

During the "14th Five-Year Plan" Period, On Promoting the Construction of Ecological Hui Tea Under the Theory of Circular Economy and Helping Rural Revitalization

-- In-Depth Field Investigation and Analysis in Huoshan County

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Abstract: With the improvement of people's living standards and health requirements, green, healthy and high-quality beverages are people's highest requirements. Tea as a beverage requires ecological development in terms of planting, processing, packaging and sales. Combined with the emphasis on rural revitalization during the "14th Five-Year Plan" period, the application of circular economy to the development of the tea industry is the general trend of the development direction of the tea industry. Huoshan County is located in the west of Anhui Province, rich in tea, but still faces poverty problems, which has typical research significance. This paper predicts China's tea sales in recent years through the gray correlation prediction model, analyzes the development status and scale of the tea industry in recent years, and then combines the actual situation of Huoshan County and links with the circular economy, so as to provide some suggestions for promoting the construction of tea economy and the construction of ecological Huoshan tea in Huoshan County, relying on the tea industry to drive tea villages to get rid of poverty and become rich.

Keywords: Hui tea, Circular economy, Rural revitalization, Gray prediction model.

1. Research Significance

China is the birthplace of tea culture, Anhui Province as one of the main tea producing provinces in the country, Huoshan County is located in the west of Anhui Province, the foothills of Dabie Mountain, tea production history is long, natural conditions are superior, and Huoshan yellow buds have long been famous. At present, the Hui tea industry has become a powerful weapon to promote tea farmers to increase income and promote rural revitalization. In the "Thirteenth Five-Year Plan" period, the tea industry played a huge role in poverty alleviation, boosting the economic development of 337 tea-related poor counties and achieving poverty alleviation. During the 14th Five-Year Plan period, China's tea industry has entered a stage of high-quality development and entered an important window period to comprehensively improve tea production, efficiency and competitiveness. Although Anhui's tea industry is growing stronger and faster, promoting the increase of tea farmers' income and rural prosperity, and has become a pillar industry for rural revitalization, it still faces some gaps and deficiencies. As a tea industry, in the context of the current era, it has certain practical significance in the current era through the combination of circular economy theory and rural revitalization strategy.



Figure 1. Landscape of Huoshan County 1



Figure 2. Landscape of Huoshan County 2

2. Analysis of the Development Background of The Tea Industry

Anhui Province has always been a key tea-producing area in China, so the study of the development of Hui tea has

certain reference significance. By the early nineties of last century, the area of tea gardens still ranked second and third in the country, the output ranked in the top five, tea production and tea making history was long, there were many famous teas, and China's top ten classic famous teas in Anhui accounted for three or four. But then, due to many factors, the tea industry began to stagnate, its position in the country began to decline, and the gap with the surrounding provinces gradually widened, and tea production faced a grim situation. Circular economy was introduced into China in the late nineties of the 20th century and quickly received domestic attention. China regards the development of circular economy as a major measure of "coordination and win-win" between environmental protection and economic development. This provides new ideas for how to develop Hui tea. Moreover, during the "14th Five-Year Plan" period, new plans were made for the development of tea. Through the comprehensive implementation of cleaner production, we will take the green development path of ecological civilization.

Research on the mechanism and countermeasures of circular economy development was the subject of the International Science Foundation in 2008. The Law of the People's Republic of China on the Promotion of Circular Economy, implemented in January 2009, gives an authoritative concept of circular economy, which follows the 3R principle and applies to various industries. The explanation of the circular economy in agriculture is essentially the application of the four principles of circular economy "reduction, reuse, recycling, and rethinking" in ecological agriculture, called circular economy ecological agriculture, which has been widely recognized. How to develop the tea industry from these four principles has become an important topic for the study of various provinces.

