment, improve the ecological environment, promote the construction of ecological cities, improve the quality of public services and improve the quality of people's lives [41].

This paper defines the concept of high-quality development as the following: high-quality development is a new development concept, whose purpose is to continuously meet people's growing needs for a better life. Among them, innovation is its main driving force, coordination is its internal feature, green development is its universal development form, openness is the only way for high-quality development to exist and sharing is its

fundamental purpose [42]. High-quality development means that a country or region's economic and social development is based on the growth of quantity, guided by the five development concepts, and achieves the development of quantity and quality through structural optimization, efficiency improvement, innovation, environmental improvement and welfare improvement [43]. High-quality development pays more attention to improving development efficiency, achieving the efficient allocation of factors, continuing structural optimization and promoting innovation, promoting the harmonious development of the ecological environment and the sharing of development achievements. The connotation of high-quality development includes the following five aspects. The first is high-quality economic growth. We will focus on improving the quality of the economy in an all-round way on the basis of stable growth in an aggregate economy [44]. Second, is high-quality resource allocation. We should not only make full use of the decisive role of the market in resource allocation, but also avoid the imbalance of resource allocation from inefficient departments to efficient departments [45]. Third, is high-quality input and output. We should make full use of the advantages of human capital and innovation development to improve total factor productivity [46]. Fourth, is a high-quality ecological environment. We should incorporate low energy consumption and low land consumption to realize the harmonious coexistence of the economy, society and environment and promote green, low-carbon and circular development [47]. Fifth, is high-quality social security. Achievements in development will benefit the general public, continue to expand the coverage of basic public services, improve the guarantee ability of basic public services, continuously improve the development of basic public services and achieve high-quality social distribution [48].

Under the background of reduction development, the evaluation of a high-quality development level of the modern service industry should also be different. The evaluation system should highlight the overall layout of reduction development and fully reflect the four key points of reduction development. Therefore, this paper combines the concept of reduction development with the concept of high-quality development and constructs a set of evaluation index systems for the high-quality development of the modern service industry under the background of reduction development based on the new development concept. It constructs the evaluation index system for reduction development from four dimensions, namely, total scale control, urban function enhancement, economic quality improvement and livable environment optimization. The secondary and tertiary indicators meet the connotation of high-quality development. At the same time, it reflects all aspects of the new development concept. Through this evaluation system, we can dynamically monitor the reduction development and high-quality development levels of the modern service industry, adjust the development direction in a timely manner, and ensure the orderly progress of reduction development and high-quality development.

In order to fully reflect the requirements of the reduction development goal, this paper takes four factors as the first-level indicators, namely, the total amount of scale control, the strengthening of urban functions, the improvement in economic quality and the optimization of the livable environment. The selection of these indicators is closely related to the concept of reduction development. Among them, the total scale control was mainly considered based on the two aspects of a population scale and land scale, strictly controlling a city scale and strictly abide by the two red lines of a total population limit [49] and urban development boundary [50]. The specific indicators of the urban function enhancement module were mainly designed based on the construction of urban core functions, including an cultural development center, international communication center, and scientific and technological innovation center. Innovation is the first driving force leading the development of science and technology. Therefore, in the scientific and technological innovation module, we will mainly investigate the innovation input, output and development of the innovation environment of the modern service industry [51]. The cultural function focuses on the evaluation of the development status of cultural industry

enterprises and various cultural activities [52], while the international communication function emphasizes the linkage between opening up to the outside world, the combination of bringing in and going out, and the promotion of both investment and technology and intelligence [53]. The degree of openness and external attraction are used as two dimensions to measure the level of opening up [54]. The economic quality improvement module mainly focuses on economic growth, industrial structure and factor efficiency [55]. High-quality development is the organic unity of scale, speed and quality benefits [56]. High-quality development cannot ignore economic growth. Economic growth is not only reflected in the contribution rate of the modern service industry to the economy, but also reflected by the income level of modern service industry employees [57]. This can be achieved by investigating the rationalization of an industrial structure to promote the high-quality development of the modern service industry, to produce a good internal driving force, and by measuring the advanced industrial structure to achieve higher production efficiency and lower production costs through the rational allocation of factors [58]. Factor efficiency affects the efficiency of economic growth. Factor efficiency is not only reflected in the improvement in production efficiency of the modern service industry, but also in the control and reduction in resource consumption [40]. The livable environment optimization module considers the ecological environment and public services [59]. It is essential to measure an ecological environment whether it is to ease the need for high-emission enterprises to effectively change their extensive and expansionary growth by reducing weight and burden, curb the ecological environment crisis, or practice the new development concept and promote the requirements of green and low-carbon economic development [40]. Sharing is the fundamental purpose of the high-quality development of the modern service industry [60]. Comprehensive evaluation is carried out by selecting various indicators such as medical treatment, education, transportation and urban construction to determine whether it can meet the diversified needs of the people at all levels and in different aspects [61].

Under the background of reduction development, the construction of a high-quality development evaluation index system of the modern service industry needs to meet certain standards and requirements. ① Systematic principle. It requires a comprehensive reflection of all aspects of the evaluation object, while paying attention to the internal relationship and logical relationship between the indicators [62]. The evaluation index system should be hierarchical and progressive, from macro to micro, and gradually refined and deepened to form a comprehensive and rigorous evaluation system. ② The principle of typicality. When selecting evaluation indicators, the principle of typicality should be followed, that is, the selected indicators should be representative and reflect the evaluation dimensions comprehensively and accurately [63]. In addition, the selected evaluation indicators should also be the focus of the work of relevant functional departments. ③ Dynamic principle. Changes in the development of the modern service industry need to be shown through time scale indicators [64]. Therefore, the selection of evaluation indexes should follow the dynamic principle and fully consider the dynamic changes, that is, when constructing the evaluation index system, we should collect as many changes in several years as possible. ④ Scientific principle. The design of an evaluation index system and the selection of an evaluation index must follow the scientific principle, that is, we should pay attention to the authenticity and authority of data sources [65]. At the same time, in the evaluation process, too complex indicators should be avoided and important information should be avoided. The data and calculation methods should be as simple and easy to understand as possible. ⑤ Principle of comparability. When selecting indicators, try to select common indicators that are highly representative, highly objective and generally accepted by society, so as to facilitate measurement, calculation and horizontal comparison between regions [65]. ⑥ Comprehensive principle. Conduct comprehensive analysis and assessment based on multiple factors such as the environment, economy and social system [66].

