

Research Article

Analysis of Rural Talent Scale in Hebei Province Based on Fractional GM (1,1) and the Grey Relational Analysis Model

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Talents are the key of rural revitalization. Under the background of Beijing-Tianjin-Hebei Coordinated Development, Hebei Province has always put talent revitalization at the core of rural revitalization. In order to promote the process of rural revitalization in Hebei Province, it is very important to understand the scale of rural talents. Firstly, the GM (1,1) model was used to predict the scale of rural talents in Hebei Province from 2020 to 2025. The prediction results showed that, in the rural development of Hebei Province in the next few years, the scale of production-oriented talents would gradually decline, while the scale of service-oriented, business-oriented, management-oriented, and skilled talents would show varying degrees of growth. Secondly, the grey relational analysis was used to analyze the importance of different factors for rural talents. Through the grey relational analysis, it was found that the infrastructure had the greatest impact on production-oriented talents, the agricultural industrialization operating rate had the strongest impact on service-oriented talents, and the urban-rural income level had the greatest impact on business-oriented talents, management-oriented talents, and skilled talents. Finally, according to the results of the GM (1,1) model and grey relational analysis, aiming at different types of rural talents, this paper puts forward countermeasures and suggestions from the aspects of strengthening rural infrastructure construction, improving rural medical and health conditions and improving income distribution pattern.

1. Introduction

Talent is the first step in rural revitalization. Rural talent revitalization is not only a talent problem in the general sense but also a strategic problem in China's modernization and development. Under the development mode dominated by urbanization and industrialization, the rural development mechanism is weakened, and a large number of rural surplus labor force choose to flow out, which makes the scale of urbanization continue to expand and the rural scale gradually shrink [1]. According to statistics, the proportion of rural population in the total population of Hebei Province decreased from 88.79% in 1978 to 77.14% in 2018. The number of new professional farmers in Hebei Province was 103600 in 2018, accounting for only 0.315% of the total rural population [2].

Hebei Province is a big province of agriculture and human resources. Under the background of the Beijing-

Tianjin-Hebei Coordinated Development strategy, it is necessary to study the scale of rural talent development and the influencing factors of talent development in Hebei Province. Talent as a resource of "special assets" is an indispensable and important factor in economic development [3].

Through the research on the scale of rural talents in Hebei Province, we can enrich the theoretical research on rural talents revitalization under the background of rural revitalization, provide theoretical reference for party and government departments at all levels to formulate rural talents training and introduction strategies, and provide theoretical basis for the construction of rural talents in other regions of China.

In previous studies, most of them took rural human resources and rural labor force as the research objects. Under the background of rural revitalization, the research on the scale of rural talents needs to be expanded. This study

classifies rural talents and then studies their scale, which can more comprehensively cover all types of rural talents, and puts forward more targeted countermeasures and suggestions.

2. Journals Reviewed

Talents are the key of rural revitalization, “human” development is the basic problem of rural revitalization [4], and human resource development practice can enhance people’s ability, skills, and knowledge [5]. The lag of talent team construction is the key factor restricting rural revitalization [6]. Without talents as the first factor, rural revitalization is impossible. If we cannot attract and retain talents and effectively play the initiative of all kinds of rural talents, rural revitalization will not be realized. Haq believed that human resources played an important role in promoting rural economic development in Pakistan [7]. Mihai and Dona pointed that human resource structure was the most important factor of production to achieve economic growth [8]. Effective development of rural human resources could promote the development of the rural economy, thereby promoting the optimization and upgrading of social structure [9]. Stimulating the internal power of rural talents is an important force to promote rural revitalization. Only by grasping the “bull nose” of talent revitalization and giving full play to the “multiplier effect” of talents, can we truly cultivate new business forms of rural industry and enhance the development power of rural revitalization [10, 11]. Sun et al. believed that strengthening the construction of rural talent teams was of great significance to enhancing the cohesion of rural grassroots teams [12].

