

# Drug Market Analysis Strategy Based on the Background of the National Unified Market

Ruijin Hou, Wenbin Fan, Yinan Wu

Taiyuan University of Science and Technology, Taiyuan, China, 030024

**Abstract:** Building a unified national market is the basic support and inherent requirement of building a new development pattern. This paper selects the indicators that have an impact on the unification of the national market and divides them. Therefore, we have established a suitable evaluation system. Secondly, based on the above index system, data are collected and clustered, and the curve fitted by grey prediction analysis predicts the trend for the next four years, indicating that China's drug market has a certain room for growth. Finally, put forward effective and reasonable suggestions to the relevant departments.

**Keywords:** Analytic Hierarchy Process, Clustering Analysis, Entropy Weight Method, Grey Prediction Analysis

## 1. Introduction

In recent years, China's socialist economic system has gradually improved, and the construction of a unified national market is the basic support and inherent requirement for the construction of a new development pattern, which embodies the essential characteristics of the socialist economy. Nowadays, in the context of the establishment of a unified market, whether the chaotic problem of the drug market can be solved is a topic of great concern to the people. However, due to the particularity of the drug market, there are still some problems in the domestic drug market, such as insufficient competition and imperfect structure.

Literature<sup>[1]</sup> points out that the regulatory defects of pharmaceutical enterprises are mainly reflected in the inconsistency of standards, local protection and inaction through the analysis of regulatory policy defects. Literature<sup>[2]</sup> points out that through big data analysis, the loss of domestic drugstores has expanded and the operating cost has increased in recent years. Literature<sup>[3]</sup> starts from the reform model of drug regulatory agencies, analyzes the reasons for the formation of the model and the problems faced, and gives the regulatory strategy of the national drug market. To sum up, the establishment of a unified national drug market is very important for the long-term and healthy development of the industry.

The above literature has made a systematic summary of the problems faced by the drug market at the present stage in China, but few solutions have been mentioned. This paper focuses on the construction of a unified national market evaluation system and applies it to the pharmaceutical industry to evaluate the unification degree and promotion space of China's pharmaceutical market, and then summarizes the key problems existing in China's pharmaceutical market from the perspective of healthy economic operation, and analyzes whether the chaotic degree of the pharmaceutical market can be improved. To test the effectiveness of the national unified market policy from the side, to put forward reasonable suggestions to the relevant departments.

First of all, we select the indicators that may have an impact on the unification of the national market and divide them into nine influencing factors. Accordingly, we establish a suitable evaluation system. Secondly, based on the above index system, data are collected and clustered, and the curve fitted by grey prediction analysis predicts the trend for the next four years, which shows that China's drug market has a certain room for growth. Finally, using the distance method of superior and inferior solutions combined with the entropy weight method to evaluate the degree of chaos in the drug market in recent years, and put forward effective and reasonable suggestions to the relevant departments.

**2. The Construction of the National Unified Market Evaluation System**

**2.1 Construction of evaluation system**

By consulting and summarizing a large number of previous studies and related papers[4], we divide this evaluation problem into three levels, the first level is the target level, that is, the unified index system to evaluate the national market of a certain industry, the second level is the criterion level, that is, market environment, market supervision and industrial structure, and the third level is the evaluation level; The third layer is the scheme layer, namely, market demand, supply capacity, profitability, regulatory scheme, local policy, implementation, innovation ability, capital investment and technology level. As shown in figure. 1

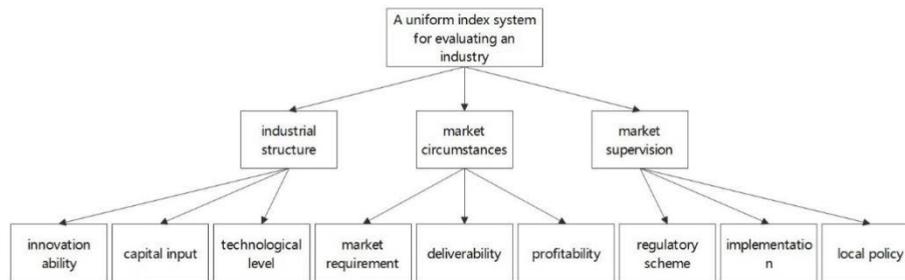


Figure 1: Evaluation system

**2.2 Model solving**

Through the matrix analysis[5], the results are shown in Table 1, all of which pass the consistency test, which is shown in Table 2.

