Layout Design of Chang-Zhu-Tan Tobacco Logistics Park Based on SLP Method

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Abstract. With the development of the tobacco logistics industry, the layout design of the tobacco logistics park is receiving more and more attention. By referring to domestic and foreign research literature and data from Hunan Provincial Statistical Yearbook, using unary linear regression model and gray prediction model to predict the total amount actually entering the Chang-Zhu-Tan Tobacco Logistics Park in the future, using MATLAB software for calculation. According to the calculation results, use the SLP method carries out the layout design of the logistics park, and finally draws the park layout plan diagram, internal flow line diagram and external traffic organization diagram.

1. INTRODUCTION

With the acceleration of urbanization and urban expansion, the contradiction between supply and demand in logistics infrastructure has become prominent, and the demand for storage facilities is in short supply, and the demand for logistics parks has begun to rise. The operation of tobacco logistics in China is generally at a lower level compared with developed countries, which also shows that there is still a lot of room for development in the field of tobacco logistics park construction planning in China. For the planning of the logistics park, many domestic scholars have conducted research. Tang Wenjun [1] calculated the economic correlation strength of various provinces and cities and divided the attraction zones into circle levels to predict the total freight volume of Beijing Jingbei Logistics Park. Afterwards, the functional analysis is performed, and the layout plan is selected using the SLP system layout design method and mathematical analysis method. Chen Zemin[2] planned the layout of the railway logistics center from the three levels of macro, meso and micro, and then used the SLP system layout design method to select the appropriate logistics plan, and applied this method to the layout of the Wuhai Railway Logistics Center Layout planning has achieved certain results. Su Chao [3] used the SLP system layout design method to quantify the functions of the logistics park, analyzed the problems in the SLP layout planning and improved the SLP system layout design method, and applied it to the functional area layout planning of a railway logistics center. The optimized layout plan was designed. The above studies also provide references for this article.
2. MATERIALS AND METHODS
This study mainly used the existing total amount actually entering the park of Chang-Zhu-Tan Tobacco Logistics Park to predict the total amount actually entering the park in future, thereby calculating the proportion of the area of each functional area, and using the SLP method for layout design, drawing the layout plan and external traffic organization chart and internal flow line chart.

2.1. Data sources and forecasts
In this paper, by querying the statistical yearbook of Hunan Province in the past 5 years and the appropriate station quantity of Chang-Zhu-Tan Tobacco Logistics Park, using grey prediction and unary linear regression to calculate the total amount actually entering the park in 2030.

According to the information obtained, the total amount actually entering the park from 2014 to 2018 are as follows:

Table 1 The total amount actually entering the park from 2014 to 2018

| Years | The total amount actually entering the park (Tons) |
|-------|--------------------------------------------------|
| 2014  | 162775.51                                       |
| 2015  | 161164.09                                       |
| 2016  | 159731.77                                       |
| 2017  | 148683.37                                       |
| 2018  | 142913.58                                       |

2.1.1. Unary linear regression
Unary linear regression is a statistical method that uses regression analysis to determine the linear correlation of a variable, which is suitable for short and medium-term forecasts. The steps of unary linear regression are as follows:

1. According to the sample, figure out \( \bar{x} \) and \( \bar{y} \):
   \[
   \bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i, \quad \bar{y} = \frac{1}{n} \sum_{i=1}^{n} y_i
   \]

2. Figure out:
   \[
   \sum_{i=1}^{n} x_i^2, \quad \sum_{i=1}^{n} x_i y_i
   \]

3. Substitute the following formula:
   \[
   b = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n} (x_i - \bar{x})^2} = \frac{\sum_{i=1}^{n} x_i y_i - n \bar{x} \bar{y}}{\sum_{i=1}^{n} x_i^2 - n \bar{x}^2}
   \]
   \[
   a = \bar{y} - b \bar{x}, \quad \ldots
   \]

4. Write a straight line equation
5. Decompose the sum of squared deviations
6. The ratio of the regression sum of squares to the total sum of square deviations
7. Estimated standard error
8. Significance test.

Taking every five years as a forecast period, a linear regression is used to predict the total amount actually entering the park in 2020 and 2025.

