

# Analysis of China Express Industry Market Situation and Trend Prediction of During the Period of "Twelfth Five-year"

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**Abstract:** Based on analyzing the situation of express market during "Twelfth Five-year" period of our country, it is concluded that the goal of China's Express delivery industry "industry to do big, enterprise to do strengthen" is realized, but the goal of "brand to do best" is not yet fully realized. By using the business revenue & volume in this period, GM(1,1) model is set up, It predicts that the Express business revenue in our country breaks through one trillion Yuan and Express delivery business break through One hundred billion pieces by 2018. Finally, the suggestions of the Express industry development in our country are given.

**Keywords** Express delivery industry; Market analysis; GM (1, 1) model; Prediction

## INTRODUCTION

At the beginning of "12th Five-Year Plan", State Post Bureau announces Express service "12th Five-Year" Planning. It mainly points that Express service should endeavor to achieve three primary targets until 2015. Firstly, expand the size of the industry, which indicates to double the incomes of Express service and the size of industry becomes to be the world class. Secondly, the enterprise should be more competitive. It is clearly to say that a mass of large business groups which are great scale, high quality, high competitive as well as normative. Thirdly, to establish a high-quality brand, Five-star Express service is the core of this purpose. Except this, the advantages of Express service change from a lower price and internet to trademark and quality which is a new way improve domestic market and expand international market<sup>[1]</sup>. During '12th Five-Year Plan', has the industry of Express achieved those goals yet? It is worth to retrospective analysis. In this article, GM (1, 1) prediction model will be established, which based on the development of Express service in China and relevant data in '12th Five-Year Plan.' This model also could provide suggestion to Express service, which ensures the progress of industry to be sustainable, healthy and stable.

## ANALYSIS OF MARKET SITUATION BASED ON EXPRESS SERVICE "12TH FIVE-YEAR" PLANING

First of all, during 12th Five-Year, the industry of Express service has expanded the size. In 2015, the volume of business was 20,670,000,000 and still was the top one in the world. It became to be a highlight in 2015, although the development of macroeconomic was retarded and traditional industries were weakness in China. Comparing the number of parcels in 2010 with 2015, it increased more than three times in the

five years, and the annual average of growth rate was 54.7%. In 2015, the peak of the business volume was over one hundred and sixty million per day. In this period from 2010 to 2015, the incomes of Express service sharply increased from 57,460,000,000 Yuan to 276,960,000,000 Yuan, which nearly raised quadruple and the annual average of growth rate was 37%. The improvement of Express service incomes and year growth rate will be presented in Figure1 and 2, and the increasing volume of business and year growth rate will be displayed in Figure3 and 4. The proportion of Express service boosts gradually in Chinese mail business. For example, it was 45% in 2010 and 68.6% in 2015. The parcels can be directly delivered to 94% rural areas, and the coverage of Express service networks in township level increased to 70%. The business volume and incomes increased 7.8 times and 3.8 times separately. Additionally, the proportion of Express service in GDP rose from 0.3% to 0.6% and Express service provided one million employment positions. The industry of Express service became to a 'dark horse' in the national economy especially in 2015 because the industry had the high speed of transformation and upgrading, and according to improving quality and reliability, the industry is rapid growth<sup>[2]</sup>.

Secondly, Express service has realized the goal of strengthening which means enterprises are more competitive than before. 2015 is a year of integration, on 15th of May, Yuantong Express announced that company sign a cooperative.

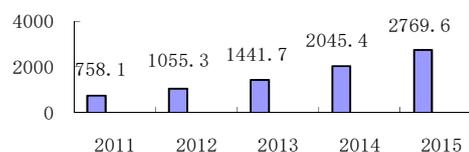


Figure1. Income changes of china express from 2011 to 2015. Units: one hundred million yuan

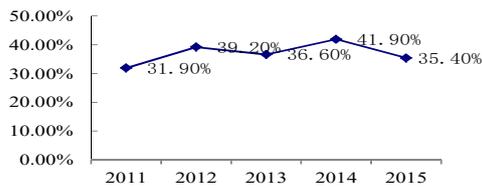


Figure2 Chian's express business income from 2011 to 2015 year-on-year growth rate changes

