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Study on the impact of cultural factors on the industrial competitiveness of oolong tea based on spatial effects

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ABSTRACT: According to industrial competitiveness evaluation of oolong tea, we would love to study different effects of cultural factors of industrial competitiveness, especially the spatial effects. Researches indicate that the cultural factors affected the competitiveness of tea industry sharply, which have spatial effects. The researches of spatial effects of cultural factors are useful in understanding their spillover effects, which is conducive to study the cultural influence of oolong tea industry.

Keywords: competitiveness of oolong tea industry; spatial effects; cultural factors

Oolong tea once was an important commodity on the Silk Road, which has worldwide cultural influence and competitive advantages. The publications of many scholars, like Weber[1], Potter[2], David[3], etc. have specified the effect of culture on the industrial development, which have demonstrated that culture has influence on economic development. The research on theory of oolong tea industry used to concentrate on industrial development strategy of oolong tea, brand building of tea, transmission and analysis of tea culture, and promotion of oolong tea production and market.

1 CULTURAL CONTENTS OF OOLONG TEA INDUSTRY

The study defined that the cultural factors of oolong tea industry are related to the regional brand culture, including regional brand reputation, network influence of regional brand, tea culture atmosphere, brand loyalty, etc.. Regional brand reputation is an important manifestation of industrial culture. The network influence of regional brand uses the regional brand as carrier, and the network as communication method, to expand regional brand visibility and influence consumer behavior. According to the survey data, the communication effect of regional brand is more obvious when the regional brand network influence is more significant.

Tea cultural atmosphere is one of the environmental conditions and the motive power of development of tea industry. The enterprise brand loyalty is the loyal behavior of consumption for brand based on the good regional brand reputation. Reputation and brand loyalty are reflected in the market behavior by the way of marketing.

2 COMPETITIVENESS EVALUATION OF OOLONG TEA INDUSTRY

We took the diamond model as framework, used the data of 125 main origins of oolong tea in China, combined the results of 800 questionnaires, and adopted exploratory factor analysis, to evaluate the competitiveness of oolong tea industry.

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2.1 *Index selection and interpretation* [4]

According to the availability and scientificity of data, 16 indicators are selected for the collection and analysis of data, which are mainly cross-sectional data. Based on the previous research and observation, the data of oolong tea industry have good continuity and robustness in recent 5 years. The study utilized the GDP (X1), the per capita GDP (X2), tea production (X3), tea output value (X4), yield (X5), tea planting area (X6), average price (X7), the scale of enterprise sales (X8), the number of enterprises (X9), R&D funds (X10), regional brand reputation index (X11), tea culture evolution (X12), brand loyalty (X13), regional brand management (X14), network sales (X15), brand network influence (X16) variables as indicators.

2.2 *Competitiveness evaluation oolong tea industry*

Many factors have impacts on oolong industrial competitiveness, and the proper selection of evaluation methods is helpful to validate the provided theoretical model of competitiveness of oolong tea industry. Exploratory factor analysis is a multivariate statistical method. Starting from studying the dependencies within the related matrix, divide the variables into groups according to correlation. On the premise of decreasing information loss, adopt the method of dimensional reduction to extract a small number of irrelevant indexes, so as to determine main influence indexes and then restudy their meanings. The factor analysis can effectively measure numerous influence indexes so as to analyze the competitiveness of oolong tea industry.

Results of reliability test show that Cronbach's Alpha coefficients get close to 0.8, the minimum acceptable coefficient of reliability test is 0.6 (Chen Qiang, 2010), and the reliability coefficient of the scale above the minimum is 0.795, which indicates that the reliability is good.

The test result of a degree of freedom of KMO is 120, the value of KMO is 0.8, which is greater than 0.5, and the significant value is less than 0.001, on behalf of the correlation matrix between common factors of parent groups, which means those data are suitable for exploratory factor analysis. After the exploratory factor analysis extracts four main factors, the cumulative variance contributes 74.3% of the total, which can explain the variables. (See Table 1)

According to the results of factor analysis, the first factor (F1) is mainly determined by yield (X5), tea output value (X4), tea plantation area (X6), the scale of enterprise sales (X8), and the number of enterprises (X9), which consist of business and industrial competitive advantages. The contribution rate of the first main factor of variance is 30%, so enhancing the industrial competitiveness of oolong tea industry is required.

