

# **COMPARISON OF THE COMPETITIVENESS OF PEONY INDUSTRIAL CLUSTERS BETWEEN HEZE AND LUOYANG, CHINA**

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## **Abstract**

*The competitiveness of industrial cluster not only shows the size of certain industry strength, but also represents the strength of the region's economic competitiveness. The study of competition of Peony Industry Cluster chooses two famous peony origins of Heze in Shandong and Luoyang in Henan as the research object, adopts the method of questionnaire survey, and based on AHP-GEM model, analyzes the factors that affects the competitiveness of peony industry cluster, and analysis of the underlying reasons, so as to put forward feasible suggestions, promote the development of both the peony industry cluster. Findings suggested that with the peony production and ornamental base, Heze and Luoyang in the peony industry cluster's competitiveness has obvious difference. Whether in resource endowments and organizational management, Luoyang were slightly better, which depends not only in the natural environment of Luoyang, depending in the guidance of the local government, the development of related businesses, industry related auxiliary, with multi part before the final formation of the strong competitiveness of Luoyang peony industry.*

*Keywords: AHP-GEM, Peony Industrial Clusters, Competitiveness, China*

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## INTRODUCTION

Since the beginning of twenty-first Century, the industrial cluster has occupied an increasingly important role in the development of social economy. In today's era, the basic spatial framework of the world economy is composed of industrial clusters, the size of a country or region's competitiveness is often reflected by the competitiveness of industrial clusters. The advantage of industrial clusters is that it can greatly reduce the cost of products, can form the absolute size of the industry effect, can enhance the efficiency of information communication, and can form a strong brand advantage. The greatest charm of industrial clusters is that it is produced naturally, through the market allocation of science, insignificant factors of production through group Hwan sent market competitiveness [Ma Guilan, 2009].

The so-called industrial clusters is refers to "in a specific area, with the relationship of competition and cooperation, and focus on the geographical, consisting of interrelated enterprises, specialized suppliers, service providers, financial institutions, firms in related industries and other relevant agencies to groups" [Liu Lei, 2011]. The so-called industrial clusters competitiveness, "is refers to the various resources of industrial clusters, including enterprises, resources, basic facilities and technical conditions as the basis, to the network dynamic relationship between enterprises and the level of progressive operation mode, with the environmental utilization ability and evading ability, in the global market competition can bring substantial efficacy of strong competitive advantage for the overall performance of the industrial clusters" [Chen Tingwei, Chen Lin, 2008].

This paper takes the peony as the research object, and takes the famous peony origin of Heze in Shandong and Henan Luoyang as a sample, using the theories and methods of industrial clusters competitiveness comparative analysis, on an area of peony industry development, improve the competitiveness of the regional economy, but to strengthen inter regional economic cooperation and has certain practical significance.

## RESEARCH METHOD

For the research of industrial cluster competitiveness, the domestic scholars have experienced the process from qualitative analysis to quantitative measurement. At present for the competitiveness of industrial clusters of quantitative analysis method mainly has: GEM model method, hierarchical analysis method, entropy method and improved entropy method, subjective and objective view of comprehensive evaluation method. In this paper, the analysis of the method, the AHP level analysis and the use of the GEM model method, the Heze Henan and Luoyang Shandong peony industry cluster competitiveness comparative evaluation.

### **Analytic Hierarchy Process**

The analytic hierarchy process, proposed by L.T Saaty, a famous American scientist and professor at University of Pittsburgh, is a systematic analysis and comprehensive evaluation method. Hierarchical analysis method according to the nature of the problem and to achieve the total goal will be covered by the problem is decomposed into different factors, and according to the relationship between the factors and mutual influence is divided into different levels, and ultimately the formation of a multi-level structure model. In the process of analysis, the relative weight of each factor is determined according to the relative importance weights of the lowest level with respect to the highest level, in order to realize the analysis of the influencing factors of the total target. In the AHP method, the weight of each level factor is obtained through expert scoring, so this method is also known as the subjective weighting method.

### **GEM Model**

GEM Model is the foundation "(Groundings), enterprises (enterprises): referred to as market (markets)" model, mainly used for the evaluation of the competitiveness of industrial clusters, by the Canadian scholar Tim Padmore and Henrev Gibson in the porter's "Diamond Model" to put forward. GEM model identified three factors and six factors. Three factors namely, enterprise and market, six factors refers to the basic elements include the "resources" and "facilities", enterprise elements include the "suppliers and related and supporting industries" and "enterprise structure, strategy and competition", market factors including the "home market" and "external market". In the GEM model, each element has a complementary relationship, and each element has an associated role.

### **Constructing Evaluation Index System**

In accordance with the AHP method, the index system is divided into target layer, criterion layer, and element layer; at the same time, the GEM model will be involved in the six factors of the further refinement for 29 second grade indexes, construct the evaluation index system of peony industry cluster, and see Table 1.