Academic circles have not reached a consensus on the definition and classification standard of rural talents, and foreign scholars mostly use “human resources” or “human capital” to define talents [13]. Bernal and Mantilla believed that the formation of human capital includes three necessary conditions: training, experience, and organizational culture [14]. Zhang and Zhang called those who lived and worked in rural areas for a long time and engage in production, management, culture, education, technology, and other activities rural talents [15]. Han and Gi believed that rural talents were the “pillar” of rural revitalization, including rural management talents, new-type professional farmers, professional talents, and local talents [16]. Combined with scholars’ point of view, this paper defines rural talents as those who are active in rural areas, can carry out creative work with their own skills, and play a role in promoting rural economic development. The number of talents needed in a region will eventually be reflected in employment, and the number of employed people needed for each industry development is the number of talents needed in this field [17]. Referring to the scholars’ classification standards of rural human resource, according to the work nature of rural employees in the three industries, rural talents are divided into five types, production-oriented talents, service-oriented talents, business-oriented talents, management-oriented talents, and skilled talents. Among them, production-oriented talents refer to those engaged in agriculture, forestry,

animal husbandry, fishery, and other industries. Service-oriented talents refer to those engaged in leasing services, resident services, and other industries. Business-oriented talents refer to those engaged in wholesale and retail, catering, and other industries. Management-oriented talents refer to those engaged in water conservancy, environment, and public facilities management. Skilled talents refer to those engaged in science and technology research and development, technical training, and software development.

In terms of the talent prediction method, Yan and Shang used the Markov model to predict the supply of human resources in Liaoning coastal economic belt from 2012 to 2020 and concluded that the supply of human resources in this region would exceed the demand [18]. Wang and Liu predicted the human resource demand of a power company through the grey BP neural network model and found that the human resource demand of company a would gradually increase [19]. Liu and Liu used the queue element method to predict China’s population size from 2018 to 2100, and the results showed that the complete two child policy would increase the peak population by about 1.55% [20]. Jiang and Yang used regression analysis to predict knowledge innovation talents and found that most of the high-level talents in the next decade would come from universities [21]. Yun and Xue used GM (1,1) model to predict the number of health workers in Inner Mongolia and found that the number of health workers in Inner Mongolia would increase from 2019 to 2022, but the imbalance of the proportion of health workers between urban and rural areas needs to be improved [22]. Markov model, grey BP neural network model, queue element method, regression analysis method, and grey prediction model can be used for prediction, but different prediction methods have their own scope of application. The calculation of matrix in Markov model is more complex, which is mostly used by professionals. The grey BP neural network model has higher requirements for parameters, which is difficult to obtain the optimal solution. In order to get the optimal solution, the queue factor method needs to understand the cause and nature of the problem, and regression analysis is more suitable for the analysis of linear relationship and the prediction of talent scale is mostly nonlinear, which affects the accuracy of the prediction results [23]. The GM (1,1) model is to analyze and predict the development law of things through a small amount of irregular original data. It is easy to operate, and the prediction results are more accurate.

3. Data Sources and Research Methods

3.1. Data Sources. In this paper, the data from the “Hebei Rural Statistical Yearbook” compiled by the general office of Hebei Provincial People’s government and Hebei Provincial Bureau of statistics from 2011 to 2020.

3.2. Research Methods. As the number of rural talents is affected by many factors, its connotation and denotation are not easy to define, and there is a nonlinear relationship between them. In the case of uncertain influencing factors of

rural talents and incomplete original data information, the data show grey characteristics [24, 25]. The GM (1,1) model is to find out its inherent laws by establishing the grey differential equation in the “poor information” and “irregular” system and predict the development law of things. Therefore, using the GM (1,1) model to predict the scale of rural talents in Hebei Province from 2020 to 2025 can reduce the adverse impact of uncertain factors on the prediction results [26]. At the same time, the grey relational analysis principle is used to analyze the influencing factors of the scale of rural talents. The correlation degree reflects the closeness between the influencing factors and rural talents. That is, the greater the correlation degree is, the closer the relationship between the factors and rural talents is, and the more important the influence is. On the contrary, the relationship is not close, and the influence is weak [24].