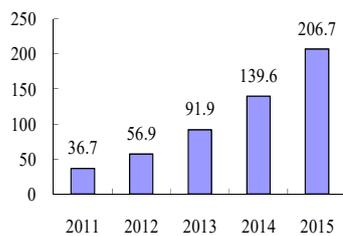


Figure3 China's express delivery business change from 2011 to 2015. Unit: million pieces

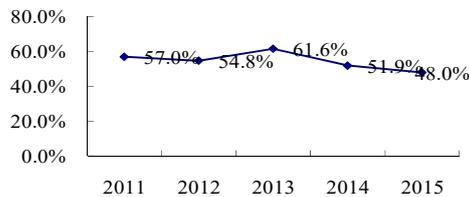


Figure 4. China's express delivery business from 2011 to 2015 year-on-year growth rate changes

agreement with Alibaba and go billions strategic investment. It gives Yuantong Express many advantages like sharing information and getting resources. On the other hand, Yuantong established a company for airfreight. In the 23rd of September morning in America, Yu Weijiao, the CEO of Yuantong, comes to Boeing Co. and sign the B737-800BCF Global user agreement that involves in purchasing fifteen airplanes in following three years. So far, there are big three in Express service, the competition between Shunfeng, EMS and Yuantong will be much more intense [3]. Moreover, in 6th of June, Shunfeng, Shentong, Zhongtong, Yunda and Global Logistic Properties (GLP) jointly issue that they set up Feng Chao Technology Co., Ltd. It devotes to explore 'Feng Chao' smart Express cabinet, which is a 24 hours self-service platform and faces to all companies of Express service, E-commerce, and logistics[3]. September in 2015, ShenTong and Tian Tian recombine their management layer and integrate resources. All of these examples clearly reveal that the

companies of Express service have achieved the goal of strengthening.

Thirdly, the objective of the high-quality brand is processing. According to table1, in 2011, there were 49,466 valid complaints which increased 343.6%. In 2012, the valid complaints increased to 137,351, and the rate of year-on-year growth was 177.7%; the number of valid complaints was 196,046, but the speed of increase seems significantly slow down in 2013. Although the number of valid complaints was sustainable growth to 235,000, the rate of growth slowed down to 19.7% gradually in 2014; last year the situation was similar, the valid complaints increased to 275,614, but the rate of growth was only 17.4%. Draw upon these data, it is clearly to say the increased valid complaints are controlled, but the number of complaints still keeps increasing. At the same time, in 2015, there were 43 companies which were complained by customers, and there were 13.34 complaints per million, which reduced 3.47 complaints. The complaints about service, delay and loss are significant, and there are no noticeable changes. We can see the complaints of service in 2015 raised to 37.6%. However, the proportion of the issue of delay decreased to 31.3% in the same year. Also, the problem of losing package increased to 19.1%. From these points, there are too many gaps between the target and reality thus Chinese Express service need more endeavor in the following period.

### INCOMES OF CHININ EXPRESS SERVICE DURING 12TH FIVE-YEAR AND PREDICTION OF BUSINESS COLUME

#### GM (1, 1) prediction model<sup>[4]</sup>

GM (1, 1) prediction model is a simple sequence differential equation of first order. The relevant grey differential equation of it is,

$$\frac{dx^{(1)}(t)}{dt} + ax^{(1)}(t) = b \quad (1)$$

In the formula,

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

this is the original sequence. The accumulation generation transforms at a time of the following sequence

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

Inside,

$$x^{(1)}(t) = \sum_{i=1}^t x^{(0)}(i), t = 1, 2, \dots, n \quad (2)$$

In the equation (1),  $x^{(1)}(t)$  is the accumulative total of this system and  $\frac{dx^{(1)}(t)}{dt}$  is the annual increment of this system, which can be seen as the speed of development in this system. GM (1,1) is a differential equation which describes the dynamic relationships between system memory and flow.