4. Construction of Evaluation of the Index System

Based on the theoretical analysis in the Section 3, this paper constructs an evaluation index system of the high-quality development of the modern service industry to adapt to the background of reduction development. After an in-depth analysis of the connotation and relationship between reduction development and high-quality development, four key dimensions were determined as the following: the total scale control, the strengthening of the urban function, the improvement in economic quality, and the optimization of the livable environment. Through a systematic literature review and theoretical derivation, this paper further selected and refined 27 specific indicators from these four dimensions, which together constitute the evaluation system shown in Table 1.

Table 1. The evaluation index system of the high-quality development of the modern service industry under the background of reduction development.

Primary Indicator	Secondary Index	Tertiary Indicator	Measurement Method	Attribute
The total scale control	Population size	Permanent population density	Number of the permanent population	—
		Employed population of the modern service industry	Number of employees in the modern service industry/total number of employees	+
	Land scale	Construction land area	Total planned supply of construction land	—
The strengthening of the urban function	Scientific and technological innovation function	Investment intensity of R&D personnel	Full-time equivalent of R&D personnel	+
		Investment intensity of R&D funds	Internal expenditure of R&D funds	+
		Economic benefits of innovation	Total value of technology contracts/added value of the modern service industry	+
		Vitality of the innovation subject	Number of science and technology service enterprises/number of modern service enterprises	+
		Cultural industry development	Added value of cultural industry/added value of modern service industry	+
	Cultural development function	Cultural enterprise	Number of cultural industry enterprises/number of modern service industry enterprises	+
		Literary and artistic activity development	Number of literary and artistic activities organized by mass art museums and cultural centers	+
		Film and television industry development	Number of film screenings	+
		Dependence on foreign trade	Total imports and exports of the service trade/added value of the modern service industry	+
	International communication function	Dependence on foreign capital	Foreign direct investment actually utilized by the modern service industry/added value of the modern service industry	+
		International popularity	International tourism revenue/added value of the modern service industry	+
		Market attractiveness	Number of Hong Kong, Macao, Taiwan and foreign-invested enterprises/number of modern service enterprises	+

Table 1. Cont.

Primary Indicator	Secondary Index	Tertiary Indicator	Measurement Method	Attribute
The improvement in economic quality	Economic growth	Economic contribution rate	Added value of the modern service industry/gross regional product	+
		Income distribution level	Average wage of employees in the modern service industry	+
	Industrial structure	Rationalization level of the industrial structure	Theil index	—
		Advanced level of the industrial structure	Advanced value of the industrial structure	+
	Factor efficiency	Production efficiency of the modern service industry	Added value of the modern service industry/number of employees in the modern service industry	+
		Unit energy consumption of the modern service industry	Total energy consumption of the modern service industry/added value of the modern service industry	—
	The optimization of the livable environment	Ecological environment	Urban greening level	Urban greening coverage
Air environment			PM10 annual average concentration	—
Sewage treatment level			Sewage treatment rate	+
Public service		Medical and health level	Number of beds in medical institutions per 10,000 people	+
		Education investment level	Ratio of students to teachers in ordinary middle schools	—
		Traffic level	Number of public transport vehicles per 10,000 people	+

In terms of total quantity scale control, this paper puts forward three evaluation indexes to evaluate the population scale change and land use scale under the background of reduction development. The “resident population density” is used to reflect the degree of population size control under the background of reduction development [67]. The impact of population size control on the employment of the modern service industry is evaluated by “the proportion of the employed population in modern service industry”. The “control rate of construction land area” is used to evaluate the improvement in the disorderly spread of urban development, improve land use efficiency and reserve high-quality development space for the long-term development of a city [67].

In terms of strengthening urban functions, our evaluation was mainly conducted based on three aspects: the function of scientific and technological innovation, the function of cultural development, and the function of international exchanges. Four indicators were set for scientific and technological innovation, and “R&D personnel investment intensity” and “R&D funds investment intensity” were used to measure the level of innovation investment from two aspects of personnel and funds, which are the basic elements of innovation development [68]. The development of the innovation environment was evaluated from the perspective of the economy and manpower by using the relevant data of the “total transaction volume of technology contracts” and “number of science and technology service enterprises” [69]. The evaluation index of the cultural development function was designed based on three aspects: the economic benefit, the enterprise subject and various cultural activities [70]. Opening up is the only way for the high-quality development of the modern service industry, and we must adhere to all-round opening up. This paper examines the attractiveness of “bringing in” and the degree of openness of “going out”. The degree of openness is mainly composed of “foreign trade dependence” and “foreign

capital dependence" [71]. These two indicators can reflect the degree of dependence on the international market. They are important factors to investigate the degree of opening up and important driving forces to promote the development of the modern service industry. External attraction is reflected in "international popularity" and "market attraction", so as to more actively introduce foreign capital, advanced technology and high-end talents and expand the international service, capital and technology markets [72].

In terms of the improvement in economic quality, it is mainly considered based on three aspects: economic growth, industrial structure and factor efficiency. This includes not only the relevant indicators of economic development such as economic trends and resource allocation, but also the indicators of coordinated development such as industrial structure. The "proportion of added value of modern service industry" was used to show the development level of the modern service industry, because only with a certain speed of growth can it provide a sustainable driving force for high-quality development [73]. The study of an "income distribution level" is based on the income growth of modern service industry employees directly affecting the sustainable development of the modern service industry economy [55]. Industrial structure is measured through rationalization and upgrade. As an index used to measure the rationalization level of industrial structure, the Theil index comprehensively considers the differences in the output value and employment structure among different industries and can consider the differences in the economic statuses of different industries, which has a more comprehensive evaluation significance [74]. The advanced level of industrial structure means that with economic growth, an industrial structure also shows the corresponding regular changes, mainly manifested in the increasing proportion of the secondary industry and the tertiary industry [75]. Resource conservation is the eternal theme of promoting economic efficiency and plays an important role in promoting the transformation of an economic growth mode and achieving high-quality development. This paper evaluates resource consumption, cost management and benefit maximization from the perspectives of "production efficiency of modern service industry" and "unit energy consumption of modern service industry", which are also forms of green development emphasized in the new development concept [76].