3.2.1. Calculation Method and Formula of the GM (1,1) Model. (i) Set the original time series to

$$X^{(0)}(k) = (x^{(0)}(1), x^{(0)}(2), \dots, x^{(0)}(k)), \quad k = 1, 2, 3, \dots, n. \tag{1}$$

(ii) The feasibility of the model was judged by the grade ratio test:

$$\delta(k) = \frac{x^{(0)}(k-1)}{x^{(0)}(k)} \in (e^{-2/n+1}, e^{2/n+1}). \tag{2}$$

(iii) Modeling: a new sequence is obtained by accumulating the original sequence:

$$X^{(1)}(k) = (x^{(1)}(1), x^{(1)}(2), \dots, x^{(1)}(k)), \quad k = 1, 2, 3, \dots, n. \tag{3}$$

The weighted average of adjacent values of equation (3) is obtained:

$$Z^{(1)}(k) = (z^{(1)}(2), z^{(1)}(3), \dots, z^{(1)}(k)), \quad k = 1, 2, 3, \dots, n, \tag{4}$$

$$z^{(1)}(k) = \frac{1}{2}(X^{(1)}(k+1) + X^{(1)}(k)). \tag{5}$$

The whitening equation is established and the matrix is constructed:

$$\frac{dx^{(1)}}{dt} + ax^{(1)} = u, \tag{6}$$

$$B = \begin{pmatrix} -z^{(1)}(2) & 1 \\ -z^{(1)}(3) & 1 \\ \vdots & \vdots \\ -z^{(1)}(k) & 1 \end{pmatrix}, \tag{7}$$

$$Y = \begin{pmatrix} x^{(0)}(2) \\ x^{(0)}(3) \\ \vdots \\ x^{(0)}(k) \end{pmatrix}.$$

The least square method is used to find the parameter sequence:

$$P = (a, u)^T = (B^T B)^{-1} B^T Y, \text{ parameter } a, u. \tag{8}$$

The GM (1,1) model can be obtained by establishing the time response function and solving the differential equation:

$$\hat{x}^{(1)}(k+1) = \left(x^{(0)}(1) - \frac{u}{a}\right)e^{-ak} + \frac{u}{a}, \quad k = 1, 2, 3, \dots, n. \tag{9}$$

Restore value is

$$\hat{x}^{(0)}(k+1) = x^{(1)}(k) - x^{(1)}(k-1) = (1 - e^a)\left(x^{(0)}(1) - \frac{u}{a}\right)e^{-ak}. \tag{10}$$

3.2.2. The Calculation Method and Formula of Grey Relational Analysis

(i) Determine the reference sequence and comparison sequence $X_i(k)$.

(ii) Each sequence is dimensionless

$$x_i(k) = \frac{X_i(k)}{X_i(1)}, \quad i = 1, 2, \dots, 12. \tag{11}$$

(iii) Find the correlation coefficient

$$\varepsilon_i(k) = \frac{\min_k \min_i |x_0(k) - x_i(k)| + \rho \max_k \max_i |x_0(k) - x_i(k)|}{|x_0(k) - x_i(k)| + \rho \max_k \max_i |x_0(k) - x_i(k)|}, \tag{12}$$

where $\rho = 0.5$ is called resolution coefficient.

(iv) Find the degree of correlation

$$r_i(k) = \frac{1}{n} \sum \varepsilon_i(k). \tag{13}$$

4. Prediction of Rural Talent Scale in Hebei Province

The sample length of rural talent demand data in Hebei Province is set to 10. According to the data of Hebei Rural

Statistical Yearbook from 2011 to 2020, all kinds of talent data are calculated. The number of rural talents in Hebei Province from 2010 to 2019 is used to form the original sequence.

$$X^{(0)}(k) = (x^{(0)}(1), x^{(0)}(2), \dots, x^{(0)}(10)), \quad k = 1, 2, 3, \dots, 10. \quad (14)$$

Taking the data of skilled talents as an example, the GM (1,1) model is constructed, and the calculation method of other types of talents is the same.