By using the existing GEM analysis steps, according to the expert scoring to determine the weight of each level factor in the AHP method, the comprehensive evaluation of the competitiveness of the peony industry clusters.

Table 1: Evaluation Index System of the Competitiveness of Peony Industry Cluster

Target layer	First criterion layer	Second criteria layer	Factor layer
Mudanjiang Dan yield trade collection group Competitive dispute power	Base B <sub>1</sub>	Capital Source C <sub>1</sub>	Climatic conditions of planting Peony D1
			The adequate degree of suitable peony planting land D2
			The level and amount of peony planting related professional and technical personnel to meet the degree of D3
			The investment level and capital adequacy of peony Enterprises D4
			The general scientific and technological level of peony enterprises and farmers planting D5
			The improvement and development of the road, railway, airport and other transportation facilities related to the peony industry D6
		Facilities C <sub>2</sub>	University and research institutes in the new varieties of peony cultivation, cultivation techniques, pest control and other aspects of support D7
			The professional level and service level of the public training system for the peony flower enterprises and farmers D8
			The improvement and implementation of the financial, tax, financial, export and other policy guidance to the peony industry D9
			Peony industry associations and other non-governmental organizations in the role of self-discipline, coordination management, communication and other functions to play a degree D10
			Financial support to the peony industry and its effectiveness D11
			The order degree of the business environment of the peony industry D12
	Enterprise B <sub>2</sub>	Supplier and related support industries C <sub>3</sub>	Professional level of the peony flower production equipment and other suppliers D13
			Peony flower Service Corporation related services, comprehensive, mature D14
			The development of peony logistics transportation system D15
		Enterprise structure strategy competition C <sub>4</sub>	The breadth and professional maturity of peony marketing network D16
			The overall innovation capability of enterprises and farmers, Peony Seedlings cooperative organization D17
			The overall management level of enterprises and farmers peony Cooperation Organization D18

		The economic competitiveness of enterprises and the scale of peony flower growers cooperative organization D19	Table 1...
		The peony flower enterprises and farmers cooperation organization of inter regional cooperation and exchange D20	
		The local peony regional brand visibility and reputation D21	
Market B <sup>3</sup>	Local market C <sub>5</sub>	Domestic peony flower market is currently the size of D22	
		Development prospects of domestic peony flower market D23	
		The satisfaction and loyalty of peony consumers in China D24	
		Local peony demand in the domestic market situation D25	
		External market C <sub>6</sub>	
		Prospects for the development of flower market in foreign countries D27	
		The size of the barriers to entry into the international market D28	
		Local peony demand in the international market D29	

## APPLICATION OF AHP-GEM MODEL TO COMPARE AND ANALYZE THE COMPETITIVENESS OF PEONY INDUSTRY CLUSTER

### Collect Data and Determine Weights

For the determination of peony industry cluster competitiveness, according to the above assessment index system design corresponding questionnaire, site survey, network survey, letter investigation through a variety of ways, respectively, to Heze and Luoyang, the two peony enterprises, scientific research personnel and management of peony, and engaged in the culture of tree peony and Peony industry research of teachers of colleges and universities, government staff and relevant experts issued 30 questionnaires, recycling effective questionnaire were 25 and 23. The index scores of the study were the same as the average scores of the questionnaires.

The calculation and treatment of statistics was completed on EXCEL2003. Results are shown in Table 2.

Table 2: Index Weight of Each Level of Peony Industry Competitiveness

First level criterion layer			Two level criterion layer			Factor layer			rankin g
Symbol	Single sort value	Total weight	Symbol	Single sort value	Total weight	Symb ol	Single sort value	Total weight	
B1	0.36	0.36	C1	0.5	0.18	D1	0.12	0.02	19
						D2	0.25	0.05	5
						D3	0.16	0.03	12
						D4	0.23	0.04	7
						D5	0.24	0.04	8
			C2	0.5	0.18	D6	0.35	0.06	3
						D7	0.09	0.02	20
						D8	0.11	0.02	21
						D9	0.10	0.02	22
						D10	0.15	0.03	13
						D11	0.08	0.01	29
						D12	0.12	0.02	23
B2	0.40	0.40	C3	0.5	0.20	D13	0.36	0.07	2
						D14	0.20	0.04	9
						D15	0.26	0.05	6
						D16	0.18	0.04	10
						D17	0.47	0.09	1
			C4	0.5	0.20	D18	0.28	0.06	4
						D19	0.13	0.03	14
						D20	0.12	0.02	24
						D21	0.25	0.03	15
						D22	0.20	0.02	25
B3	0.24	0.24	C5	0.5	0.12	D23	0.19	0.02	26
						D24	0.23	0.03	16
						D25	0.13	0.02	27
						D26	0.35	0.04	11
						D27	0.27	0.03	17
			C6	0.5	0.12	D28	0.16	0.02	28
						D29	0.22	0.03	18