2.1.2. Grey prediction model GM(1,1)
GM (1,1) is the most common model in the grey forecasting method\(^{[4]}\). The forecasting steps of this model are as follows:

1. The differential equation form of the GM(1,1) model is:
   \[
   \frac{dx^{(1)}}{dt} + \alpha x^{(1)} = \mu
   \]
   \(\alpha\) means developing ash number, \(\mu\) means endogenous control ash number.
(2) Assume \( X^{(0)} \) as the original sequence,
\[
X^{(0)} = [X^{(0)}(1), X^{(0)}(2), \ldots, X^{(0)}(n)]
\]  

\( n \) means the number of data.

(3) Accumulate the original sequence once to generate
\[
X^{(1)} = \sum_{i=1}^{k} X^{(0)}(i) = X^{(1)}(k - 1) + X^{(0)}(k)
\]

\( X^{(1)}(1) = X^{(0)}(1) \)

(4) Construct cumulative matrix \( B \) and constant vector \( Y_n \):
\[
B = \begin{bmatrix}
-\frac{1}{2} (X^{(1)}(1) + X^{(1)}(2)) & 1 \\
-\frac{1}{2} (X^{(1)}(2) + X^{(1)}(3)) & 1 \\
\vdots & \vdots \\
-\frac{1}{2} (X^{(1)}(n-1) + X^{(1)}(n)) & 1 \\
\end{bmatrix}
\]

\( Y_n = (X^{(0)}(2), X^{(0)}(3), X^{(0)}(4), \ldots, X^{(0)}(n))^T \)

(5) Use ordinary least square method to figure out \( \alpha \) and \( \mu \)
\[
\alpha = \mu = (B^T B)^{-1} B^T Y_n
\]

(6) Substituting the calculated parameters into the equation to solve the following prediction model:
\[
\hat{X}^{(1)}(t + 1) = \left( X^{(0)}(1) - \frac{\mu}{\alpha} \right) e^{-\alpha t} + \frac{\mu}{\alpha}
\]

(7) Take \( \hat{X}^{(1)}(t) \) derivative and restore it to get
\[
\hat{X}^{(1)}(t + 1) = -\alpha \left( X^{(0)}(1) - \frac{\mu}{\alpha} \right) e^{-\alpha t}
\]

(8) Perform reduction to get the predicted value of the original time series:
\[
\hat{X}^{(0)}(t + 1) = \hat{X}^{(1)}(t + 1) - \hat{X}^{(1)}(t)
\]

(9) Calculate the difference and relative error between \( X^{(0)}(t) \) and \( \hat{X}^{(1)}(t) \)
\[
e^{(0)}(t) = X^{(0)}(t) - \hat{X}^{(0)}(t)
\]

\[
q(X) = \frac{X^{(0)}(t)}{\hat{X}^{(0)}(t)}
\]

(10) Calculate the absolute value of the deviation:
\[
\Delta(t) = |X^{(0)}(t) - \hat{X}^{(0)}(t)|
\]

(11) Find the maximum and minimum difference in \( \Delta(t) \)

(12) Calculate the correlation coefficient of each period of the sequence:
\[
\eta(t) = \frac{\text{Min}(|\Delta(t)| + \rho \text{Max}(|\Delta(t)|))}{\Delta(t) + \rho \text{Max}(|\Delta(t)|)}(t = 1, 2, \ldots, n), \rho = 0.5
\]

(13) Calculate the relevance \( r \) of the model:
\[
r = \frac{1}{n} \sum_{t=1}^{n} \eta(t)
\]

When \( \rho = 0.5 \), if \( r > 0.6 \), the prediction accuracy is considered high.

(14) Calculate the mean square error of the original sequence:
\[
S_1 = \sqrt{\frac{\sum_{t=1}^{n} (X^{(0)}(t) - \hat{X}^{(0)}(t))^2}{n - 1}}
\]

\[
\hat{X}^{(0)}(t) = \frac{\sum_{t=1}^{n} X^{(0)}(t)}{n}
\]

(15) Calculate the mean square error of the residual absolute value sequence \( [\Delta(t)] \):
Calculate the mean square error ratio:
\[ c = \frac{S_2}{S_1} \]  \hspace{1cm} (21)

Calculate the probability of error:
\[ P = P(|D(t) - \bar{D}| < 0.6745S_1) \]  \hspace{1cm} (22)

Determine the accuracy level of the model:

| C   | P   | Forecast accuracy level |
|-----|-----|-------------------------|
| ≤ 0.35 | ≥ 0.95 | Good                   |
| ≤ 0.5 | ≥ 0.80  | Qualified              |
| ≤ 0.65 | ≥ 0.70  | Barely qualified       |
| > 0.65 < 0.70 | Unqualified           |

This model is available when the prediction accuracy level is qualified.