4.1. Prediction Results and Accuracy Test of the GM (1,1) Model from 2010 to 2019. This paper tests the original number series of skilled talents from 2010 to 2019, showing that $\delta(k) = \{0.97, 0.97, 0.95, 0.98, 0.97, 0.98, 0.97, 0.99, 0.99\} \in (0.83, 1.20)$. It meets the modeling conditions of the grey prediction model. According to the calculation steps of GM (1,1) model, the GM (1,1) model is established. The time response function of skilled talents in rural talent scale of Hebei Province is as follows.

$$\hat{x}^{(1)}(k+1) = 2389.445e^{0.024k} - 2333.03. \quad (15)$$

The reduction value of skilled talents in rural talent scale of Hebei Province is as follows:

$$\hat{x}^{(0)}(k+1) = 57.611e^{0.024k}. \quad (16)$$

Using the actual value of skilled talents from 2010 to 2019 to test the model, the results show that the average relative error of skilled talents is 0.95%, the accuracy of the model is 99.05%, and the small error probability is 1.00, indicating that the prediction result is excellent. Similarly, using the same method to predict other types of talents, the development coefficients α of production-oriented talents, service-oriented talents, business-oriented talents, management-oriented talents, and skilled talents are 0.0083, -0.0060 , -0.0235 , -0.0095 , and -0.0244 , respectively. When $-\alpha \leq 0.3$, medium and long-term prediction can be made. It can be seen from the above results that all kinds of talent prediction models can carry out medium and long-term prediction. The actual and predicted values of all kinds of rural talents from 2010 to 2019 are shown in Tables 1 and 2.

According to the prediction results, the accuracy test is carried out, as shown in Table 3.

It can be seen from Table 3 that the accuracy of all kinds of talent models is greater than 95%, and the small error probability is greater than 0.8. According to the model accuracy evaluation standard and the precision grade table of posterior error test, the model has good accuracy and can be used for prediction.

4.2. Forecast of Rural Talent Scale in Hebei Province from 2020 to 2025. The scale of rural talents in Hebei Province in 2020–2025 is predicted by using the GM (1,1) model. The forecast results are shown in Table 4.

It can be seen from Table 4 that the scale of production-oriented talents is decreasing year by year from 13.25 million

in 2020 to 12.71 million in 2025. The service-oriented, business-oriented, management-oriented, and skilled talents all show varying degrees of growth trends. Among them, the growth rate of service-oriented talents and management-oriented talents are gentle, with an average annual growth rate of 0.60% and 0.95%, respectively. The business-oriented and skilled talents are obvious, with an average annual growth rate of 2.38% and 2.47%, respectively.

5. Analysis of the Influencing Factors of Rural Talents Scale in Hebei Province

5.1. Index Selection. Wu found that the scale of human resources was related to the level of rural economic development, traffic conditions, health care level, and rural policy system [27]. Michael et al. believed that the level of rural infrastructure, living environment constraints, and urban-rural income gap would affect the development choice of rural talents [28]. Arowolo et al. found that education level, financing difficulty, income level, salary, and career development potential were closely related to the scale of rural talents [29]. Latif et al., Pham et al., and Yue et al. pointed out that education, health, rural electrification, infrastructure construction, and other factors would affect the scale of rural talents [30–32]. Zeng and Li used the logistic analysis method to analyze Western Chongqing and found that rural work attraction includes psychology, organizational behavior, management, economics, and other fields. Infrastructure, working environment, family environment, and quality of life were important factors to measure the scale of rural talents [33].

Drawing on the analysis of scholars on the influencing factors of rural talent development, this paper summarizes the influencing factors of rural talent development in Hebei Province into six factors, economy, environment, education, government, medical care, and policy. The expression, name, and meaning of each index are shown in Table 5.

5.2. Result Analysis. According to the data of Hebei Rural Statistical Yearbook from 2011 to 2020, this paper sorts out the original data of each influencing factor, uses the grey relational analysis method, takes the number of all kinds of talents from 2010 to 2019 as the reference sequence, and takes the above six influencing factors as the comparison sequence for grey relational analysis, so as to explore the influence degree of each factor on the development of rural talents, taking the correlation degree between production-oriented talents and various influencing factors as an example to calculate.