The high-quality development of the modern service industry is also reflected in the improvement in people's quality of life. In terms of the optimization of their livable environment, the ecological environment and public services are mainly considered. Urban environmental quality and ecological protection status are important aspects of green development. Among them, "urban green coverage", "PM10 concentration value" and "sewage treatment rate" measure the urban environmental quality and ecological protection status from three aspects of solid, gas and liquid [77]. These indicators are not only the needs of urban green development, but also an important measure of people's living welfare level. Secondly, this paper starts from all aspects of people's lives, that is, from the three aspects of health care, education and transportation, using the relevant data of public services that residents can enjoy, not the investment data in this field, which fully reflect the actual situation of people's quality of life. The "number of beds in medical institutions per 10,000 people" is used to measure the situation of medical resources in the region, because medical and health care are the basic guarantees to meeting the needs of people's health and good life [78]. With the help of "the ratio of students to teachers in ordinary middle schools", the situation of a school education scale and school running quality can be reflected to a certain extent [79]. The "traffic level" can be used to describe the improvement in public facilities [80].

5. Construction of the Evaluation Model

This paper used the entropy weight TOPSIS method to build the evaluation model. There are two kinds of weight assignment methods commonly used in academia. One is a subjective evaluation method, such as the expert consultation method and brainstorming method. The other is an objective evaluation method, such as the entropy weight method, variation coefficient method and analytic hierarchy process. The entropy weight method

is one of the most widely used methods at present. Deng et al. [81] pointed out that the entropy weight method is based on the discreteness of index data to judge the amount of information of the index and then determine the index weight. The greater the discreteness, the greater the amount of information and the greater the index weight. This method can effectively solve the problem of information overlap between multi-index variables. The TOPSIS method selects the best and worst schemes through the evaluation matrix, then calculates the distance between each evaluated object and the two schemes, compares the degree of each evaluated object close to the optimal scheme, and finally determines the advantages and disadvantages of each evaluated object. Tao [82] pointed out that the advantages of the TOPSIS method include having less restrictions on the evaluation object, lower requirements on indicators and data distribution, and making full use of the original data information with less loss. The entropy weight TOPSIS method combines the advantages of the entropy weight method and TOPSIS method at the same time, which can not only avoid the weight assumption caused by subjective weighting, but also effectively judge the advantages and disadvantages of each observation object, making the calculation results more objective and reasonable. Therefore, this paper used the entropy weight TOPSIS method to measure the high-quality development level of the modern service industry. This paper used Cronbach's alpha to evaluate the reliability of the scale.

Assuming that there are n evaluation objects and m indicators, the basic steps for constructing an evaluation model of the high-quality development of the modern service industry are as follows.

Step 1: Standardized processing

Construct the original matrix v_{ij} of the evaluation index system with n rows and m columns. V in the matrix represents the value of the j -th index of the i -th object, $i = 1, 2, \dots, n$ and n is the number of evaluation objects. $j = 1, 2, \dots, m$, m is the number of evaluation indicators.

$$V = \begin{bmatrix} v_{11} & v_{12} & \dots & v_{1m} \\ v_{21} & v_{22} & \dots & v_{2m} \\ \dots & \dots & \dots & \dots \\ v_{n1} & v_{n2} & \dots & v_{nm} \end{bmatrix} \quad (1)$$

In order to eliminate the influence of each index dimension and index category on the evaluation index system of the high-quality development of the modern service industry, this paper used the extreme value method to standardize and isotropize the data of each evaluation index and establish a standardization matrix. In the evaluation index system of the high-quality development of the modern service industry, the permanent population density, construction land area, rationalization level of the industrial structure, unit energy consumption of the modern service industry, air environment and education investment level are negative indicators, that is, the smaller their index value, the better.

Positive indicators:

$$x_{ij} = \frac{v_{ij} - \min(v_{ij})}{\max(v_{ij}) - \min(v_{ij})} \quad (2)$$

Negative indicator:

$$x_{ij} = \frac{\max(v_{ij}) - v_{ij}}{\max(v_{ij}) - \min(v_{ij})} \quad (3)$$

The standardized matrix is

$$X = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1m} \\ x_{21} & x_{22} & \dots & x_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ x_{n1} & x_{n2} & \dots & x_{nm} \end{bmatrix} \quad (4)$$

Step 2: Reliability analysis of the evaluation index

The calculation formula of the Cronbach coefficient is

$$\alpha_m = \frac{m}{m-1} \left(1 - \frac{\sum_{j=1}^m \sigma_j^2}{\sigma_S^2} \right) \quad (5)$$

$$\sum_{j=1}^m \sigma_j^2 = \sum (x_{ij} - \bar{x}_j)^2 \quad (6)$$

where α_m is the Cronbach coefficient, σ_j^2 represents the variance in the j -th evaluation index, σ_S^2 represents the overall variance in the evaluation index and $\bar{x}_j$ represents the mean value of the variable of the j -th indicator of all objects.

When using the Cronbach reliability coefficient to evaluate the reliability of the index system, if the coefficient value is greater than or equal to 0.8, it means that the index system has very good reliability. When the coefficient value is above 0.7, the reliability of the index system is acceptable. If the coefficient value is above 0.6, the index system needs to be revised, but its value still exists. If the coefficient value is less than 0.6, it indicates that the index system needs to be redesigned.