Taking every five years as a forecast period, the gray forecast model GM(1,1) is used to predict the total amount actually entering the park in 2030.

2.1.3. Result
The data in Table 1 is applied to the unary linear regression and gray prediction models, and the prediction results are obtained and passed the error analysis. The error analysis is as follows:

![Figure 1: Error analysis of unary linear regression using EXCEL](image)

It can be seen from Figure 1 that the model has \( P = 0.016416 < 0.05 \), the confidence level reaches 95%, the model regression is significant, and the reliability is high.

The error test of the gray prediction model GM(1,1) is as follows:

(1) Residual test

\[ t = 0, \bar{X}^{(1)}(1) = 162775.51 \]
\[ t = 1, \bar{X}^{(1)}(2) = 482066.85 \]
\[ t = 2, \bar{X}^{(1)}(3) = 631771.42 \]
\[ t = 3, \bar{X}^{(1)}(4) = 775216.72 \]
\[ t = 4, \bar{X}^{(1)}(5) = 912664.47 \]
\[ \tilde{X}^{(0)}(1) = \tilde{X}^{(1)}(1) = 162775.51 \]
\[ \tilde{X}^{(0)}(2) = \tilde{X}^{(1)}(2) - \tilde{X}^{(1)}(1) = 319291.34 \]
\[ \tilde{X}^{(0)}(3) = \tilde{X}^{(1)}(3) - \tilde{X}^{(1)}(2) = 149704.57 \]
\[ \tilde{X}^{(0)}(4) = \tilde{X}^{(1)}(4) - \tilde{X}^{(1)}(3) = 143445.3 \]
\[ \tilde{X}^{(0)}(5) = \tilde{X}^{(1)}(5) - \tilde{X}^{(1)}(4) = 137447.74 \]

Calculate the absolute error:

\[
e(1) = 0
\]
\[
e(2) = 158127.25
\]
\[
e(3) = 10027.2
\]
\[
e(4) = 5238.07
\]
\[
e(5) = 5465.84
\]

Relative error:

\[
q(1) = 0
\]
\[
q(2) = 0.98
\]
\[
q(3) = 0.06
\]
\[
q(4) = 0.04
\]
\[
q(5) = 0.04
\]

(2) Relevance test:
Define the correlation coefficient

\[
\eta(t) = \frac{\text{Min}[e(t)] + \rho \text{Max}[e(t)]}{e(t) + \rho \text{Max}[e(t)]} (t = 2, ..., 5), \rho = 0.5
\]

\[
\eta(2) = \frac{158127.25 + 0.5 * 158127.25}{5238.07 + 0.5 * 158127.25} = 0.36
\]
\[
\eta(3) = \frac{10027.2 + 0.5 * 158127.25}{5238.07 + 0.5 * 158127.25} = 0.95
\]
\[
\eta(4) = \frac{5238.07 + 0.5 * 158127.25}{5238.07 + 0.5 * 158127.25} = 1
\]
\[
\eta(5) = \frac{5465.84 + 0.5 * 158127.25}{5465.84 + 0.5 * 158127.25} = 1
\]

Calculate the relevance \( r \) of the model

\[
r = \frac{1}{n} \sum_{t=1}^{n} \eta(t) = (0.36 + 0.95 + 1 + 1)/4 = 0.82 > 0.6
\]

Meet the inspection standards.

(3) Posterior error test

\[
S_1 = \sqrt{\frac{\sum_{t=1}^{5} (X^{(0)} - \tilde{X}^{(0)}(t))^2}{n-1}} = 165309.34
\]
\[
S_2 = \sqrt{\frac{\sum_{t=1}^{n} (\Delta(t) - \bar{\Delta})^2}{n-1}} = 68490.92
\]
\[
c = \frac{S_2}{S_1} = 0.41 < 0.5
\]
\[
P = P(|\Delta(t) - \bar{\Delta}| < 0.6745 * S_1) = 4/5 = 0.8
\]

The model prediction accuracy level is: Qualified.

The total amount actually entering the park in 2020, 2025 and 2030 is shown in Table 3:

| Years     | The total amount actually entering the park (Tons) |
|-----------|--------------------------------------------------|
|           |                                                 |
|           |                                                 |
|           |                                                 |

Table 3 Forecast results of The total amount actually entering the park
It can be seen from Table 3 that in the future, the total amount actually entering the park will show a decreasing trend over time, which provides a basis for the area calculation of the following functional zones.