In order to eliminate the influence of dimension, the initial value processing is carried out to make the data of production-oriented talents comparable with the influencing factors. Then, the correlation coefficient between the data of production-oriented talents and the influencing factors is calculated. Finally, the importance of the influencing factors to the development of production-oriented talents is judged according to the correlation degree. The calculation process is as follows.

TABLE 1: The actual value of rural talent in Hebei from 2010–2019. Unit: 10000 person.

Year	Production-oriented talents	Service-oriented talents	Business-oriented talents	Management-oriented talents	Skilled talents
2010	1458.33	871.68	248.91	206.71	56.41
2011	1433.17	898.08	259.52	216.37	58.20
2012	1419.85	919.13	264.39	221.73	59.77
2013	1397.22	926.57	290.13	219.98	62.77
2014	1389.29	940.85	296.78	222.61	63.88
2015	1371.37	951.04	302.83	229.49	65.59
2016	1369.28	959.57	308.58	233.13	67.02
2017	1354.71	963.31	311.98	233.13	69.12
2018	1354.33	928.34	310.71	225.28	70.05
2019	1338.01	953.14	317.21	236.83	70.58

TABLE 2: The predicted value of rural talent in Hebei from 2010–2019. Unit: 10000 person.

Year	Production-oriented talents	Service-oriented talents	Business-oriented talents	Management-oriented talents	Skilled talents
2010	1458.33	871.68	248.91	206.71	56.41
2011	1426.83	915.49	268.77	218.01	59.03
2012	1415.10	920.99	275.16	220.09	60.49
2013	1403.47	926.51	281.70	222.18	61.99
2014	1391.93	932.07	288.40	224.30	63.52
2015	1380.48	937.67	295.26	226.44	65.09
2016	1369.13	943.30	302.28	228.59	66.70
2017	1357.87	948.96	309.47	230.77	68.34
2018	1346.71	954.65	316.83	232.97	70.03
2019	1335.63	960.38	324.36	235.19	71.76

TABLE 3: GM (1,1) model accuracy test.

	Average relative error $(1/n - 1)\epsilon(\text{avg}) \sum_{k=2}^n \epsilon(k) $	Model accuracy, P^0 (%)	Posterior error, C	Small error probability, P
Production-oriented talents	0.0034	99.66	0.14	1.00
Service-oriented talents	0.0125	98.75	0.48	0.90
Business-oriented talents	0.0255	97.45	0.31	1.00
Management-oriented talents	0.0129	98.71	0.39	0.90
Skilled talents	0.0095	99.05	0.14	1.00

TABLE 4: Forecast value of rural talents in Hebei Province from 2020 to 2025. Unit: 10000 person.

Year	Production-oriented talents	Service-oriented talents	Business-oriented talents	Management-oriented talents	Skilled talents
2020	1324.65	966.15	332.07	237.43	73.54
2021	1313.76	971.95	339.97	239.69	75.35
2022	1302.96	977.78	348.05	241.97	77.22
2023	1292.24	983.65	356.33	244.28	79.12
2024	1281.62	989.55	364.80	246.60	81.08
2025	1271.08	995.49	373.48	248.95	83.08

TABLE 5: Index selection of influencing factors of rural talent development.

Type	Expression	Index name and unit	Meaning
---	$X_1 \sim X_5$	Production-oriented, service-oriented, business-oriented, management-oriented, and skilled talents (10000 person)	People who promote the development of rural economy in Hebei Province
Economic factors	X_6	Agricultural industrialization operation rate (%)	Economic development level
	X_7	Per capita GDP of residents (yuan)	
	X_8	Wage income (yuan)	
Environmental factor	X_9	Per capita disposable income of rural residents (yuan)	Infrastructure investment
	X_{10}	Investment in power, network, and transportation (unit)	

TABLE 5: Continued.

