

# Analysis and Forecast of Wenzhou City's National Economy

Xiaoyi Guan, Tianhao Lin, Wanting Guo, and Xiaofeng Zhang

Zhejiang Tongji vocational college of science and technology, Hangzhou 311231, China

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## Abstract

Wenzhou City is a regional center and important commercial city along the southeast coast of Zhejiang Province, and is one of the 27 cities in the central area of the Yangtze River Delta. In 2020, Wenzhou achieved a gross domestic product of 687.09 billion yuan. Analyzing the national economy of Wenzhou can provide a better understanding of its economic composition. Predicting the development of Wenzhou's national economy can provide reference for the healthy economic development of Wenzhou. This article analyzes the composition of the three industries in Wenzhou City and uses artificial neural network algorithms to predict the economic development of Wenzhou City. The results show that the artificial neural network method is suitable for predicting the national economic development data of Wenzhou City.

## Keywords

Wenzhou City; National Economy; Industrial Analysis; Artificial Neural Network.

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## 1. Introduction

Wenzhou City is located in the southeast of Zhejiang Province, with an overall easterly slope[1-2]. To the west is a mountainous area, to the east is a hilly area, and the closest coastal area is the plain. The climate of Wenzhou City belongs to the subtropical monsoon climate, with a suitable climate and more rainfall. The unique geographical location of Wenzhou provides convenience for its economic and social development. Given this unique geographical location, the commercial and fishery development of Wenzhou City is relatively advantageous. Wenzhou City is also a famous production base for clothing enterprises in China. Wenzhou's economic development is at the forefront level in Zhejiang. Wenzhou's overall economic development is stable and has a good momentum of development.

## 2. Analysis of Wenzhou's National Economy

In 2020, the city achieved a regional gross domestic product (GDP) of 687.09 billion yuan[3], an increase of 3.4% compared to 2019. In terms of industries, the added value of the primary industry is 15.98 billion yuan, an increase of 2.3%; The added value of the secondary industry was 283.45 billion yuan, an increase of 3.1%; The added value of the tertiary industry was 387.66 billion yuan, an increase of 3.7%. The value-added structure of the three industries is 2.3:41.3:56.4. According to the regulations of China's unified accounting and data release system for regional gross domestic product, regional gross domestic product accounting includes two steps: preliminary accounting and final verification. After final verification, in 2019, the total current value of the city's gross domestic product was 660.8 billion yuan, an increase of 8.2% compared to the previous year at comparable prices. The value-added structure of the three industries was 2.3:42.1:55.6.

### 2.1 Primary Industry

In 2020, the output value of agriculture, forestry, animal husbandry, and fishery was 25.41 billion yuan,. Looking at different industries, the output value of the planting industry is 11.32 billion yuan,

an increase of 2.7%; The forestry output value is 700 million yuan, an increase of 4.6%; The output value of animal husbandry is 4.17 billion yuan, a decrease of 2.0%; The fishery output value reached 8.67 billion yuan, an increase of 3.6%; The output value of the agricultural, forestry, animal husbandry, and fishing service industry was 560 million yuan, an increase of 7.3%.

**Table 1.** Main agricultural product production in 2020

Indicator	production (10000 tons)	increase compared to the previous year (%)
fruit	61.8	1.4
#Garden fruits	32.7	2.8
vegetable	172.4	4.3
rapeseed	1.4	4.7
sugar	3.6	6.5
Tea	0.7	3.9
Chinese herbal medicine	4.5	-2.2

The total annual output of aquatic products was 640000 tons, an increase of 3.3%, among which the output of seawater products was 594000 tons, an increase of 1.8%. The domestic marine fishing yield was 387000 tons, a decrease of 7.3%; The production of mariculture reached 199000 tons, an increase of 19.3%, and the production of deep-sea fisheries reached zero breakthrough, reaching 9000 tons.

The construction of rural revitalization has been comprehensively promoted. Throughout the year, 311 projects for the Western Ecological Leisure Industry Belt were implemented, 56 high-quality tourism lines for the Western Ecological Leisure Industry Belt were cultivated, driving the number of rural tourists to 41 million. 37 new demonstration belts for rural revitalization were built, and 2 cross regional high-quality belts for rural revitalization were continued. We have launched the "Six Achievements" campaign to create beautiful rural areas, with a total of 577 fields being renovated, 484000 acres of beautiful rural areas being created, 869 long-term unregulated farmland with an area of 11200 acres being centrally renovated, and 2186 standardized agricultural management houses being constructed. We have built 13 demonstration towns for beautiful rural areas and 791 new era beautiful villages, with a coverage rate of 53.6%. There are 397 new villages for the classification and treatment of rural household waste, and the coverage rate of administrative villages for the classification and treatment of rural household waste reaches 85%.