Step 3: Indicator weight calculation

Calculate the entropy of index j :

$$e_j = -k \sum_{i=1}^n p_{ij} \ln(p_{ij}), j = 1, \dots, m \quad (7)$$

where $k = 1/\ln(n) > 0$ meets $e_j \geq 0$.

Calculate the information entropy redundancy (difference):

$$d_j = 1 - e_j, j = 1, \dots, m \quad (8)$$

Calculate the weight of each indicator:

$$w_j = \frac{d_j}{\sum_{j=1}^m d_j}, j = 1, \dots, m \quad (9)$$

Step 4: Building the evaluation matrix

In order to improve the objectivity of the evaluation matrix of the high-quality development of the modern service industry, the index weight calculated by the entropy weight method is added to the decision matrix. The weighted normalized evaluation matrix $Y = (y_{ij})_{m \times n}$ is obtained by multiplying each row of matrix X by its corresponding weight. The evaluation matrix Y is shown as follows.

$$Y = \begin{bmatrix} y_{11} & y_{12} & \dots & y_{1m} \\ y_{21} & y_{22} & \dots & y_{2m} \\ \dots & \dots & \dots & \dots \\ y_{n1} & y_{n2} & \dots & y_{nm} \end{bmatrix} \quad (10)$$

Step 5: Determination of positive and negative ideal solutions

Let Y^+ be the maximum value of the j -th index in i objects, that is, the optimal scheme, which is called the positive ideal solution. Let Y^- be the minimum value of the j -th index in i objects, that is, the worst scheme, which is called the negative ideal solution. The calculation formula is

$$Y^+ = \{ \max y_{ij} \mid i = 1, 2, \dots, n \} = \{ y_1^+, y_2^+, \dots, y_n^+ \} \quad (11)$$

$$Y^- = \{ \min y_{ij} \mid i = 1, 2, \dots, n \} = \{ y_1^-, y_2^-, \dots, y_n^- \} \quad (12)$$

Step 6: Measuring the gap between each evaluation index and the optimal vector and the worst vector

Calculate the distance between each evaluation index and the positive and negative ideal solutions, respectively.

$$D_i^+ = \sqrt{\sum_{j=1}^m (y_j^+ - y_{ij})^2} \quad (13)$$

$$D_i^- = \sqrt{\sum_{j=1}^m (y_j^- - y_{ij})^2} \quad (14)$$

Step 7: Measuring the proximity between the evaluation object and the optimal scheme

$$C_i = \frac{D_i^-}{D_i^+ + D_i^-} \quad (15)$$

where, C_i represents the proximity between the evaluation object and the optimal scheme and also represents the level of high-quality development of the modern service industry of the i -th object. The value range is $[0, 1]$. The higher the C_i value, the better the evaluation object, that is, the higher the high-quality development level of the modern service industry.

6. Empirical Analysis

6.1. Data Sources

Based on the evaluation index system constructed above, this paper collected original data related to the evaluation indexes in Table 1 from 2008 to 2021 from the Beijing Statistical Yearbook, China Statistical Yearbook and China's tertiary industry's statistical yearbook. Through the processing and calculation of the original index data, the relevant data of the above 27 specific evaluation indexes of the Beijing modern service industry from 2008 to 2021 were finally obtained.

At present, there is no unified definition of the modern service industry. Referring to the connotation of the modern service industry and the interpretation of the Beijing Municipal Bureau of Statistics on the modern service industry, this paper defines the modern service industry as the following: compared with the traditional service industry, the modern service industry is an emerging industry that meets the development needs of modern people and modern cities and has the characteristics of high-tech content, high cultural content, new service fields and new service modes. Referring to the statistical classification of Beijing's modern service industry by the Beijing Municipal Bureau of Statistics in 2020, this paper classifies the following ten industries as part of the modern service industry: information transmission, software and information technology services; financial industry; real estate industry; leasing and business services; scientific research and technical services; water conservancy, environment and public facility management industry; education; health and social work; culture, sports and entertainment; and public administration, social security and social organizations.

6.2. Indicator Reliability Analysis

Using Formula (5) to analyze the reliability of the high-quality development evaluation index of the modern service industry, the results are shown in Table 2. It can be seen from Table 2 that the value of Cronbach's reliability coefficient is 0.921, which exceeds 0.9, indicating that the reliability quality of the research data is high, and it can objectively and comprehensively evaluate the high-quality development level of the modern service industry under the background of reduction development.

Table 2. Cronbach reliability analysis results.

Analysis Item	Number of Indicators	Sample Size	Cronbach Reliability Coefficient
Evaluation index of the high-quality development of the modern service industry	27	14	0.921

6.3. Weight Calculation Results

The weight coefficient of each index was calculated by using the entropy weight method formula. The weight calculation results of the primary, secondary and tertiary indexes are shown in Table 3. The higher the weight of an indicator, the greater the impact on the high-quality development of Beijing's modern service industry. Among the primary indicators affecting the quality development of Beijing's modern service industry, the capital's function and economic quality have a higher weight. Although the results were affected by the number of indicators, to a certain extent, they can also show that the development of these two aspects has a relatively significant impact on the high-quality development level of Beijing's modern service industry. Specifically, the permanent population density, the development of cultural enterprises, the vitality of innovation subjects, and the air environment have relatively high weight coefficients, which have become the key factors affecting the high-quality development of Beijing's modern service industry. In order to realize the rapid and stable growth of the high-quality development of the modern service industry, we must comprehensively promote reform and improvement in these aspects.

Table 3. Weight calculation results by the entropy method.