Type	Expression	Index name and unit	Meaning
Educational factors	X_{11}	Number of rural primary and secondary schools (unit)	Education development level
	X_{12}	Number of full-time teachers in rural primary and secondary schools (10000 person)	
Government factors	X_{13}	Financial investment (10000 yuan)	Government investment level
Medical factors	X_{14}	Health technicians in township hospitals (person)	Medical and health conditions
Policy factors	X_{15}	Number of insured persons (10000 person)	Insurance policy

(i) Initialization

$$\begin{aligned}
 X'_1 &= (1.00, 0.98, 0.97, 0.96, 0.95, 0.94, 0.94, 0.93, 0.93, 0.92), \\
 X'_6 &= (1.00, 1.02, 1.05, 1.08, 1.10, 1.12, 1.10, 1.14, 1.12, 1.15), \\
 X'_7 &= (1.00, 1.08, 1.25, 1.32, 1.39, 1.38, 1.84, 1.55, 1.62, 1.64), \\
 X'_8 &= (1.00, 1.06, 1.11, 1.17, 1.28, 1.39, 1.51, 1.64, 1.77, 1.79), \\
 X'_9 &= (1.00, 1.00, 1.01, 1.04, 1.05, 1.07, 1.18, 1.30, 1.32, 1.35), \\
 X'_{10} &= (1.00, 1.00, 0.92, 0.93, 0.87, 0.90, 0.91, 0.92, 0.95, 0.96), \\
 X'_{11} &= (1.00, 0.77, 0.71, 0.69, 0.69, 0.66, 0.64, 0.61, 0.59, 0.58), \\
 X'_{12} &= (1.00, 0.74, 0.67, 0.67, 0.68, 0.67, 0.68, 0.68, 0.68, 0.68), \\
 X'_{13} &= (1.00, 0.42, 1.67, 1.49, 0.78, 0.63, 1.16, 0.55, 0.55, 0.56), \\
 X'_{14} &= (1.00, 1.02, 1.02, 1.02, 1.01, 1.02, 1.03, 1.05, 1.03, 1.06), \\
 X'_{15} &= (1.00, 1.19, 1.36, 1.54, 1.71, 1.85, 2.00, 2.16, 2.35, 2.58).
 \end{aligned}
 \tag{17}$$

(ii) To find the correlation coefficient

$$\begin{aligned}
 \min_k \min_i |x_0(k) - x_i(k)| &= 0, \\
 \max_k \max_i |x_0(k) - x_i(k)| &= 1.66, \\
 \varepsilon_{1,i}(k) &= \frac{\min_k \min_i |x_0(k) - x_i(k)| + \rho \max_k \max_i |x_0(k) - x_i(k)|}{|x_0(k) - x_i(k)| + \rho \max_k \max_i |x_0(k) - x_i(k)|},
 \end{aligned}
 \tag{18}$$

where $k = 1, 2, \dots, 10, i = 6, 7, \dots, 15, \rho = 0.5$.

$$\begin{aligned}
 \varepsilon_{1,6}(1) &= 1.00, \varepsilon_{1,6}(2) = 0.95, \varepsilon_{1,6}(3) = 0.92, \varepsilon_{1,6}(4) = 0.88, \\
 \varepsilon_{1,6}(5) &= 0.85, \varepsilon_{1,6}(6) = 0.82, \varepsilon_{1,6}(7) = 0.83, \varepsilon_{1,6}(8) = 0.80, \\
 \varepsilon_{1,6}(9) &= 0.81, \varepsilon_{1,6}(10) = 0.79, \\
 &\dots \\
 \varepsilon_{1,15}(1) &= 1.00, \varepsilon_{1,15}(2) = 0.80, \varepsilon_{1,15}(3) = 0.68, \varepsilon_{1,15}(4) = 0.59, \\
 \varepsilon_{1,15}(5) &= 0.52, \varepsilon_{1,15}(6) = 0.48, \varepsilon_{1,15}(7) = 0.44, \varepsilon_{1,15}(8) = 0.40, \\
 \varepsilon_{1,15}(9) &= 0.37, \varepsilon_{1,15}(10) = 0.33.
 \end{aligned}
 \tag{19}$$

(iii) Find the degree of correlation

TABLE 6: Grey relational analysis of rural talent development in Hebei Province.