### Determination of the Peony Industry Cluster Competitiveness Score

#### *Calculate the Index Score*

According to the weight of each level in Table 2, combined with the average value of the questionnaire, the scores of each level can be calculated. Weighted average of each level of the score and its weight, the result is the upper level of the index score, the results see Table 3

Table 3: Evaluation System of Each Level Index Score Table

First level criterion layer			Two level criterion layer			Factor layer		
Symbol	Factor on score		Symbol	Factor on score		Symbol	Index score	
	Heze	Luoyan		Heze	Luoyang		Heze	Luoyang
B1	5.21	6.90	C1	6.76	7.98	D1	9.06	9
						D2	6.81	8.62
						D3	6.27	7.46
						D4	3.59	6.08
						D5	8.93	8.98
						D6	2.81	4.93
			C2	3.65	5.81	D7	5.67	7.60
						D8	3.56	6.65
						D9	5.21	6.45
						D10	2.86	5.68
						D11	3.67	5.07
						D12	4.35	6.35
B2	4.01	6	C3	3.81	5.99	D13	3	5.32
						D14	4.03	6.03
						D15	4.95	5.95
						D16	3.53	7.35
						D17	5.26	6.02
			C4	4.38	6.01	D18	3.54	6.54
						D19	2.79	5.69
						D20	4.62	5.78
						D21	7.07	8.37
						D22	5	5
B3	6.17	6.94	C5	5.81	6.77	D23	7.50	7.50
						D24	3.97	6.03
						D25	5.46	6.64
						D26	7.99	7.99
			C6	6.52	7.10	D27	8	8
						D28	2.08	5.08
						D29	5.60	6.06

### Calculate the Competitiveness of Peony Industry Cluster

GEM model is used to calculate the competitiveness of peony industrial clusters, and to go through the two conversions. The first conversion: Based on the score of each factor in Table 3, the calculation and conversion of the factors were carried out in order to get the score of each factor. The formula used is:

$$LCS = \sum_{i=1,3} (Bi)$$

LCS, the full name is LINEAR CLUSTER SCORE. By the formula, we can see that the cluster linear score for each factor of the Bi product, reflecting the various factors in the GEM model

correlation between pairs of, any one factor of the lower score will affect the final score of the competitiveness of the entire cluster.

The second conversion: its purpose is to make the final score out of 1000, so that it is only a percentage of the conversion. Formula for:

$$GEM=2.5 \left( \prod_{i=1,3}^{2} B_i \right)^{2/3}$$

The higher the score of GEM is, the stronger the cluster competitiveness of the industry. If a cluster of six factors score of 5 points, which reached the average level of each factor, then the gem score for 250 points, indicating the competitiveness of the industrial cluster to achieve a domestic average level; when the score of a factor of 6 to 7 minutes, then its gem score for about 490 points, indicating that the industrial clusters competitiveness in the country is very strong; if the scores of all factors are close to 10 points, then the gem score close to 1000 that the competitiveness of the industrial cluster is the world's strongest (Yang Xiaoyun, Qi Zhenfa, 2011).

Calculated according to the formula, the final score of Heze and Luoyang peony industry cluster competitiveness respectively 255.50 and 435.425 points, according to the findings in the relevant personnel to scoring display of Heze peony industry cluster has certain competition ability, in the peony flower market with a certain competitive advantage; and Luoyang peony industry clusters have stronger competitiveness, in domestic has a stronger competitive advantage.

### ***Comparative Analysis of the Competitiveness of Peony Industrial Clusters***

In the six factors scores of peony industry cluster competitiveness, Heze and Luoyang, the two resources to 6.76% and 7.98 points, both in terms of peony planting and cultivation has unique geographical advantages in resources, excellent varieties of peony, at home and abroad prestigious, but compared, Heze Peony firm level investment limited, peony industry capital injection is not sufficient, which in a certain extent limits the peony industry cluster development, so to improve the competitiveness of peony industry cluster, efforts should be increased in the actively introducing strategic capital investment. Facility scores were 3.65 points and 5.81 points, the Heze peony industry hardware facilities was lower, mainly because of economic geographical location caused by Heze, Heze is the underdeveloped regions in Shandong Province, traffic facilities, traffic network is underdeveloped, high transportation costs, reduce the foreign competitive advantage; secondly, the prevention and control of Heze Universities and research institutions to cultivate new varieties of peony cultivation techniques, plant diseases and insect pests of the lack of support, especially in local colleges and universities, is closely linked with the enterprise and the peony flower, to a certain extent, also restricts the



peony competitiveness of industrial clusters; thirdly, compared Luoyang relatively perfect training system and the industry association. According to the Heze peony flower enterprises and farmers of the public training system is not perfect, the peony industry association and other non-governmental organizations function has not been fully Play, fiscal and taxation policy guidance is not in place, greatly hindered the healthy development of peony industry cluster; in addition, in the level of economic development, with Luoyang and Heze also exist a certain gap, economic development is relatively backward, the market order should be further standardized, market access to information is not timely, influence the development of the peony industry greatly.