2.2. Functional area measurement

2.2.1. Storage area
According to the calculation formula of the storage area in Reference[1], combined with the prediction results in the previous chapter, in 2030, the total amount actually entering the park will be 82,309.23(tons), including tobacco leaves and cigarettes, and the average turnover period is 7 days. According to the calculation of the size of a cigarette of 450(mm)×250(mm)=112500(mm²), a box of cigarettes contains 5 pieces. According to all the tiles, a box of cigarettes covers an area of 0.5625m². According to a box of cigarettes in the previous chapter it can be calculated that the weight of 0.06875 tons of cigarettes is 0.5625(m²)/0.06875(tons)=8.18(m²)/(ton). The storage area of Chang-Zhu-Tan Tobacco Logistics Park is:

\[ S=82309.23\times\delta\times s\times T\times K=168322.38(m^2) \]  

δ means the proportion of tobacco in the total amount of goods, taking 1, s means the area per ton of goods, T means the turnover period, taking 1/52, K means the unbalance coefficient of the warehouse or yard, generally 13.0~13.5, taking 13.0; the storage area accounts for about 16.8% of the total area of the logistics park. [1]

2.2.2. Processing area
Reference[1], the distribution processing area generally occupies 20%-25% of the area of the storage area. Taking 20%, which is 33664.476(m²), which accounts for about 3.4% of the total area of the logistics park.

2.2.3. Office area
According to the requirements of the national standards for the construction of the logistics park, the land area of the office area should not exceed 15% of the total area of the park. The Chang-Zhu-Tan Tobacco Logistics Park project covers an area of 1,000,000(m²), so the office area is taken 5% of the area is 50,000 (m²).

2.2.4. Fire zone
According to the specifications in <YC T 205-2017 Design Specification for Tobacco and Tobacco Products Warehouse>, Design Basis, the tobacco warehouse belongs to the category C combustibles warehouse. The warehouse area of Chang-Zhu-Tan Tobacco Logistics Park is larger than 6000(m²) and belongs to the first-class fire-resistant building. Therefore, the area of the fire compartment should be 1500(m²). Since the fire compartment is set in the warehouse, the number of zones is about

\[ 168322.38(m^2)/6000(m^2)=28 \]
\[ 28\times1500(m^2)=42000(m^2) \]

The circulation processing area is also calculated according to the warehouse standard. About

\[ 33664.476(m^2)/6000(m^2)=6 \]
\[ 6\times1500(m^2)=9000(m^2) \]

The appropriate number of tobacco stations in offices, accommodation areas, and comprehensive service areas is relatively small. Therefore, a fire compartment is set up, and other basic fire-fighting facilities are configured. The total area of the fire-fighting area is

\[ 42000(m^2)+9000(m^2)+3\times1500 (m^2)=64500(m^2), \]

and the total area of the fire-fighting area is 6.45% of the total area.
2.2.5. Green accommodation area
According to the requirements of national standards for the construction of logistics parks, the green coverage area in the park should reach 30%, and the green accommodation area is designed to be 30% of the total area of the park, which is 300,000(m²).

2.2.6. Comprehensive service area
With reference to the detailed construction plan of the Tobacco Logistics Park of Tongren City Company of Guizhou Tobacco Company, the area of the comprehensive service area of the logistics park accounts for about 20% of the total area of the park, which is similar to the Chang-Zhu-Tan Tobacco Logistics Park in terms of cargo types. The area of the comprehensive service area of Chang-Zhu-Tan Tobacco Logistics Park is used as a reference basis, and it is set to 20%, which is 200,000(m²).

2.2.7. Transportation infrastructure and open space
Excluding the area occupied by the functional areas mentioned above, the remaining area is the area of transportation infrastructure and open space. According to the requirements of the national standards for the construction of logistics parks, 5% of the area is generally reserved as vacant land, which is 50000(m²). The land area for transportation infrastructure is generally 12%-15%. Taking 13%, which is 130,000(m²).

2.2.8. Shipping area
The above functional areas have already occupied 94.65% of the land area, and the remaining 5.35% of the area can be used as the area of the shipping area, which is 53500(m²).