Primary Indicator	Secondary Index	Tertiary Indicator	Information Entropy e	Information Utility Value d	Weight Coefficient w
The total scale control (17.46%)	Population size (14.21%)	Permanent population density	0.7163	0.2837	9.70%
		Employed population of the modern service industry	0.8681	0.1319	4.51%
	Land scale (3.25%)	Construction land area	0.9051	0.0949	3.25%
The strengthening of the urban function (42.32%)	Scientific and technological innovation function (14.54%)	Investment intensity of R&D personnel	0.8863	0.1137	3.89%
		Investment intensity of R&D funds	0.8901	0.1099	3.76%
		Economic benefits of innovation	0.9471	0.0529	1.81%
		Vitality of innovation subject	0.8516	0.1484	5.08%
	Cultural development function (15.95%)	Cultural industry development	0.9424	0.0576	1.97%
		Cultural enterprise	0.7406	0.2594	8.87%
		Literary and artistic activity development	0.9595	0.0405	1.39%
		Film and television industry development	0.8911	0.1089	3.72%
	International communication function (11.83%)	Dependence on foreign trade	0.8973	0.1027	3.51%
		Dependence on foreign capital	0.8999	0.1001	3.42%
		International popularity	0.9180	0.0820	2.81%
		Market attractiveness	0.9389	0.0611	2.09%

Table 3. Cont.

Primary Indicator	Secondary Index	Tertiary Indicator	Information Entropy e	Information Utility Value d	Weight Coefficient w
The improvement in economic quality (20.29%)	Economic growth (7.29%)	Economic contribution rate	0.8920	0.1080	3.69%
		Income distribution level	0.8947	0.1053	3.60%
	Industrial structure (6.84%)	Rationalization level of industrial structure	0.9239	0.0761	2.60%
		Advanced level of industrial structure	0.8760	0.1240	4.24%
	Factor efficiency (6.16%)	Production efficiency of the modern service industry	0.9034	0.0966	3.30%
		Unit energy consumption of the modern service industry	0.9164	0.0836	2.86%
The optimization of the livable environment (19.91%)	Ecological environment (10.71%)	Urban greening level	0.9399	0.0601	2.06%
		Air environment	0.8438	0.1562	5.35%
		Sewage treatment level	0.9034	0.0966	3.30%
	Public service (9.20%)	Medical and health level	0.8737	0.1263	4.32%
		Education investment level	0.9400	0.0600	2.05%
		Traffic level	0.9171	0.0829	2.83%

6.4. Analysis of the High Quality Development Level of Modern Service Industry

Using the obtained weight coefficient, the evaluation matrix was constructed according to Formula (10), and the positive and negative ideal solutions were determined by Formulas (11) and (12). By using Formulas (13) and (14), respectively, we calculated the distance D^+ between each evaluation index and the positive ideal solution, and the distance D^- between each evaluation index and the negative ideal solution. Then, we used Formula (15) to calculate the relative proximity C and sort it. The results are shown in Table 4 and Figure 1. The results show that from 2008 to 2021, the high-quality development level of Beijing's modern service industry increased from 0.403 to 0.612, showing a good upward trend. From 2008 to 2011, the high-quality development level of Beijing's modern service industry declined. The reason for this phenomenon is related to the financial crisis in 2008 and the emphasis on economic growth rate in development. At the same time, it is contrary to the characteristics of this index system that integrates the reduction of development and strengthening the function of the capital. Since the implementation of the Beijing urban master plan (2016–2035), the growth rate of the high-quality development level of Beijing's modern service industry has increased significantly, especially from 2016 to 2017. This shows that Beijing's modern service industry is constantly improving its efforts to practice the concept of reduction development and new development. The high-quality development of the modern service industry has achieved remarkable results.

The level values and trends of each dimension of the high-quality development of Beijing's modern service industry from 2008 to 2021 are shown in Table 5 and Figure 2.

From the above results, we can see the implementation of total quantity scale control in Beijing. In 2008, the number of permanent residents, the number of employees in the modern service industry and the area of construction land in Beijing were relatively small, so the level of total scale control was relatively high.

With the continuous development of Beijing's economy and the growth of its population, the size of the city has gradually expanded. For a long time, Beijing's rapid growth has also brought about a series of problems, such as the deterioration of the urban environment, the imbalance of urban functional structure and the disorderly expansion of urban space. Beijing has begun to strengthen its regulation and control. Therefore, the total scale control

level has shown an upward trend since 2014. Specifically, as shown in Figure 3, despite the decline in the density of permanent residents after the implementation of the reduction development policy, the employed population of the modern service industry still shows an upward trend, which shows that Beijing has made remarkable achievements in the development scale and industrial structure division of the modern service industry. The ability of the modern service industry to absorb employment is gradually increasing and has gradually become the main pillar of the city's employment and an important means of "stabilizing employment".

Table 4. High-quality development level of Beijing modern service industry from 2008 to 2021.

Year	Distance of Positive Ideal Solution D ⁺	Distance of Negative Ideal Solution D [−]	Relative Proximity C	Sort Results
2008	0.169	0.114	0.403	6
2009	0.174	0.089	0.339	9
2010	0.179	0.071	0.285	11
2011	0.175	0.061	0.258	14
2012	0.170	0.060	0.261	13
2013	0.171	0.062	0.266	12
2014	0.167	0.067	0.286	10
2015	0.160	0.082	0.339	8
2016	0.155	0.095	0.379	7
2017	0.144	0.115	0.444	5
2018	0.131	0.122	0.482	4
2019	0.114	0.152	0.572	3
2020	0.113	0.168	0.597	2
2021	0.112	0.176	0.612	1

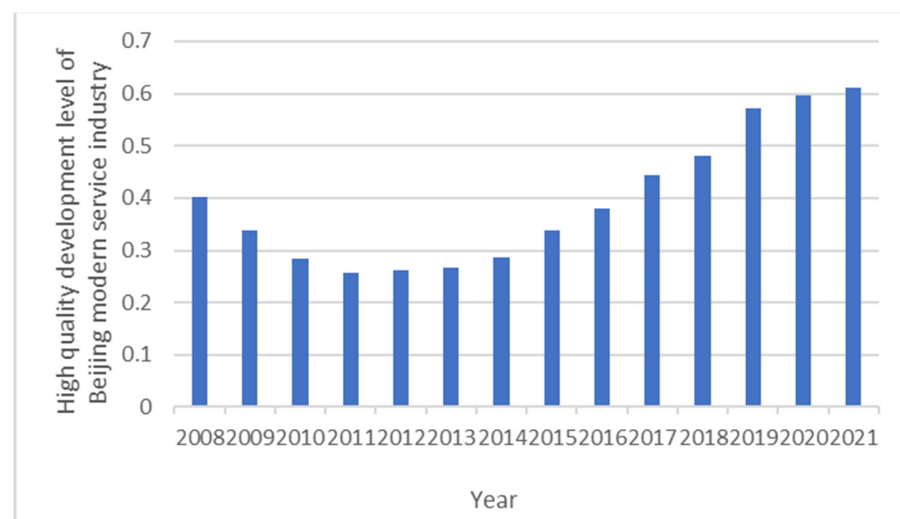


Figure 1. High-quality development levels of Beijing's modern service industry from 2008 to 2021.