Table 1: Average random consistency index RI

<b>n</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>
RI	0	0	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49	1.52	1.54	1.56	1.58	1.59

Table 2: Consistency check

Programme	CI	CR
C	2.77E-04	5.33E-04
Industrial structure	0.0077	0.0148
Market environment	0.0342	0.0658
Market regulation	0.0028	0.0053

**2.3 Calculate the weight**

Matlab software is used to normalize the above matrix and calculate the weight. To ensure the robustness of the results, this paper uses three methods to calculate the average value after the weight and then calculates the score of each scheme according to the weight matrix, ranking and comprehensive analysis, which effectively avoids the deviation caused by using a single method[6], and the results are more comprehensive and effective. The obtain results are shown in Table 3.

Table 3: Weight analysi

Industrial structure			Market environment			Market regulation		
0.6487			0.2292			0.1222		
Innovation ability	Capital input	Technical level	Market demand	Supply capacity	Profitability	Regulatory program	Implementation	Local policy
0.5498	0.2406	0.2096	0.6129	0.1180	0.2691	0.5397	0.1631	0.2972

**2.4 Model conclusion and analysis**

The combined weight of the scheme layer to the target layer is further calculated, that is, the proportion of the importance of these indicators to the quality of economic operation. Among them, the largest proportion is supply capacity, which reaches 35.7%, indicating that supply capacity is very important in the quality of economic operation. As shown in figure. 2

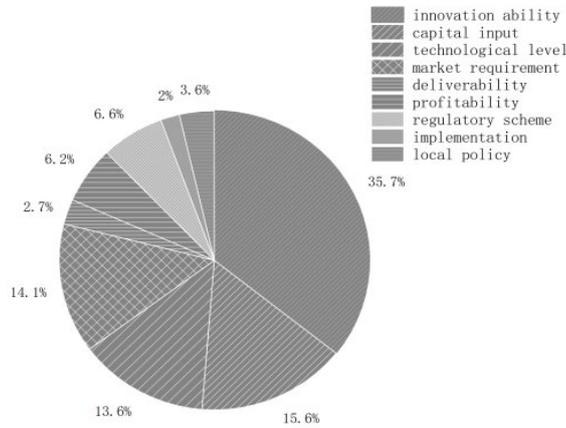


Figure 2: Proportion of indicators in economic operation

**3. Solution to the Unification Degree of the National Drug Market**

**3.1 Data summarization**

By searching the Statistical Report of Drug Supervision and Administration of the State Drug Administration up to the end of September 2021., we divide the industrial structure into the number of raw materials and pharmaceutical manufacturers and the number of special pharmaceutical manufacturers and divide the market environment into the number of wholesale stores[7].

**3.2 Model solution**

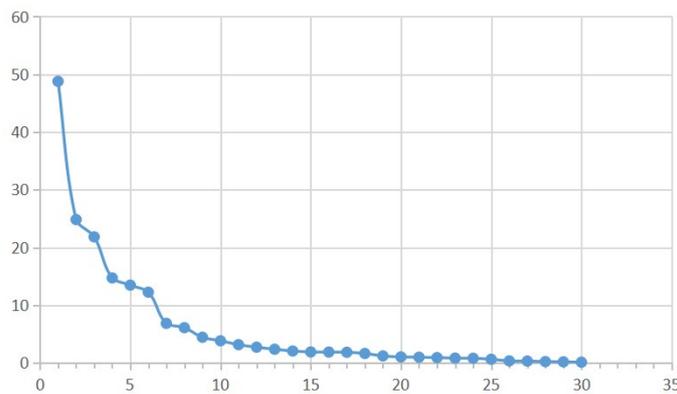
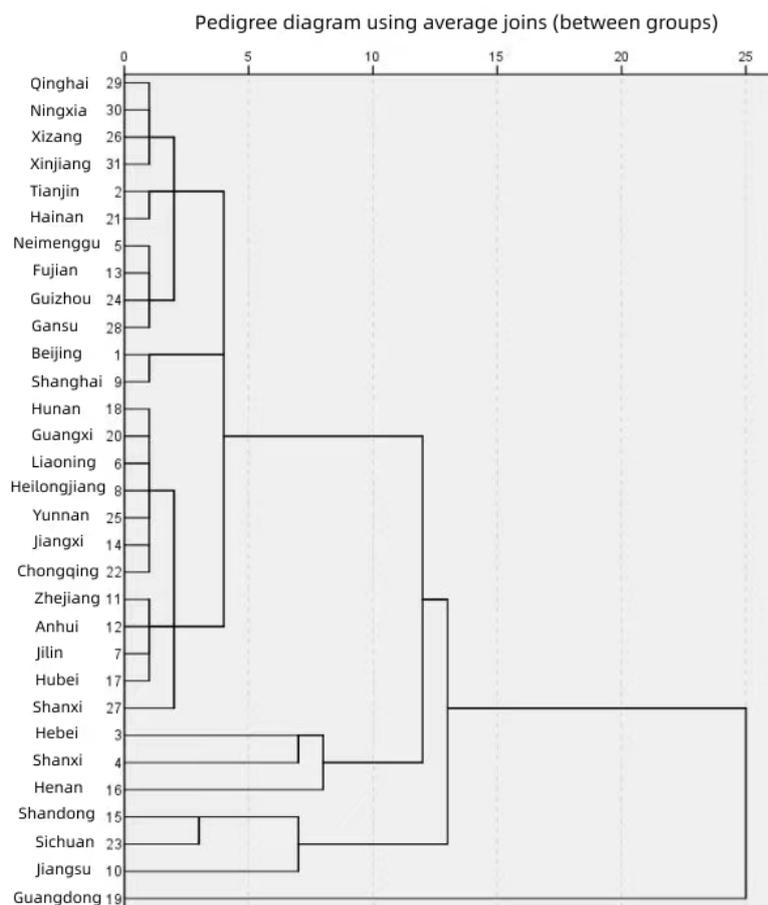