2.3. SLP-based layout design
2.3.1. Five Elements Analysis
(1) Products and materials (P)
Through the investigation of the background of the research subjects, it is concluded that the cargo types of Chang-Zhu-Tan Tobacco Logistics Park are mainly cigarettes and tobacco leaves.

(2) Quantity of goods (Q)
Based on the above prediction of the appropriate station volume of Chang-Zhu-Tan Tobacco Logistics Park in 2030, it can be concluded that the predicted appropriate station volume of Chang-Zhu-Tan Tobacco Logistics Park in 2030 is 82329.03 (tons).

(3) Processing flow or transportation route (R)
In the layout design of the Chang-Zhu-Tan Tobacco Logistics Park, this article has set up storage areas, circulation processing areas, office areas, fire areas, green accommodation areas, comprehensive service areas, transportation infrastructure, open space and shipping areas. Under normal circumstances, after the goods arrive in the park, they first enter the storage area, then move to the circulation processing area, and finally leave the shipping area. The specific flow chart is as follows:
Activities, source and capabilities to make sure the normal operation of production (S)

The Chang-Zhu-Tan Tobacco Logistics Park contains resources such as logistics training area, multimodal transport area, fire area, commercial area and gas station that can ensure the normal operation of production.

Time factor (T)

Chang-Zhu-Tan Tobacco Logistics Park adopts the FJ100000 cigarette sorting system provided by China Tobacco Logistics Technology Co., Ltd., and adopts the "smoke frame + robot" method to improve the sorting efficiency of the whole line to 80,000(pieces)/(hour), reaching a single line Maximum efficiency.

2.3.2. Comprehensive relationship analysis

According to the description of the comprehensive correlation analysis in the SLP layout idea, the weighted value is 3:1[2], combined with the comprehensive relationship level division table, the comprehensive relationship table 4 is obtained as follows:

Table 4 Classification table of comprehensive relationship (3:1)

| Value | Grade |
|-------|-------|
| 13    | A     |
| 9-12  | E     |
| 5-8   | I     |
| 1-4   | O     |
| 0     | U     |

Table 5 Comprehensive relationship table

| Functional area pair | Closeness | Comprehensive relationship |
|----------------------|-----------|---------------------------|
| Functional area 1- Functional area 2 | Logistics relationship weight | Non-logistics relationship weight | Value | Grade |
|                          | Grade     | Value | Grade | Value | Grade |

Figure 2 Operation flow chart of Chang-Zhu-Tan Tobacco Logistics Park
| Storage area – Processing area | A | 4 | E | 3 | 15 | A |
|-----------------------------|---|---|---|---|----|---|
| Storage area - Office area | U | 0 | U | 0 | 0 | O |
| Storage area - Shipping area | E | 3 | I | 2 | 11 | E |
| Storage area - Fire zone | U | 0 | I | 2 | 2 | O |
| Storage area - Green accommodation area | U | 0 | U | 0 | 0 | U |
| Storage area - Comprehensive service area | O | 1 | U | 0 | 3 | O |
| Processing area - Office area | U | 0 | U | 0 | 0 | U |
| Processing area - Shipping area | A | 4 | A | 4 | 16 | A |
| Processing area - Fire zone | U | 0 | I | 2 | 2 | O |
| Processing area - Green accommodation area | U | 0 | U | 0 | 0 | U |
| Processing area - Comprehensive service area | U | 0 | I | 2 | 2 | O |
| Office area - Shipping area | U | 0 | U | 0 | 0 | O |
| Office area - Fire zone | U | 0 | I | 2 | 2 | O |
| Office area - Green accommodation area | U | 0 | U | 0 | 0 | U |
| Office area - Comprehensive service area | U | 0 | I | 2 | 2 | O |
| Shipping area - Fire zone | U | 0 | I | 2 | 2 | O |
| Shipping area - Green accommodation area | U | 0 | A | 4 | 4 | O |
| Shipping area - Comprehensive service area | O | 1 | I | 2 | 5 | I |
| Fire zone - Green accommodation area | U | 0 | I | 2 | 2 | O |
| Fire zone - Comprehensive service area | U | 0 | I | 2 | 2 | O |
| Green accommodation area - Comprehensive service area | U | 0 | U | 0 | 0 | U |
The function relationship diagram is drawn according to the comprehensive relationship table as follows:

![Function Relationship Diagram](image)