Influence factor/types of talents	Production-oriented (X_1)	Service-oriented (X_2)	Business-oriented (X_3)	Management-oriented (X_4)	Skilled talents (X_5)
X_6	0.87	0.98	0.89	0.98	0.93
X_7	0.70	0.73	0.76	0.72	0.74
X_8	0.73	0.78	0.79	0.76	0.78
X_9	0.86	0.92	0.90	0.90	0.92
X_{10}	0.96	0.85	0.75	0.83	0.78
X_{11}	0.78	0.69	0.60	0.66	0.62
X_{12}	0.78	0.69	0.61	0.67	0.63
X_{13}	0.72	0.68	0.62	0.67	0.63
X_{14}	0.93	0.95	0.83	0.92	0.86
X_{15}	0.59	0.60	0.58	0.57	0.57

$$r_{1,i}(k) = \frac{1}{10} \sum \varepsilon_{1,i}(k),$$

$$r_{1,6}(k) = 0.87, r_{1,7}(k) = 0.70, r_{1,8}(k) = 0.73, r_{1,9}(k) = 0.86,$$

$$r_{1,10}(k) = 0.96, r_{1,11}(k) = 0.78, \gamma_{1,12}(k) = 0.78, \gamma_{1,13}(k) = 0.72,$$

$$\gamma_{1,14}(k) = 0.93, \gamma_{1,15}(k) = 0.59.$$

Similarly, according to the above method, the correlation between each type of talent and its influencing factors is calculated, and the results are shown in Table 6.

- (1) For production-oriented talents, infrastructure and medical and health conditions have the strongest impact on them, and the correlation degree is more than 0.90. The correlation among the operation rate of agricultural industrialization, per capita GDP, wage income, the comparison of urban and rural income levels, the number of primary and secondary schools, and the number of teachers and government investment is also relatively high, and the correlation degree is above 0.70. Economic factors will have an important impact on its scale. Productive talents are mainly engaged in agricultural production activities. The important factors to be considered are the backward development level of productive infrastructure, the guarantee of children’s education, and the sound medical and health conditions.
- (2) For service-oriented talents, agricultural industrialization operation rate, per capita GDP, wage income, comparison of urban and rural income levels, and infrastructure and health care are the main factors affecting the scale of service-oriented talents, and the correlation degree is more than 0.70. Among them, the correlation degree between agricultural industrialization operation rate and comparison of urban and rural income levels and health care is even more than 0.90. The purpose of service-oriented talents is to enable farmers to get satisfactory services. With the increase of agricultural industrialization operation rate, agricultural added value will also increase,

so as to improve farmers’ income, increase their satisfaction with production and life, and reduce the work pressure of service-oriented talents. Therefore, regional industrial development is an important factor for service-oriented talents, and its development level directly affects the scale of service-oriented talents.

- (3) For business-oriented talents, management-oriented talents and skilled talents, urban-rural income level, agricultural industrialization rate, and medical and health conditions ranked the top three, and the correlation degree is above 0.80. The income level directly affects the development scale of talents. The better the economic development, the higher the agricultural industrialization operation rate, the more confident the talents have in the development of the region, the larger the scale of the talents. In addition, the sound medical conditions can effectively guarantee the health rights and interest of people. With the development of economy and society, people’s demand for basic medical and health service level is also gradually improving. It is very important for rural talents to improve the medical and health conditions in rural areas and solve the problem of “difficult and expensive to see doctors.”
- (4) The impact of education development level, government investment, and insurance policy on all rural talents is generally the same, and the correlation degree is between 0.57 and 0.78. No matter what the nature of rural talents is, they will focus on the regional economic development level and educational ability when choosing a career.