## 2.2 Secondary Industry

There are 5963 industrial enterprises above designated size in the city, achieving an industrial added value of 110.65 billion yuan. The added value of light industry was 37.22 billion yuan, a decrease of 3.2%, while the added value of heavy industry was 73.43 billion yuan, an increase of 6.3%. The sales output value of industrial enterprises above designated size reached 528.83 billion yuan, an increase of 0.6%, with export delivery value reaching 64.69 billion yuan, a decrease of 7.9%.

**Table 2.** Value added of industries above designated size in 2020

Indicator	Number of units (units)	Value added of industries above designated size) Actual performance (100 million yuan)	Value added of industries above designated size Specific gravity (%)
total	5963	1106.5	100.0
Among them: light industry	2664	372.2	33.6
heavy industry	3299	734.3	66.4
Among them: state-owned enterprises	9	28.1	2.5
Collective enterprise	11	1.5	0.1
Joint-stock cooperative enterprise	138	8.8	0.8
Limited Liability Company	248	121.4	11.0
Limited Liability Company	57	123.4	11.2
private enterprise	5384	742.7	67.1
Hong Kong, Macao, and Taiwan invested enterprises	45	20.9	1.9
foreign-invested enterprise	70	59.1	5.3

### 2.3 Tertiary Industry

Fixed assets investment increased by 4.9% over the previous year. Private investment in the city increased by 2.4%, with private project investment increasing by 18.6%; Industrial investment increased by 22.0%, with manufacturing investment increasing by 15.8%; Investment in the service industry increased by 2.1%. 64 provincial centralized construction projects have entered the construction site, and 44 provincial "152" projects have been launched.

The investment in real estate development in the city increased by 1.5% compared to the previous year. The construction area of the house is 58.714 million square meters, of which the residential construction area is 41.828 million square meters; The sales area of commercial housing is 12.047 million square meters, including 10.45 million square meters of residential sales.

The total retail sales of consumer goods for the year amounted to 349.78 billion yuan, a decrease of 2.7% compared to the previous year. In the wholesale and retail sales of goods above the designated size, the retail sales of grain, oil and food, beverages, cultural and office supplies, Chinese and Western medicine, and furniture increased by 28.3%, 26.5%, 23.8%, 6.6%, and 2.5% respectively compared to the previous year. The consumption demand for upgraded products continues to release, with wearable intelligent devices, new energy vehicles, computers and their supporting products increasing by 32.1%, 29.3%, and 24.5%, respectively. The online retail sales in the city reached 203.02 billion yuan, an increase of 6.1%; The online consumption of residents reached 142.84 billion yuan, an increase of 6.5%.

Throughout the year, it received 119.42 million domestic and foreign tourists, achieving a total tourism revenue of 129.41 billion yuan, restoring to 87% and 83.4% of the previous year's levels, respectively. Among them, it received 119.991 million domestic tourists and achieved a revenue of 129.31 billion yuan, recovering to 87.3% and 84.6% of the previous year's levels, respectively;

Received 29000 overseas tourists and achieved overseas foreign exchange earnings of 14 million US dollars.

**Table 3.** Main Classification of Import and Export of Goods in 2020

Indicator	Actual performance (100 million yuan)	Increase compared to the previous year (%)
Total import and export volume of goods	2189.7	15.1
Export volume of goods	1878.1	11.4
#General trade	1444.6	5.0
processing trade	22.9	-36.0
#Footwear	204.0	-32.2
Clothing and clothing accessories	98.5	-12.1
#Mechanical and Electrical Products	894.3	14.9
#High tech products	60.9	14.1
Import amount of goods	311.7	43.8
#General trade	299.3	48.2
processing trade	7.0	-27.3

The actual use of foreign investment throughout the year was 327 million US dollars, an increase of 17.2% compared to the previous year; The actual use of foreign investment in high-tech industries is 123 million US dollars, accounting for 37.7%.

### 3. Prediction of National Output Value in Wenzhou City based on Artificial Neural Network Algorithm

Using artificial neural network methods to simulate and predict the data from the Wenzhou Statistical Yearbook from 1976 to 2020 to test the applicability of the method. The calculation steps are as follows[4-5]:

Step 1: Set the number of iterations  $t=0$ .

Step 2:  $t \leftarrow t+1$ , Calculate  $S_j^{1,q}$ ,  $h_j^q$ ,  $S_k^{2,q}$ ,  $y_k^q$ .

Step 3: Calculate the total error  $E(t)$ , and if  $E(t) \leq \varepsilon$  (allowable error), stop the iteration; Otherwise, proceed to step 4.