Based on solving differential equation (1), the GM (1, 1) is

$$\begin{cases} \hat{x}^{(1)}(t+1) = [x^{(0)}(1) - \frac{b}{a}]e^{-at} + \frac{b}{a}, & (t=1,2,\dots,n) \\ \hat{x}^{(0)}(t+1) = \hat{x}^{(1)}(t+1) - \hat{x}^{(1)}(t) \end{cases} \quad (3)$$

**Data sources**

According to the running condition of mail industry from 2011 to 2015, the general incomes and business volume of enterprises above designated size are displayed in Table 1.

Table 1 During the period of "twelfth five-year" express business revenue and express business in our country. Unit: One hundred million yuan and Million pieces

Year Index	2011	2012	2013	2014	2015
Express business revenue	758.1	1055.3	1441.7	2045.4	2769.6
Express business volume	36.7	56.9	91.9	139.6	206.7

The original sequence is the general incomes of Chinese Express service during 12th Five-Year,

$$x_1^{(0)}(t) = (x_1^{(0)}(1), x_1^{(0)}(2), x_1^{(0)}(3), x_1^{(0)}(4), x_1^{(0)}(5)) \text{ Acc} = (758.1, 1055.3, 1441.7, 2045.4, 2769.6)$$

simulation generation transform at a time is

$$x_1^{(1)}(t) = (x_1^{(1)}(1), x_1^{(1)}(2), x_1^{(1)}(3), x_1^{(1)}(4), x_1^{(1)}(5)) = (758.1, 1813.4, 3255.1, 5300.5, 8070.1)$$

Through using the software of grey modeling system, acquire:

$$\hat{a}_1 = -0.458908, \hat{b}_1 = 1225.000529$$

Thus, the prediction model of Chinese Express service revenue is

$$\begin{cases} \hat{x}_1(t+1) = 3427.48072e^{0.458908t} - 2669.38072 \\ \hat{x}_1^{(0)}(t+1) = \hat{x}_1^{(1)}(t+1) - \hat{x}_1^{(1)}(t) \end{cases} \quad (4)$$

And the simulative sequence, residual sequence, relative error sequence and average relative error of Express service revenue are presented in Table2.

Table 2 Analysis table of error

Year	Actual value $x$	Simulation value $\hat{x}$	Residual value	Relative error $\Delta_i$ (%)
2012	1813.4	1995.9774	182.5774	10.0682
2013	3255.1	3158.3255	-96.7745	-2.9730
2014	5300.5	4997.5617	-302.9383	-5.7153
2015	8070.1	7907.8684	-162.2316	-2.0103

The average relative error of the value of simulation is  $\Delta_i = 5.19\%$ , and the average relative accuracy of it is  $1 - \Delta_i \approx 95\%$ . According to the frequently-used comparison table of accuracy level in Table 3, which is from reference 4, the simulation accuracy achieves the level 2. The prediction accuracy  $1 - \Delta_4 \approx 98\% > 95\%$  is beyond level 2 and approaching level 1.

Table 3 Reference table of level of accuracy test

accuracy class	Level 1	Level 2	Level 3	Level 4
relative error $\Delta$	0.01	0.05	0.10	0.20

**THE PREDICTION OF THE TENDENCY OF CHINESE EXPRESS BUSINESS VOLUME**

Based on Table 2, the data of Chinese Express business volume during 12th Five-Year can be seen as original sequence, thus using GTMS3.0 to establish Express business volume GM (1,1) prediction model. The specific steps are following: The original sequence is the total Express business volume,

$$x_2^{(0)}(t) = (x_2^{(0)}(1), x_2^{(0)}(2), x_2^{(0)}(3), x_2^{(0)}(4), x_2^{(0)}(5)) = (36.7, 56.9, 91.9, 139.6, 206.7)$$

Accumulation generation transform at a time,

$$x_2^{(1)}(t) = (x_2^{(1)}(1), x_2^{(1)}(2), x_2^{(1)}(3), x_2^{(1)}(4), x_2^{(1)}(5)) = (36.7, 93.6, 185.5, 325.1, 531.8)$$

Through using the software of grey modeling system, acquire:

$$\hat{a}_2 = -0.526285, \hat{b}_2 = 61.421018$$

Thus, the prediction model of Express business volume is

$$\begin{cases} \hat{x}_2(t+1) = 153.406815e^{0.526285t} - 116.706815 \\ \hat{x}_2^{(0)}(t+1) = \hat{x}_2^{(1)}(t+1) - \hat{x}_2^{(1)}(t) \end{cases} \quad (5)$$

And the simulative sequence, residual sequence, relative error sequence and average relative error of Express business volume are presented in Table 4.