6. Conclusion and Discussion

According to 2010–2019 rural talents and related data in Hebei Province, this study uses the GM (1,1) model to predict the scale of rural talents in Hebei Province from 2020 to 2025 and explores the main influencing factors of the scale and draws the following conclusions:

- (1) The overall scale of rural talents in Hebei Province shows an upward trend, but the scale of production-oriented talents is gradually declining, and the scale of service-oriented, business-oriented, management-oriented, and skilled talents is gradually expanding.
- (2) There is a close relationship between the level of economic development and the scale of rural talents. The income level of urban-rural areas has the greatest impact on the service-oriented talents, business-oriented talents, management-oriented talents, and skilled talents.
- (3) Infrastructure is an important factor to measure the scale of rural talents, and production-oriented talents are most strongly affected by water conservancy, transportation, and other infrastructure.
- (4) Medical and health conditions are one of the main concerns of rural talents, and the number of rural doctors and village health centers is the focus of production-oriented talents and service-oriented talents.
- (5) The level of education development and government investment have the strongest impact on production-oriented talents, and teachers are very necessary for rural development.
- (6) Insurance policy does not play a significant role in promoting the development of all kinds of talents. The scale of talents is weakly affected by insurance policies such as basic medical care and endowment insurance.

According to the research conclusions, the following policy recommendations are put forward.

All regions of Hebei Province should adapt measures to local conditions and create an environment conducive to the development of all kinds of talents:

- (1) For production-oriented talents, the first step is to increase policy support, optimize the agricultural and rural development environment, increase investment in irrigation and water conservancy projects, optimize irrigation and water-saving technology, increase the coverage of rural power grid, and accelerate the construction of rural roads. Secondly, strengthen the construction standards of rural public schools, improve the teaching conditions of teachers, increase the treatment of rural teachers, encourage graduates of normal universities to teach in rural areas, strengthen the exchange of urban-rural teachers, and constantly improve the quality of rural schools. Thirdly, we should strengthen the rural vocational skills training, guide the rural grassroots cadres and the broad masses of farmers to actively participate in the training, and cultivate a group of professional farmers with strong

comprehensive quality who understand agricultural production and are good at management.

- (2) For service-oriented talents, we should accelerate the improvement of urban-rural income level, accelerate the equalization of urban and rural public services, narrow the development gap between urban and rural areas, promote the rational flow of resource elements between urban and rural areas, improve the service-oriented talents' sense of identity with public basic services, improve rural medical and health conditions, and strengthen the management of rural medical practitioners. Strictly enforce the professional standards of rural doctors and increase the investment in rural social security.
- (3) For business-oriented, management-oriented and skilled talents, we should improve the pattern of income distribution, introduce policies to optimize the working environment of talents, provide guarantee for rural development from financial, cultural, resource and technical aspects, and create a good entrepreneurial environment. Let the excellent projects incline to the countryside, allow the farmers who settle down in the city to transfer their homestead and housing to the entrepreneurs, let the talents who are willing to start a business in the countryside start a business smoothly, and drive the development of more farmers.
- (4) Government investment should be inclined to rural areas and increase investment in rural economic development. Firstly, invest in high-quality development projects of modern agriculture and develop characteristic agricultural industrial parks and characteristic agricultural vegetable gardens to promote the development of rural characteristic industries. Secondly, invest in agricultural products processing projects to ensure the safety and efficiency of the whole process of agricultural products production, storage, and circulation. Thirdly, invest in the construction of training bases for rural talents, optimize the talent service environment, and provide technical guidance and service items to improve the quality of talent training.
- (5) Strengthen policy incentives and improve the development treatment of rural talents. Firstly, we should strengthen work guidance and life care, provide guarantee for rural talents, and reduce the anxiety about the development after the work expires. Secondly, reduce the threshold of entrepreneurship access in the rural market, simplify the relevant procedures such as project approval and financing guarantee, and reduce the cost of entrepreneurship as much as possible. The third is to plan the introduction standards of rural talents, allocate rural jobs, so that rural talents can give full play to their skills, establish an open, transparent, scientific, fair and pragmatic reward and punishment system, and make more talents realize that rural development is also promising.

Data Availability

All data are included within this paper. However, the reader may contact the corresponding author for more details of the data.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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