The second factor (F2) corresponds to tea culture, including regional brand reputation index (X11), tea culture evolution (X12), brand loyalty (X13), regional brand management (X14), and brand network influence (X16), which reflect the cultural competitive advantages. The variance contributes 17.6% of the total, so improving competitive advantage of cultural factors is necessary for oolong tea industry. The third main factor (F3) corresponds to the GDP (X1), the per capita GDP (X2), network sales (X15), and R&D funds (X10), of which contribution rate of variance is 17%. F4 corresponds to the average price (X7) and tea production (X3), and that rate is 9.1%.

Table 2. Competitiveness evaluation of oolong tea industry

Region	Scores of F1	Scores of F2	Scores of F3	Scores of F4	Total
Anxi	9.38191	1.26827	-1.09495	1.64834	4.545985
Nantou	1.57644	2.60208	0.70161	-0.70096	1.408315
Fu'an	2.15631	0.2862	0.81473	-0.59849	1.127616
Wuyishan	1.38383	1.06627	1.32583	-1.05406	1.013916
Taipei	-0.12349	4.18381	-0.48615	-0.79772	0.802672
Luoyuan	0.79147	-0.01305	0.86334	2.32737	0.781358
Zhangping	1.42264	-0.33885	1.16195	-0.0768	0.764422
Fuding	1.32846	0.05025	1.09529	-0.80802	0.722177
Jian'ou	0.68512	0.06189	1.78871	-0.58863	0.587097
Taizhong	-0.59452	3.7704	-0.32246	-0.28812	0.575653
Guangzhou	-0.7594	3.04367	-0.36643	1.87691	0.561301

As we can see from Table 2 that, in the top five competitiveness of oolong tea industry, the score of Anxi is far more than that of other regions. The analytic results indicate that Anxi has a competitive advantage in infrastructure and efficiency. Nantou, Taipei and Taoyuan have advantages in the third factor, which means they have cultural competitiveness, and indicates that Taiwan oolong tea industry's key competitive advantage is the ability of using cultural factors, like brand culture, to enhance the overall competitive advantage. The competitiveness of Wuyi oolong tea industry comes from regional brand, which en-

Table 1. The explanation of the total variance

	Initial eigenvalues			Extraction square and loading			Rotating square and loading javascript:;		
	Total	Variance	Cumulation	Total	Variance	Cumulation	Total	Variance	Cumulation
1	6.332	39.575	39.575	6.332	39.575	39.575	4.874	30.464	30.464
2	3.143	19.646	59.222	3.143	19.646	59.222	2.831	17.695	48.159
3	1.357	8.481	67.703	1.357	8.481	67.703	2.738	17.114	65.274
4	1.070	6.685	74.387	1.070	6.685	74.387	1.458	9.114	74.387
5	0.941	5.884	80.272						

hances the price and gains more profit.

The analyses of competitiveness factors of oolong tea industry can draw the conclusion that the cultural factor has a significant impact on the competitiveness of oolong tea industry. However, considering the influence of spillover effect, the spatial auto regression model is selected.

3 CULTURAL FACTORS OF SPATIAL CORRELATION

Culture is an important factor that influences the way of behavior and thinking, and also impacts on the industrial market competitiveness through affecting the cultural choices and evaluations of target consumers[5]. The close spatial distance is helpful for the flow among elements and improves the production efficiency.

According to research results of Keluerman[6], Lin Guangping[7], Langxiong He[8], etc., and actual situation of oolong tea industry, this study used the reciprocal of spatial distance as spatial weights matrix. The distance between region *i* and region *j* is recorded as d_{ij}, so the weight of spatial distance can be defined as

$$w_{ij} = \frac{1}{d_{ij}}$$

The weight of spatial distance shows that as the spatial distance increases, neighboring effects will decay.

3.1 *Global Moran's I test*

Spatial autocorrelation has complexity in time and direction, and the most popular spatial autocorrelation test is Moran's I.

Table 3. Spatial autocorrelation test

Moran's I					
Variables	I	E(I)	sd(I)	z	p-value
F1	0.051	-0.008	0.014	3.794	0.000

The variable F1 is the score of cultural evaluation of oolong tea industry, and utilizes the reciprocal of spatial distance in different county regions as the spatial weight to test spatial correlation. The results show that the Moran's I is 0.05, which is higher than 0. It denies the original hypothesis of "no spatial correlation", and shows that there is spatial correlation among industrial cultures of oolong tea.

3.2 *Local Moran index test*

The global Moran's I test has studied the spatial effect of industrial cultures of oolong tea, which proved the spatial correlation among them. In order to analyze the spillover effect of industrial culture in different regions, we use the local Moran's I to identify the situation of spatial agglomeration of cultural factors of oolong tea industry in different counties.