3. Tea Market Size and Forecast

3.1 Existing size of the tea market

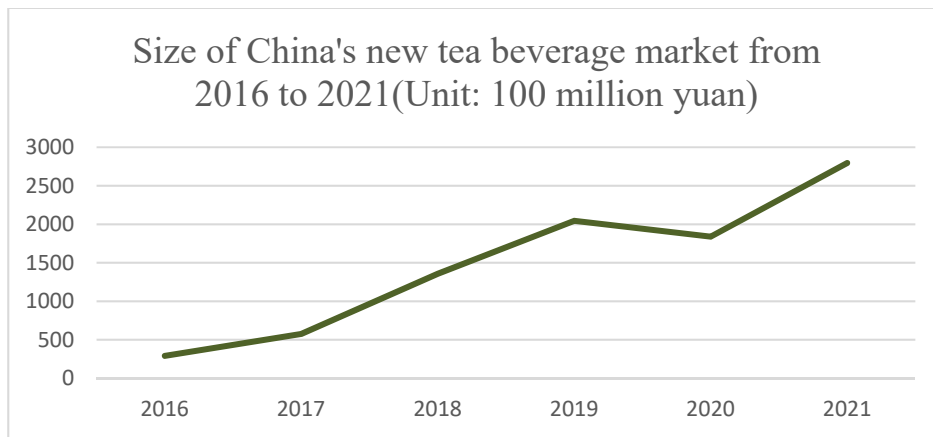


Figure 3 . Size of China's new tea beverage market from 2016 to 2021

From the above table, it can be seen that the demand for new tea in the Chinese market is generally on the rise. In 2020, due to the outbreak of the new crown epidemic, the circulation of tea products was seriously hindered, and sales declined. With the comprehensive advancement of social

resumption of work, production and market, the new tea market has gradually and rapidly recovered, and ordinary consumers have a high acceptance of tea innovation, and market consumption is also rising rapidly.[2]

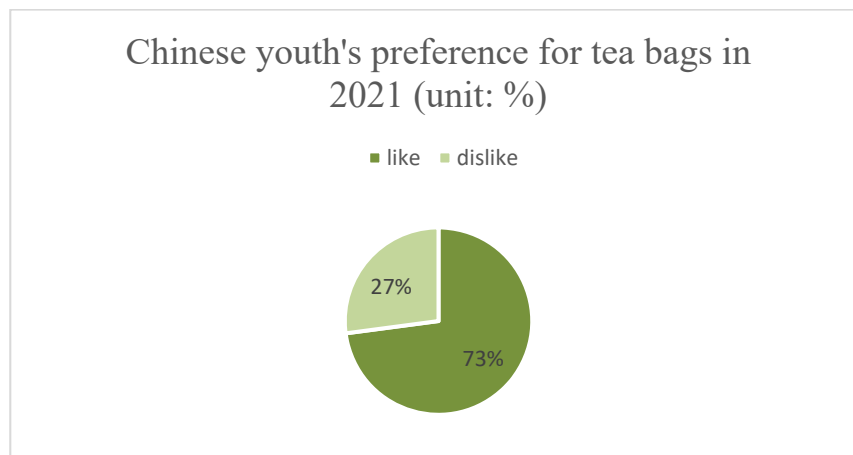


Figure 4. Chinese youth's preference for tea bags in 2021 (unit: %)

From the figure 4, it can be intuitively concluded that the tea consumption market has not flattened, and young

consumers have a high acceptance of tea.

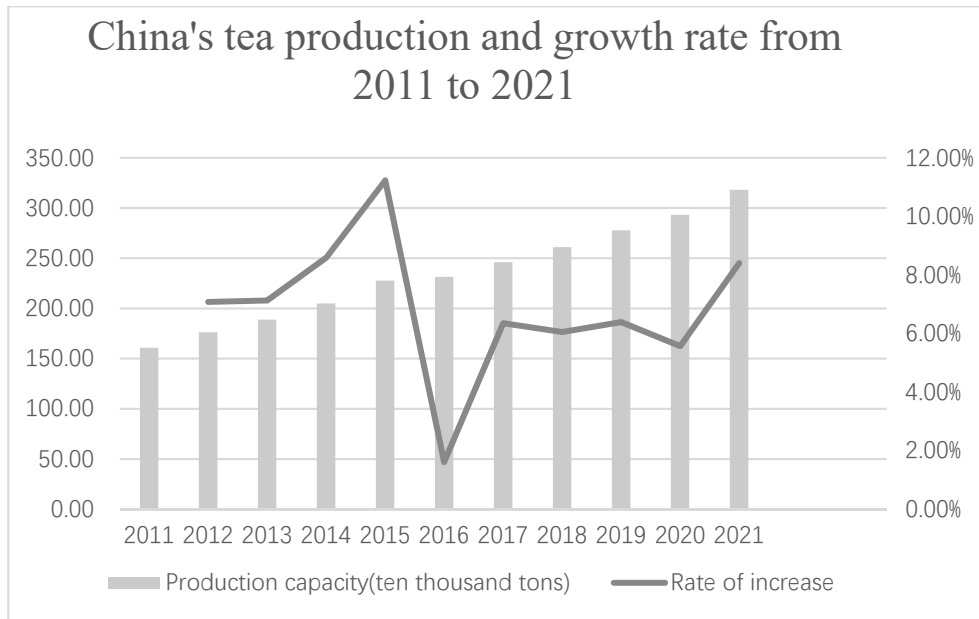


Figure 5. China's tea production and growth rate from 2011 to 2021

Data show that China's tea production in 2021 has reached 3.180 million tons, an increase of 248,200 tons over 2020, a year-on-year increase of 8.40%. As can be seen from Figure 5, the growth rate of tea production in 2021 was higher. Overall, tea production is relatively stable and continues to grow.