The average relative error of value of simulation is  $\Delta_i = 6.51\%$ , and the average relative accuracy of it is  $1 - \Delta_i \approx 93.49\%$ . Through comparing with Table 4, the simulation accuracy is approaching level

2. The prediction accuracy  $1 - \Delta_4 \approx 96.89\% > 95\%$  is better than level 2.

Table 4 Analysis table of error

Year	Actual value $x$	Simulation value $\hat{x}$	Residual value	The relative error $\Delta_i$ (%)
2012	93.6	106.2545	12.6544	13.5197
2013	185.5	179.8497	-5.6503	-3.0460
2014	325.1	304.4194	-20.6806	-6.3613
2015	531.8	515.2701	-16.5298	-3.1083

Based on the model (4) and (5), the prediction of Express business revenue and volume from 2016 to 2018 are shown in Table 5.

Table 5 Predictive value of express business revenues and express business volume form 2016 to 2018. Unit: One hundred million yuan and Million pieces

Year	2016	2017	2018
Express business revenue	4605.11	7286.87	11530.36
Express business volume	356.89	604.09	1022.49

### CONCLUSION

Regarding prediction, the Express business revenue will break through trillion Yuan, and the Express business volume will be over a hundred billion pieces. With the development of technology and global economic integration, the Express service will be large-scale, collective and branded rapidly. Furthermore, the Express business revenue and volume will increase dramatically; therefore, the incomes of Express service will be an important part of GDP.

### SUGGESTIONS

According to a 2015-2020 China's Express delivery industry market supply and demand outlook in-depth research report, it shows that China's Express delivery industry is brewing a new revolution [5]. One is Yuantong is in charge of "Tonglu group"; the second is the Express industry pattern changed; the current Express industry balance is broken; cross-border overseas online shopping is more and more popular. Express delivery enterprises have to the breakthrough stage of qualitative transformation, bigger and stronger. Therefore, development of domestic Express delivery enterprises need to put forward the following Suggestions are as follows:

First one is with the active support of national policy and promote, Courier companies will become bigger and stronger, must get merger and reorganization, the listed financing, integration of small and medium-sized enterprises, optimize the allocation of resources, further strengthen cross-border

electricity business investment and development, using the thinking of "Internet + Express" activate

enterprise development potential, promote transformation and upgrading of industry and the mass transfer efficiency.

Secondly, it is regulating the Express delivery market, establish a perfect legal system, improve the service level of Express enterprises. At present, the Express delivery service quality is unsatisfactory, high proportion of consumer complaint and appeal. Data from Table 1 shows that most of the Courier companies to Express mail is delivered promptly to compare, and for delivery to establish their brand awareness is insufficient of training service personnel. The industry personnel could strengthen the brand awareness, brand management innovation; Need for state construction, a group of radiation domestic and international air Express freight hubs and actively guide the cultivation form internationally competitive large key Courier companies.

Thirdly, the Express service in middle and west of China should be focused. The Express service is a vast market with unbalanced regional development in China especially in central and western regions where to have potential development spaces. The provinces in these areas should enact corresponding '13th Five-Year' measures toward to Express industry based on < Opinions of the State Council on Promoting the development of Express delivery industry>. According to this document, Express industry should face to rural areas, western region and then oversea market. Therefore, establishing expert gardens of Express delivery and terminal markets could be feasible scheme; besides, building the terminal service platform and improving service network around the countryside and western part also need to be concerned. In particular, Western provinces should support the innovation model of collaborating between mail business and Express service, which could enhance the efficiency of using mail infrastructures. Except that, creating a healthy atmosphere is also a crucial element, which includes legal environment, policy conditions, market circumstances and harmonious society. Meanwhile, all of these factors could promote Express delivery in central and western areas and then the harmonious development of Express industry can be achieved.

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