Under the background of reduction development, the high-quality development level of Beijing's modern service industry has the best development benefit in strengthening urban functions. Before the implementation of Beijing's urban master plan in 2016, the development trend of the modern service industry in terms of scientific and technological innovation, culture and open exchanges was basically stable. After 2016, the high-quality development level of Beijing's modern service industry increased sharply and entered a rapid growth stage of high-quality development. From the perspective of expansion, the functions of scientific and technological innovation, cultural development and international exchange show different development trends, as shown in Figure 4. Before 2009, the level of scientific and technological innovation showed a downward trend. Al-

though it later showed an increasing trend, the growth rate has been slow. Until 2016, the country has implemented the innovation-driven development strategy of “three steps”. Beijing actively takes three cities and one district (i.e., Zhongguancun Science City, Huairou Science City, a future science city and the Beijing Economic and Technological Development Zone) as the main platforms to optimize the layout of scientific and technological innovation and promote the innovative development and high-end development of the modern service industry. Therefore, the level of scientific and technological innovation has made a breakthrough after 2017. The overall level of cultural development has shown an upward trend. From 2008 to 2017, the growth rate of cultural development level was slow and continued at a low level. Since then, by strengthening the construction of the cultural function, improving the added value of the cultural industry and encouraging the development of cultural enterprises, the level of cultural development has increased rapidly after 2017. From 2008 to 2021, the overall opening up level showed a fluctuating downward trend. On the one hand, the modern service industry is facing negative external impact. On the other hand, from the original data, the total import and export volume of the service trade, the actual use of foreign direct investment in the modern service industry and other original data indicators show an upward trend year by year. However, due to the large value-added base and fast growth rate of the modern service industry, the openness of Beijing’s modern service industry has a certain degree of lag, which means that Beijing still needs to continue to strengthen its opening up and adjust with the times.

Table 5. Levels of various dimensions of the high-quality development of Beijing’s modern service industry from 2008 to 2021.

Year	The Total Scale Control	The Strengthening of the Urban Function	The Improvement in Economic Quality	The Optimization of the Livable Environment
2008	0.647	0.341	0.027	0.164
2009	0.592	0.254	0.064	0.144
2010	0.438	0.276	0.087	0.096
2011	0.333	0.263	0.180	0.149
2012	0.259	0.271	0.270	0.217
2013	0.192	0.257	0.374	0.290
2014	0.192	0.264	0.446	0.322
2015	0.240	0.280	0.584	0.420
2016	0.291	0.292	0.647	0.525
2017	0.309	0.376	0.723	0.684
2018	0.310	0.446	0.800	0.697
2019	0.366	0.619	0.859	0.845
2020	0.343	0.652	0.935	0.925
2021	0.351	0.691	0.858	0.920

Under the background of reduction development, the economic quality of Beijing’s modern service industry is generally stable, maintaining a healthy development trend and gradually enhancing its pulling effect on the city’s economic development. From the perspective of disassembly, economic growth, industrial structure and factor efficiency have maintained a steady upward trend. This shows that in the Beijing region, the economic benefits and industrial structure of the modern service industry are relatively good, and the production efficiency and unit energy consumption are developing well. With the high-quality development of the modern service industry and the more scientific urban master plan of Beijing, this indicator is expected to maintain steady improvement in the future.

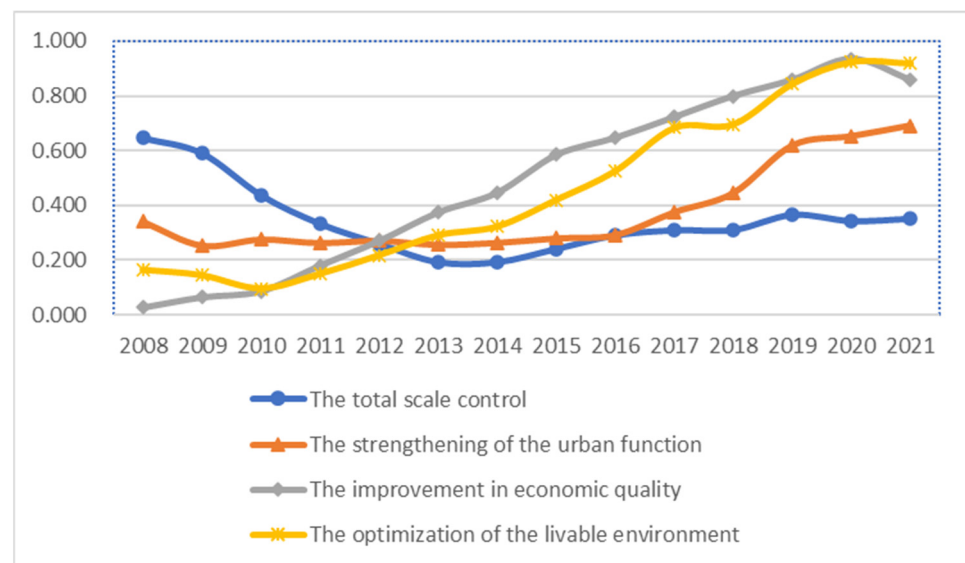


Figure 2. Various dimensions of the high-quality development of Beijing's modern service industry from 2008 to 2021.