Figure 3: Coefficient elbow chart

As shown in the figure above, hierarchical clustering calculates the distance between two classes of data points, combines the closest two classes of data points, recalculates the distance between the new class and all classes, and iterates this process until all data points are combined into one class. The data were processed in SPSS software, and the clustering coefficient matrix and the clustering pedigree diagram were obtained after standardization. As shown in figure 3.



*Figure 4: Average join spectrogram*

In descending order and display it in the form of an elbow line chart, with the clustering category as the abscissa and the aggregation coefficient as the ordinate. As shown in figure. 4.

According to the elbow plot of the aggregation coefficient [8], when the number of categories is 2, the downward trend of the broken line is significantly slowed down, and the degree of distortion is reduced, so the number of categories can be set to 2. Except for Guangdong, the other provinces are in the same category.

### **3.3 Model conclusion and analysis**

From the above clustering results, we can see that China's drug market can be roughly divided into two categories. Except for Guangdong Province, the other provinces are similar in terms of industrial structure, market environment and market supervision, and China's drug market is relatively unified.

## **4. Solution to the Promotion Space of the Unified National Drug Market**

### **4.1 Application of Entropy Method and Grey Prediction Analysis**

By looking up the data of the number of national drug dealers in the nine years from 2012 to 2020 from the Drug Administration [9], the market environment is quantified, and the grey prediction analysis is carried out through the spsspro software to obtain the trend of the market environment in the next four years. As shown in figure. 5.



Figure 5: Trend of market environment in the next four years

From Figure 5, it can be seen that the market environment will steadily rise in the next four years, and there is still room for improvement in the unified market.

### 5. The Key Problems and Solutions of the Large Drug Market

#### 5.1 Summary of key issues in the drug market

Table 4: Drug market violation cases

Year Case	Drug cases (10,000)	Drug packaging material cases (case)	Medical device cases (10,000)	Cosmetic cases (10,000)
2015	8.92	211	1.08	0.61
2016	9.68	457	1.39	0.77
2017	11.2	318	1.7	1
2018	9.8	249	1.8	1.1
2019	7.7	264	1.5	0.87
2020	6.17	140	2.67	1.43

By referring to and summarizing a large number of previous studies and related papers, we have summed up five key issues for the healthy operation of the market, including drug violations, drug packaging material violations, medical device violations, cosmetics violations and health care food violations. Considering that health care food violations will be incorporated into drug violations after 2015, this paper will not discuss them. We have sorted out the number of violations in the drug market in the six years from 2015 to 2020. The data are from the annual report of the State Drug Administration. As shown in Table 4.