3.2 Grey Prediction Model

3.2.1 Model Building

In the first step, before establishing the gray prediction model GM(1,1), the time series is tested for a cascade ratio. If the cascade test is passed, it means that the sequence is suitable for building a gray model, and if it does not pass the cascade test, the sequence is "translated and transformed", so that the new series satisfies the cascade ratio test, and the time series is set to:

$$X^{(0)} = (x^{(0)}(1), x^{(0)}(2), \dots, x^{(0)}(n))$$

In the second step, the parameters to be estimated are solved. Set $\hat{\mu}$ as the parameter to be estimated, $\hat{\mu} = \begin{bmatrix} \alpha \\ \beta \end{bmatrix}$. By constructing the data matrix B and the data vector Y, solving by the least squares method yields:

$$\hat{\mu} = (B^T B)^{-1} B^T Y_n$$

The third step is to build a gray prediction model

The differential equations for the GM(1,1) model are:

$$\frac{dX^{(1)}}{dt} + \alpha X^{(1)} = b$$

Among them, α is the development gray number, and b is

the endogenous control gray number. At $-\alpha < 0.3$, the GM(1,1) model can be used well for medium- and long-term forecasting. After solving, we can get the whitening response:

$$X^{(1)}(k+1) = \left(X^{(0)}(1) - \frac{b}{\alpha} \right) e^{-\alpha k} + \frac{b}{\alpha}$$

The predicted value can be obtained by decrementing the obtained value.

The fourth step is model verification. The accuracy test formula is:

$$P^0 = (1 - \varepsilon(\text{avg})) \times 100\%, C = \frac{S_2}{S_1}$$

where C is the posterior difference ratio, S1 is the standard deviation of the residual, and S2 is the standard deviation of the original sequence.

Model accuracy inspection level: C value less than 0.35 means that the model accuracy is high, C value less than 0.5 indicates that the model accuracy is qualified, C value less than 0.65 indicates that the model accuracy is basically qualified, if C value is greater than 0.65, it indicates that the model accuracy is unqualified.

3.2.2 Model prediction results and analysis

After calculation, the grade ratio of China's tea sales was in the interval (0.779, 1.284), and all the grade ratios fell within the feasible range, indicating that the original sequence was suitable for constructing GM(1,1) gray prediction model.

Table 1. Table of step ratio test results

Year	Original value	Step ratio
2015	167.91	-
2016	171.06	0.982
2017	181.7	0.941
2018	191.05	0.951
2019	202.56	0.943
2020	220.16	0.92
2021	230.19	0.956

By accumulating the original data of China's tea sales from 2015 to 2021, generating an accumulation sequence, making

the original data smooth, and then establishing a gray differential equation and finding its parameter values, the

development coefficient $\alpha=-0.061$ and the gray action amount $b=155.04$ are obtained by substituting into the formula:

$$X^{(1)}(k+1) = 2709.5493e^{0.061k} - 2541.6393$$

Table 2. Model fitting results

Year	Original value	Predicted value	Residuals	Relative error (%)
2015	167.91	167.91	0	0
2016	171.06	170.364	0.696	0.407
2017	181.7	181.034	0.666	0.366
2018	191.05	192.373	-1.323	0.693
2019	202.56	204.423	-1.863	0.92
2020	220.16	217.227	2.933	1.332
2021	230.19	230.833	-0.643	0.279

The table above shows the table of fitted results for the gray forecast model. The average relative error of the model is

0.571%, which means that the model fits well.