**Figure 3** The functional area relationship diagram of Chang-Zhu-Tan Tobacco Logistics Park

### 2.3.3. Functional area location relationship

According to the functional relationship diagram, the graph construction method is used to obtain the association line diagram as follows:

![Association Line Diagram](image)

**Figure 4** Correlation line diagram of functional areas of Chang-Zhu-Tan Tobacco Logistics Park

Each functional area is represented by a dot in the figure. Connect these functional areas in pairs. The larger the relationship value between the two functional areas, the thicker the line segment. In Figure 4, find the functional area pair "processing area-shipping area" (16) with the largest value, and select it into the figure, and find the distribution processing area and shipping area in the remaining functional areas. The adjacent functional area pair with the largest value is selected into the figure, as shown in Figure 5:
In the remaining functional areas, find the functional area pair with the largest value adjacent to the processing area, the shipping area and the storage area, and select it into Figure 6 as follows:

By analogy, three schemes are finally obtained, and the best scheme is obtained according to the traffic environment of the park, the relationship between functional areas and the goods route as shown below:

Figure 6 Schematic diagram of the third step of the graph construction method

Figure 7 Adjacent layout (processing-fire-comprehensive service area)
3. RESULTS AND DISCUSSION
According to the layout design plan of Chang-Zhu-Tan Tobacco Logistics Park, combined with the macro environment, the layout design of Chang-Zhu-Tan Tobacco Logistics Park is drawn as shown in Figure 8:

![Figure 8 The layout design of Chang-Zhu-Tan Tobacco Logistics Park](image)

Based on the analysis of the five elements in the previous article, the internal movement route of Chang-Zhu-Tan Tobacco Logistics Park is obtained. Among them, the following options are available for the movement route of vehicles in the park:

1. Entrance → Tobacco storage area → Processing area → Shipping area → Exit
2. Entrance → Cigarette storage area → Processing area → Shipping area → Exit.

Tourists have the following options for moving routes in the park:

1. Entrance → Comprehensive service area → Shipping area → Exit
2. Entrance → Shipping area → Exit.

There are the following options for employees' moving routes in the park:

1. Entrance → Tobacco storage area
2. Entrance → Cigarette storage area
3. Entrance → Processing area
4. Entrance → Tobacco storage area → Processing area
5. Entrance → Cigarette storage area → Processing area
6. Entrance → Tobacco storage area → Processing area → Shipping area
7. Entrance → Cigarette storage area → Processing area → Shipping area
8. Entrance → Shipping area
9. Entrance → Office area
10. Entrance → Green accommodation area
11. Entrance → Comprehensive service area
12. Entrance → Comprehensive service area → Green accommodation area.

The specific route is shown in Figure 9:
Figure 9 Internal flow line diagram of Chang-Zhu-Tan Tobacco Logistics Park

The external traffic organization chart of the park is shown in Figure 10:

Figure 10 External traffic organization chart of Chang-Zhu-Tan Tobacco Logistics Park

The park has three entrances and exits, and their routes are as follows:
(1) Drive in the rightmost lane from G107 to the south, come to intersection 1, turn right into the park.
(2) Drive in the rightmost lane from Yanjiang Avenue to the east, come to intersection 2, turn right into the park.
(3) Drive in the rightmost lane from Yanjiang Avenue to the north, come to intersection 3, turn right into the park.

The departure routes of the three entrances and exits are as follows:
(1) Drive eastward from the entrance and exit close to intersection 1 and keep on the right lane to reach intersection 1. Turn left or right.
(2) Drive in the right lane from the entrance near the junction 2 to the north, and turn left or right when you arrive at the junction 2.
(3) Drive west from the entrance and exit near No. 3 intersection and keep on the right lane until you arrive at No. 3 intersection and turn left or right.

This design avoids the shortcomings caused by the previous single qualitative or quantitative analysis method, and uses a combination of qualitative and quantitative methods. However, because the tobacco industry is greatly affected by policies and policies will change over time, this method is not suitable for long term planning.

4. CONCLUSION
Through the extraction of statistical yearbook data and the understanding of relevant information, this paper provides the basis for the prediction of the total amount actually entering the park and the selection of the layout plan of the Chang-Zhu-Tan Tobacco Logistics Park. Two methods of univariate linear regression and grey prediction are used to make short-term and medium-term forecasts. The forecast concludes that the total amount actually entering the park will decrease in the next ten years. The method of combining qualitative and quantitative analysis can provide certain reference value for similar research.

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