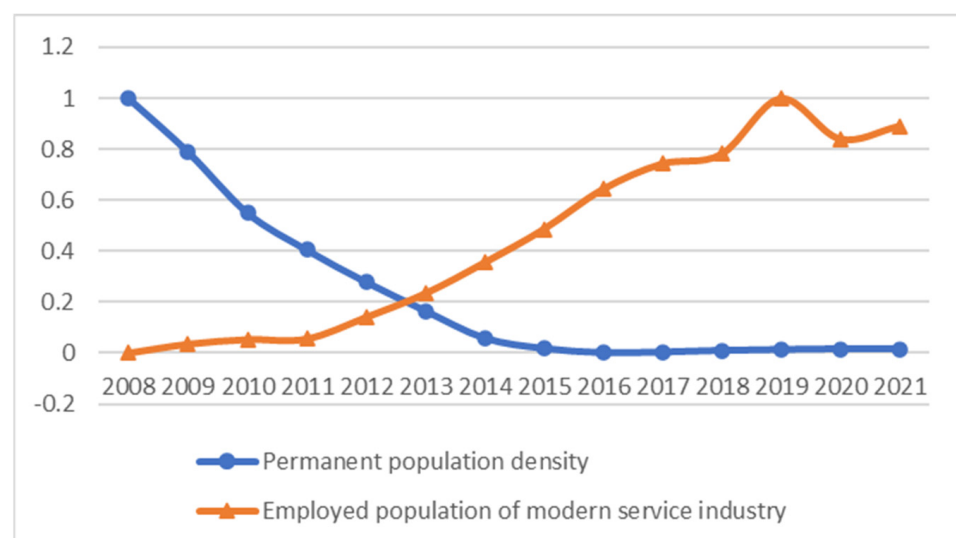


Figure 3. Density levels of the population employed in the modern service industry and the resident population.

Under the background of reduction development, Beijing's modern service industry is generally stable and positive in terms of livable environment optimization, and the construction of ecological civilization has been solidly promoted. Before 2016, Beijing's modern service industry showed a fluctuating upward trend in terms of ecological environment optimization and public service construction. Since the implementation of the reduction development policy, there has been a rapid growth trend, and then it has tended to be stable and improved. This rapid growth trend means that green development has produced remarkable results, and more high-quality development achievements of modern service industry benefit all people. This is closely related to Beijing's efforts to ease high-energy consumption and high-emission enterprises, improve urban greening coverage, take serving the people as the starting point and foothold of its work, and continuously improve the service supply and service quality of modern service industry.

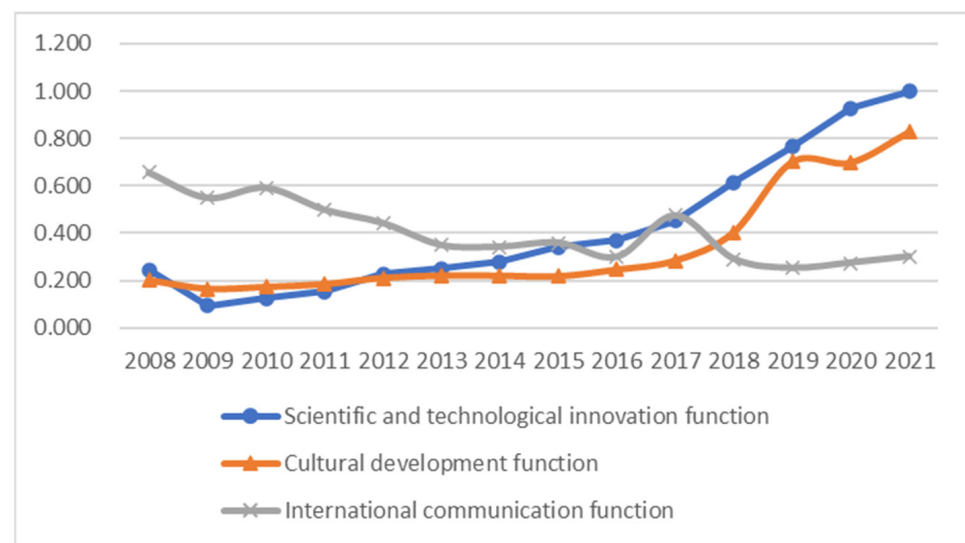


Figure 4. Level values of the scientific and technological innovation function, cultural development function and international communication function of the modern service industry.

7. Discussion

7.1. Main Conclusions

This paper constructed an evaluation index system for the high-quality development of Beijing's modern service industry under the background of reduction development from four dimensions: total scale control, strengthening of capital functions, improvement in economic quality and optimization of the livable environment. We propose an evaluation model for the high-quality development of Beijing's modern service industry based on the entropy weight TOPSIS method. The results show that the high-quality development level of Beijing's modern service industry from 2008 to 2021 is on an upward trend. After the implementation of reduction development, the total scale has been controlled and the population density has decreased, but the modern service industry still shows good employment absorption capacity. The functions of the capital have been strengthened, especially in science and technology and culture, but there is still room for improvement in terms of openness. Both the economic quality and the living environment are stable and improving.

7.2. Recommendations for Countermeasures

Based on the above research, the following countermeasures and suggestions are proposed for the high-quality development of Beijing's modern service industry.

First, vigorously promote the development of scientific and technological innovation in the modern service industry. Accelerate the promotion of ten advanced and sophisticated industries, including new generation information technology, integrated circuits and artificial intelligence. Beijing should put forward improvement plans for the problems of high housing prices and the high cost of living in Beijing and encourage the introduction of high-end talents. Increase innovation investment in the research and development of core technologies. At the same time, improve the transformation system of scientific and technological achievements, establish and improve the market-oriented allocation mechanism of technological elements. Through these methods, we can provide scientific and technological support for the high-quality development of the modern service industry.

Second, focus on improving the sharing level of the modern service industry. Accelerate the industrialization of elderly care services and promote the integrated development of home-based, community and institutional elderly care in many ways. Promote the "Internet plus" medical service to realize the intelligent service of health management based on the family. Optimize the supply of multi-level education services.