Step 4: Calculate  $d_j^{1,q}$ ,  $d_k^{2,q}$ .

$$d_k^{2,q} = (t_k^q - y_k^q) y_k^q (1 - y_k^q) \tag{1}$$

$$d_j^{1,q} = \left( \sum_{k=1}^n d_k^{2,q} w_{jk}^2 \right) h_j^q (1 - h_j^q), k = 1, 2, \dots, n; j = 1, 2, \dots, l; q = 1, 2, \dots, Q \tag{2}$$

Step 5: if  $E(t) \leq E(t-1)$ .

$$\begin{cases} \eta(t) = \eta(t) * (1 + \lambda) \\ a(t) = a(t) * (1 + \lambda) \end{cases} \quad (3)$$

Otherwise.

$$\begin{cases} \eta(t) = \eta(t) * (1 - \lambda) \\ a(t) = a(t) * (1 - \lambda) \end{cases} \quad (4)$$

$$\begin{cases} w_{jk}^2(t) = w_{jk}^2(t-1) + \eta(t) \sum_{q=1}^Q h_j^q d_k^{2,q} + a(t)(w_{jk}^2(t-1) - w_{jk}^2(t-2)) \\ w_{ij}^1(t) = w_{ij}^1(t-1) + \eta(t) \sum_{q=1}^Q x_i^q d_j^{1,q} + a(t)(w_{ij}^1(t-1) - w_{ij}^1(t-2)) \end{cases} \quad (5)$$

$$\begin{cases} \theta_k^2(t) = \theta_k^2(t-1) + \eta(t) \sum_{q=1}^Q (-1) d_k^{2,q} + a(t)(\theta_k^2(t-1) - \theta_k^2(t-2)) \\ \theta_j^1(t) = \theta_j^1(t-1) + \eta(t) \sum_{q=1}^Q (-1) d_j^{1,q} + a(t)(\theta_j^1(t-1) - \theta_j^1(t-2)) \end{cases} \quad (6)$$

Return to step 2 and continue iteration.

The simulation prediction results are shown in Figure 1.

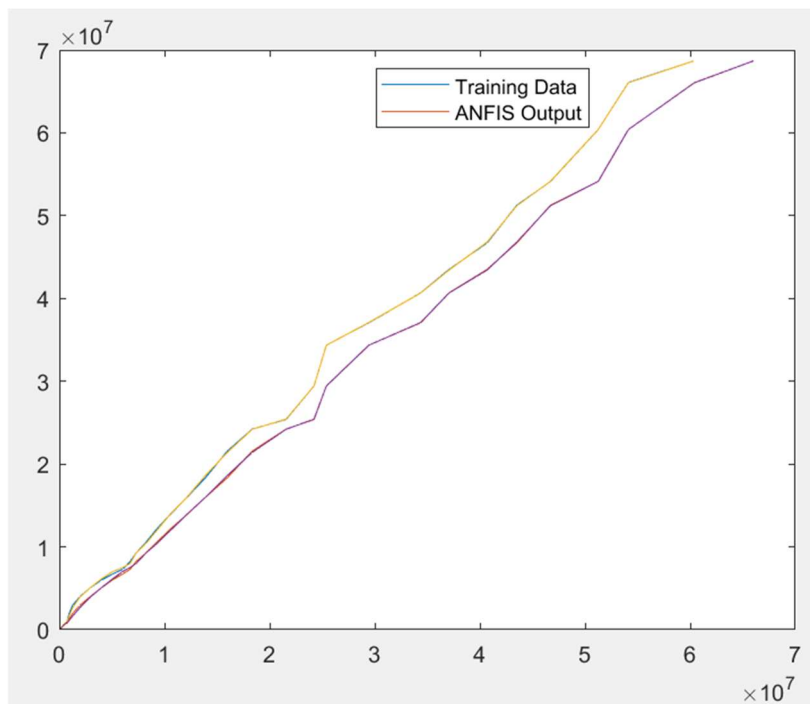


Figure 1. Simulation prediction result graph

## 4. Conclusion

This article analyzes the situation of Wenzhou's national economy. In 2020, the city achieved a regional gross domestic product (GDP) of 687.09 billion yuan, calculated at comparable prices (the same below), an increase of 3.4% compared to the previous year. In terms of industries, the added value of the primary industry is 15.98 billion yuan, an increase of 2.3%; The added value of the secondary industry was 283.45 billion yuan, an increase of 3.1%; The added value of the tertiary industry was 387.66 billion yuan, an increase of 3.7%. This article uses the artificial neural network method to predict the economic and social development situation of Wenzhou City. The simulation results show that the artificial neural network method is feasible.

## Acknowledgments

This paper is funded by the science and technology program of Zhejiang Provincial Department of water resources (RC2085)&Provincial cultivation project of Zhejiang Tongji Vocational College of science and Technology (FRF21PY001)& Science and technology project of Zhejiang Water Resources Department in 2020 (No.RC2031)&Natural Science Foundation of Zhejiang Province (LZJWY22E090005).

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