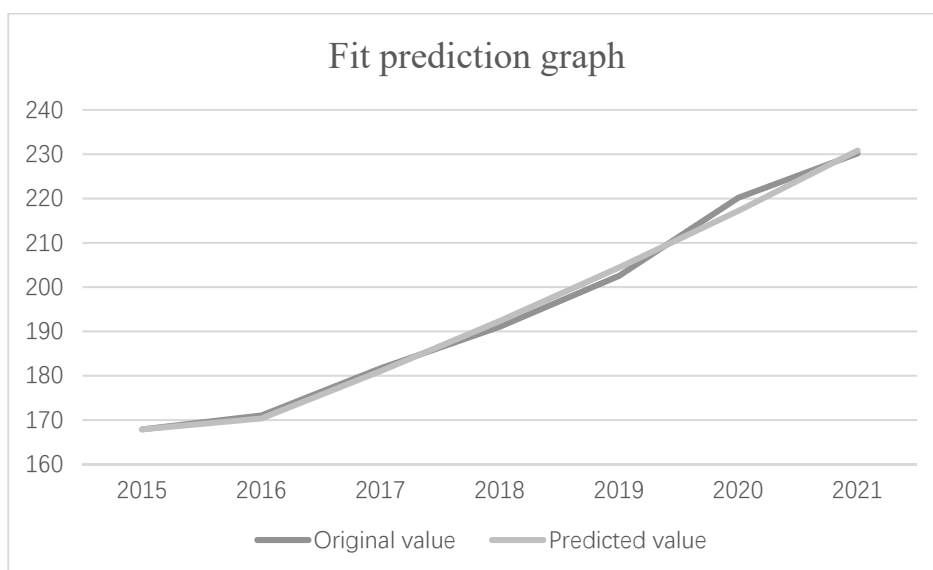


Figure 6. Fit prediction graph

After establishing and using the GM(1,1) model, the forecast of tea sales from 2022 to 2024 is obtained, and it can

be seen from the table below that China's tea sales will show a growing trend in the next few years.

Table 3. Model prediction results

Forecast year	Predicted value
2022	245.291
2023	260.655
2024	276.981

4. Problems and Expectations: Starting from the Actual Situation in Huoshan

4.1 Under the background of rural revitalization, what are the aspects of innovation in the Hui tea industry? How to solve it?

(1) Continue to improve infrastructure and mechanized production. After investigation, it was found that the local production facilities and their supporting facilities (drainage and irrigation ditches, power facilities, etc.) have been greatly improved, and the level of productivity has also improved, but there is still a certain gap with the development of mechanization and intelligence. Carry out variety improvement and tea garden planting management to accelerate the transformation process of aging tea gardens. In

line with the concept of circular economy and the local people of Huoshan County, we continue to strengthen ecological construction and actively apply green environmental protection technologies.

(2) Combine with local people's livelihood and people's feelings. Encourage scientific research institutions and enterprises to carry out the introduction and breeding suitable for the geography, climate and humidity of Huoshan County of Lu'an City. Earnestly invest in high-tech new technologies that conform to Hui tea production and Hui tea culture to carry out standardized production of tea products, comply with relevant regulations, formulate clear steps for strict implementation, strengthen quality control, and adhere to high standards and high-quality tea supply.

(3) Launch innovative products and balance product structure. Combining the circular economy of tea with the current concept of young people's pursuit of low sugar, low

fat, and healthy ecology, we will launch new products that meet the consumption concept of young people, such as flower tea, fruit tea, tea drinks, tea wine, matcha flavored ice cream, matcha cake, tea soap and other products closely related to life. It should also be noted that Hui tea supply has different grades, different styles, different effects, and different positioning product combinations.[1]

4.2 How to deal with the uneven quality of Hui tea in the market?

From planting to selling, the process involves all aspects, resulting in uneven quality of Hui tea. Most tea farmers do not have the conditions to carry out in-depth tea processing, and only roughly process the picked tea leaves and sell them directly to tea merchants. This is also a single aspect of the structure of Hui tea, and Huoshan County tea urgently needs a complete industrial chain to change this situation. We launched "tea enterprises + scientific research institutions + tea farmers", which can better integrate and manage tea farmers and tea merchants, realize the specialization of tea planting, the uniformity of tea production, improve the planting level of good and bad, form a complete and reasonable business model, and ensure the interests of tea farmers and tea enterprises. For this industrial chain, we will conduct a feasibility analysis and modify and improve it according to the specific conditions of the tea village.

4.3 How to promote the development of Huicha under the circular economy model?

(1) The principle of reduction, the principle of reuse, and the principle of resource circulation. At the input, production process and output, it is controlled layer by layer. Reduce the use of pesticide fertilizers, reduce the generation of waste, reduce the input of non-renewable resources and other ways to avoid pollution through prevention; In the tea production process, the production or tea products should be used multiple times to avoid premature garbage; Waste in the production of production resources or tea products will be harmless, recycling, and ecologically recycled, and become usable resources again, rather than useless waste.

(2) Promote cleaner production within the tea industry. Formulate clear standards in accordance with national standards and the specific production methods of Hui tea.

(3) Establish a circular chain between tea and other industries. Combine tea industry, planting industry, agricultural product processing industry, eco-tourism, industry and other fields.