Strengthen efforts to standardize the management of studying abroad. Encourage the cooperation between vocational colleges and well-known enterprises to improve the quality of vocational education. Standardize the development of various forms of infant care institutions.

Third, accelerate the opening up of the modern service industry. Introduce advanced management concepts and technologies from the foreign modern service industry. Increase the proportion of foreign investment in modern service industries. Improve the developmental quality of the modern service industry and adhere to the guidance of specialization, branding and internationalization. At the same time, improve the institutional system in line with international trade rules and strive to form a number of international standards in emerging fields such as the digital economy, financial technology, etc.

Fourth, steadily promote the coordinated and green development of the modern service industry. In terms of coordinated development, continue to improve policies related to urban–rural coordination and industrial coordination. Through complementary advantages and resource sharing, we should vigorously develop the county economy and rural modern service industry and promote the employment of the rural labor force nearby. In terms of green development, continue to take more effective measures to continuously promote the prevention and control of air pollution, water resource management, soil management, waste classification and other work and further improve the quality of the capital's ecological environment.

7.3. Implications

The following describes the importance of this study and its implications:

With the transformation and upgrade of the global economy, the modern service industry has become a key force to promoting economic growth. However, how to realize the high-quality development of the modern service industry under the background of limited resources and increasing environmental pressure is an urgent problem to be solved. Based on this background, this study provides theoretical support and practical guidance for the high-quality development of the modern service industry by constructing a scientific evaluation system. This is not only helpful to enhance the overall competitiveness of the modern service industry, but also of great significance to realize the sustainable development of the economy.

This study theoretically deepens the understanding of the high-quality development law of the modern service industry, especially under the emerging background of reduction development. Through empirical analysis, we verified the science and effectiveness of the evaluation system, which provides a new perspective and methodological expansion for the theoretical research of the modern service industry. Future research can explore the high-quality development path of the modern service industry in different regions and industries, so as to enrich and improve the relevant theoretical system.

This study has guiding significance for practice. Taking Beijing as an example, the empirical analysis not only revealed the current situation of the high-quality development of the modern service industry in Beijing, but also provides a reference for other cities. Other cities can combine their own reality and refer to the evaluation system of this study to promote the high-quality development of the modern service industry.

The findings of this study have important reference value for the government to formulate the development policy of the modern service industry. According to the evaluation system of this study, the government can make a comprehensive and objective evaluation of the development of the modern service industry, so as to formulate more scientific and reasonable policies.

7.4. Limitations

This study was mainly limited by the following aspects when discussing the evaluation of the high-quality development of the modern service industry under the background of reduction development. First, were data restrictions. We mainly analyzed the data

of the modern service industry in Beijing. However, due to the limitations of the data availability and time span, the research may not have fully revealed the long-term trends and subtle differences in the modern service industry under the background of reduction development. In addition, the lack of some data may have also affected the accuracy of the research results. Second, were the limitations of the research scope. Although Beijing is representative as a case study, its uniqueness and geographical characteristics may limit the universal applicability of the research findings. Other cities or regions may face different challenges and opportunities in the process of promoting the reduction development and the high-quality development of their modern service industry, which needs further research. Third, although we strove to be comprehensive and objective, it was still possible that we ignored some important indicators or factors that were difficult to quantify when constructing the evaluation index system for the high-quality development of the modern service industry. Finally, the entropy weight TOPSIS method shows limitations when dealing with qualitative or non-numerical problems. This is mainly because the method is essentially a data-driven decision analysis method, which relies on numerical data to calculate the weight of each attribute and the score of the sample. When faced with qualitative or non-digital standards, such as a text description, rating or expert opinions, data conversion or quantitative processing is required, which will face challenges in data conversion, information loss, weight determination and data quality. In addition, in the entropy weight TOPSIS method, each evaluation index is regarded as independent factors, which simplifies the calculation process and makes the results easy to explain. However, this assumption may not be consistent with the complexity of the real world. In the actual decision-making scenario, there are often complex interactions and dependencies between the standards, which are crucial for a comprehensive and accurate assessment. The entropy weight TOPSIS method fails to consider these relationships, so it may ignore the important links between the standards, resulting in deviation between the evaluation results and reality.

7.5. Future Studies

In the future, the high-quality development evaluation of the modern service industry can be studied from many aspects. First, with the abundance of data resources, researchers can further use big data and data mining technology to obtain detailed and comprehensive data, so as to more accurately evaluate the development effect of the modern service industry. Second, researchers can expand the research scope to more cities or regions, carrying out cross-regional comparative analyses to reveal the similarities and differences in the modern service industry under different regional backgrounds. Third, the evaluation index system should be constantly optimized and improved in order to more accurately reflect the multidimensional and dynamic development of the modern service industry. Fourth, the internal and external factors and their mechanisms that affect the high-quality development of the modern service industry can be further explored, so as to provide strong theoretical support for relevant policy-making. Fifth, for the challenge of qualitative or non-numeric criteria, future research can explore better decision analysis tools. Specifically, researchers can perform the following: (1) study and apply appropriate quantitative methods to scientifically convert qualitative data into digital forms; (2) combined with expert judgment, use expert knowledge to enhance the accuracy of qualitative data processing; (3) further explore the combination of fuzzy mathematics and existing methods to deal with uncertainty and fuzziness; (4) develop hybrid methods and integrate the advantages of multiple decision analysis technologies; (5) add data validation steps to ensure the quality of converted data; and (6) continue to optimize existing methods to improve the directness and accuracy of processing qualitative data. Through these explorations, a more flexible and accurate decision support system can be built to adapt to diverse data needs and analysis scenarios. Finally, in order to solve the problem that the entropy weight TOPSIS method ignores the interaction between indicators, future research can build an improved model considering the relevance of indicators. For example, network analysis, system dynamics or structural

equation modeling can be used to clearly describe the interaction between indicators and incorporate them into the evaluation framework of TOPSIS. This will help to improve the comprehensiveness and accuracy of the decision-making process and better reflect the complex decision-making scenarios in the real world.

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