Suppliers and related and supporting industries of Heze to score only 3.81, show that Heze peony industry chain of industrial clusters development is still not perfect, suppliers and related industries development is lagging behind, peony flowers, service, service is not comprehensive, not mature, especially for peony service logistics system construction and the construction of marketing system is obviously insufficient, and the level of lower. Luoyang is 5.99, Luoyang peony industry cluster has begun to take shape, development of related industries and services more comprehensive and mature, especially in terms of marketing system, the government and the Association for sales of peony provides a strong guarantee. Enterprises structure, strategy and competition score was 4.38 and 6.01, Heze score is still low, below the average level that the peony enterprises and Farmers Cooperation Organization in management level and economies of scale are still gaps, inter regional cooperation and exchanges still need to further enhance and improve.

From the point of view of the local market score, Heze is 5.81 points, Luoyang was 6.77 points, are slightly higher than the general level, thus it may be known, two peony industry cluster has some unique advantages in resources, at the same time, it also has good prospects for the development of the market. High score of exterior market, respectively, 6.52 and 7.10, that the foreign market prospect is good, but the Heze Peony into the international market has some obstacles, mainly manifested in the lack of brand protection; flowers cyber squatting has sounded the alarm. Brand protection should be strengthened in the future development, the better the open foreign markets.

## CONCLUSION

From the above analysis we can see that, with the peony production and ornamental base, Heze and Luoyang in the peony industry cluster's competitiveness has obvious difference. Whether in resource endowments and organizational management, Luoyang were slightly better, which depends not only in the natural environment of Luoyang, depending in the

guidance of the local government, the development of related businesses, industry related auxiliary, with multi part before the final formation of the strong competitiveness of Luoyang peony industry. In terms of Heze, also has peony unique geographical and resource advantages, and certain extent formed the regional brand, fusion of Heze City Peony Research Institute of scientific research strength, so that the aggregate economy in many industries positive effect can be achieved, such as providing learning opportunities. But in the further development there are still imperfect industrial facilities, auxiliary industry construction is not in place, service system is not mature, peony corporate structure is irrational, strategic positioning is not clear, competition ability is not strong and so many problems; coupled with lack of awareness of brand protection, inadequate policy support, make the peony industry chain is not smooth enough.

According to the quantitative evaluation results of the competitiveness of the peony industry cluster, and combined with the actual development experience and characteristics of the two places, the following suggestions are put forward:

First, the government led, to promote the development of peony industrialization. A regional economic and industrial development, is inseparable from the government's policy support, the government should do work of land transference, promote the peony industry development scale, to ensure the adequacy of peony; increase the local government financial investment, at the same time, increase investment, to attract more strategic investors to participate in the peony industry development. In addition, actively cultivate new varieties, improve the overall scientific and technological level of peony enterprises and farmers, and improve the efficiency of capital output. Simultaneously,

Secondly, the awareness of the development of peony industry must be enhanced. Strengthen the development of peony industry, improve people's awareness and identification of peony and its industry, is the basis of industrialization. Should be established to promote the government, the industry self built peony industry service system. Increase the training intensity of the peony industry related personnel, establish and perfect the peony industry service system, the establishment of peony industry association, strengthen cooperation between schools and enterprises, improve the level of peony research and innovation capacity.

Third, the establishment of a sound market economic order. The development of regional economy cannot be separated from the healthy economic environment. Improving business environment for peony industry; speeding up the highway and airport construction, reduce transportation disadvantage of high transportation costs; the establishment of government led, conform to the laws of market economy operating mechanism, integration peony enterprises, actively cultivate leading enterprises of peony, establishment of industrial

development model of node in agricultural enterprises; at the same time, grow in size and strong brand of peony, increase investment and publicity of the brand peony, peony industry chain integration, government guarantee, industry associations to guide, enterprise capital and technical support, after-sales service department, peony industry to create a dragon, enhance the brand advantage, peony industry cluster competitiveness enhancement.

Peony industry cluster competitiveness improvement depends on the external environment and the internal resources, in the development, from the perspective of industry chain of establish a smooth peony flower industry chain, brought into full play the initiative of the government, enterprises, farmers, industry associations, research institutions, universities and other aspects, cluster competitiveness of ascension as a common work, give full play to the positive role of the factors in the cluster; at the same time, the timely grasp market trends, market demand oriented, driven by the peony industry to a higher level.

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