#### 5.2 Analysis of solutions to key issues in the context of the Unified

In the context of a unified market, we quantify the industrial structure as the number of all manufacturing enterprises, the market environment as the number of all operating enterprises, and the market supervision as the quantity of drug production licenses. By consulting the annual reports provided by the State Drug Administration from 2015 to 2016, we have sorted out the quantity of the above indicators for each year.

Under this evaluation system, the above violations are analyzed one by one, and the broken line chart is drawn after the matrix is dimensionally standardized. As shown in Figure 6 and 7.

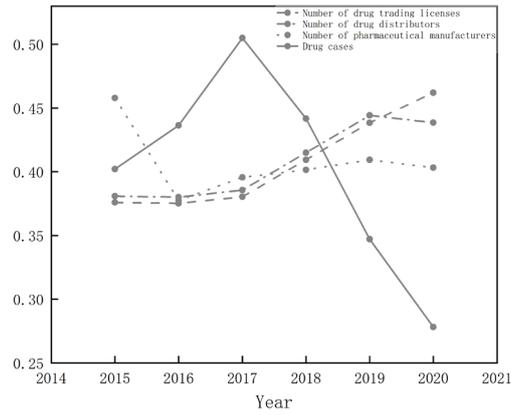


Figure 6: Drug cases

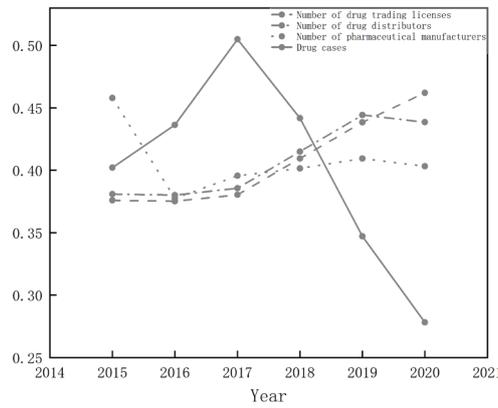


Figure 7: Drug packaging material case

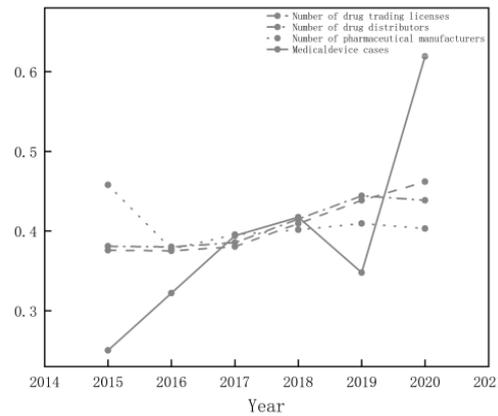


Figure 8: Medical cases

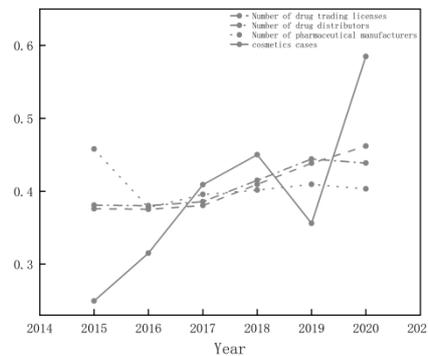


Figure 9: Device cases Cosmetic case

From the above graph, it can be seen that the number of the three indicators is generally on the rise, and the number of drug cases and drug packaging material cases has decreased significantly with the increase of the three indicators in the unified market, indicating that the problem of drug violations and drug packaging material violations can be effectively solved. Medical device cases and cosmetics cases rose slowly from 2015 to 2018, declined in 2019, but rose sharply in 2020 and reached the highest point in history, indicating that medical device violations and cosmetics violations can not be effectively solved under the background of the unification of the national market. As shown in Figure 8 and 9.

Considering the impact of the epidemic situation in China in 2020, we believe that under the epidemic situation, the manufacturers of medical devices and cosmetics can not be effectively regulated, and it is expected to decrease with the slowdown of the epidemic.

## 6. Conclusion

This article has established a set of suitable appraisal systems, according to the corresponding target, collects the data and carries on the clustering, and through the grey forecast analysis fitting curve has forecast the next four years' tendency, indicating our country's drugs market has a certain rise space. However, under the epidemic situation, if the manufacturers of medical devices and cosmetics are not effectively regulated, their share will decrease with the slowdown of the epidemic. Therefore, relevant departments should introduce relevant laws and policies to regulate and guide them. Only in this way can China's drug market develop better and faster.

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