Helping tea enterprises and tea farmers in Huoshan County can create more revenue, promote the construction of ecological civilization in tea areas under the theory of circular economy, explore the added value of more tea, improve the utilization rate of tea, improve the supply capacity of tea, and further help rural revitalization. It can polish the Hui tea brand, tap the historical value of tea, enrich the cultural connotation of tea, promote the integration of tea tourism, greatly enhance the social recognition of famous and excellent tea in our province, and expand the reputation of Hui tea brand. Steadily improve the core competitiveness of Huoshan tea industry.

5. Conclusion

By obtaining data related to the tea industry, establishing and analyzing the above models, and combining relevant data analysis to obtain data about the tea industry, the overall

development trends of China's tea industry include: first, the younger consumer group, second, the rationalization of consumption thinking, third, the diversification of purchase channels, and fourth, the diversification of product categories. Such a conclusion is of great significance to the transformation and innovation of tea products. Based on the above conclusions, combined with the actual situation of Huoshan County, the following suggestions are put forward:

(1) Create an ecological tea development model under the circular economy. Carry out multi-level and multi-link comprehensive utilization of agricultural resources, improve product design and production technology through the promotion of cleaner production, reduce the harm to the human body and the environment, improve the efficiency of resource utilization, and increase the economic benefits of tea farmers and tea enterprises in Huoshan County.

(2) The tea packaging adopts degradable materials. Green consumption is another direction for the development of tea consumption, and the use of degradable material packaging under the condition of "plastic restriction order" is more in line with today's concept of green and sustainable development. At the same time, with people's awareness and support for ecological environmental protection, consumers are more inclined to more "simple and not simple" environmentally friendly product packaging, starting with product packaging changes but not limited to this. The "low carbon" of tea products will be more reflected in intuitive aspects such as green simple packaging, tea paper straws, and degradable tea bags, but from a longer-term perspective, supply chain energy conservation will be put on the agenda.

(3) Combine "tea" and "travel" to create a tea culture characteristic tourist park and experience park integrating sightseeing, tea picking, tea making, tea tasting, tea purchase and tea viewing. By using online new media and other methods, shoot short videos to attract more consumers. Tea farmers not only earn income from tea cultivation, but also increase their income through tourism and the development of farmhouses, while developing the tea tourism industry can strengthen the brand of Hui tea and improve the popularity of Hui tea.

(4) Launch innovative Hui tea products. With the continuous diversification of people's lives, tea is not only the "exclusive" of middle-aged and elderly people, but also can become the object of young people's pursuit. In order to meet the spirit of young people who love to pursue new things and pursue the concept of healthy life, new products such as flower tea, fruit tea, tea wine, and tea soap will be launched. Creating the diversification of Hui tea products is not only in line with the current development trend of the tea industry, but also conducive to the future development of the Hui tea industry.

(5) Develop tea sales channels, the rapid development of social e-commerce and live streaming has become a new field of breakthrough in tea online sales. The social group model of live streaming has developed rapidly in recent years, greatly improving consumers' shopping experience. In addition, the development of tea sales channels is conducive to brands tracking market trends and consumer needs, achieving accurate output through "data portraits", targeted new product development and personalized content discovery, and increasing the sales volume of Hui Tea.[3]

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References

- [1] LIU Zhonghua, CHEN Zongmao, YANG Yajun, et al. Innovation Drives the High-quality Development of China's Tea Industry: From Basic Research of Tea Science to Supporting Industrial Development[J]. China Tea, 2021, 43(2):9.
- [2] LI Fujia. Analysis of competition and development trend of China's tea industry in the era of "cloud consumption"[J]. Times Economics and Trade, 2021, 18(4):77-79.
- [3] Ma Qun. Investigation Report on the Exploration and Practice of New Tea Industry Entrepreneurship Based on Internet Business Model [J]. Fujian Tea, 2020, 42(4):1.
- [4] Gao Ming. Exploration of the Integration of Christian Tea Culture——Taking "Respect" in Tea Culture as an Example [J]. Christian Religious Studies, 2022(01):500-514.
- [5] Zhao Rui. Discussion on Teaching Innovation of Financial Management Major in Colleges and Universities from the Perspective of Tea Culture [J]. Fujian Tea, 2022,44(11):100-102.
- [6] Yin Yaoning, Zhao Tingting, Yin Jia. The path and practice of the ideological and political construction of the course "Tea Culture and Tea Art" from the perspective of "cultivating people through morality" [J]. Fujian Tea, 2022,44(11):115-117.