Table 4. Local spatial autocorrelation test

Moran's I_i (F1)					
Location	Ii	E(Ii)	sd(Ii)	z	p-value
3 Taipei	0.200	-0.001	0.033	6.053	0.000
12 Nantou	0.131	-0.001	0.039	3.357	0.001
14 Yilan	0.047	-0.001	0.023	2.075	0.038
61 Jian'ou	0.099	-0.003	0.033	3.071	0.002
84 Wuyishan	0.127	-0.002	0.025	5.091	0.000
24 Anxi	-0.263	-0.003	0.045	-5.806	0.000

If I_i is not 0, it demonstrates that the region *i* is surrounded by high scores or low scores of cultural factors' evaluation of oolong tea industry. In order to verify the accumulation of oolong tea industrial competitiveness of different counties, the study chooses local Moran's I. This study shows empirical results of partial counties and cities for convenience.

4 THE EFFECTS CAUSED BY THE SPATIAL CORRELATION OF INDUSTRIAL CULTURE

4.1 *The positive effect of cultural factors on the competitiveness of oolong tea industry*

In the oolong tea-producing areas with strong industrial culture, cultural factors have a significant positive effect on the competitiveness of oolong tea industry. The cultural factors' observation variables are the regional brand reputation, tea culture, regional brand management and network influence of regional brand. Region 3, 12 and 14 are Taipei, Nantou, and Yilan, respectively. The local spatial autoregressive test verifies that there is significant spatial correlation among the above counties, and the cultural factors have industrial agglomeration effect. According to the evaluation results of competitiveness of oolong tea industry, the three counties in Taiwan have more significant competitive advantage in the industrial culture, and Nantou and Taipei get higher scores. For example, the evaluation score of cultural factors of Taipei is higher than 2.5, which has obvious positive influence on competitiveness of its oolong tea industry; that of Nantou is 1.4, and that of Yilan is 0.47, which occupy import positions, and it has proven that cultural factors have great influence on oolong tea industry of Nantou and Yilan.

The area 74 is Jianyang, and area 84 is Wuyishan. The evaluation score of cultural factors of oolong tea industry of Jianyang is 0.54, and that of Wuyishan is 2.65, which play an important role in evaluation. The quality of tea in Wuyishan is outstanding, which is the basis of industrial culture, and then accumulates cul-

tural competitive advantages for the tea industry of Wuyishan for a long time. In recent years, the interactive development between tea industry and tourism culture industry Wuyishan expands its network influence and regional brand awareness. Jianyang, Shaowu, Jianou which are closed to Wuyishan also have a long tea planting history with high brand reputation, and have significant cultural competitive advantage, to enhance the competitiveness of oolong tea industry, which illustrate that cultural factors has the premium effect of strengthening industrial competitiveness.

4.2 *The negative effects of cultural factors on the competitiveness of tea industry*

The area 24 is Anxi, which has enclosed by low scores areas based on the empirical results of local Moran's I test. The yield of Anxi oolong tea is in the first place and Anxi-Tieguanyin as an important representative of oolong tea enjoys a high popularity and reputation in the market. Anxi oolong tea industry have obvious cultural influence, and its evaluation score of cultural factors reached 2.51, only behind Wuyishan and Taipei, which has significant cultural competitive advantage in the oolong tea-producing areas.

The evaluation score of cultural factors of Yongchun, nearby the Anxi, is 0.08, which is lower than that of industrial base factor and industrial efficiency factor. It indicates that cultural factor hinders the total evaluation score of industrial competitiveness. The evaluation score of culture factors of Huaan is 0.14, while that of Nan'an is 0.12. The oolong tea industry in Huaan is lack of well-known regional brands and geographical indications, as well as network influence of regional brand in cultural industry, and the yield of oolong tea in Huaan is obviously less than that in Anxi. In a word, there is no sufficient market competitive advantage for Huaan. The development of oolong tea industry in Nan'an is rapid and the main category of oolong tea is Tieguanyin, which is lack of regional brand and enterprise brand with extensive market influence. Compared with Anxi, the cultural influence of oolong tea industry of above areas is lower, and the cultural competitive advantage is also not obvious, which have a negative impact on the competitiveness of oolong tea industry.

Anxi-Tieguanyin is a well-known regional brand, and its valuation of regional public brand in 2015 reached 5.1 billion Yuan, ranking first in China. Taking Anxi for example, its cultural competitive advantage plays a significant role in promoting the competitiveness of the oolong tea industry. However, its cultural competitive advantage has no obvious spillover effects, and the nearby producing region doesn't significantly benefit from it.

Anxi-Tieguanyin as a regional brand is named after Anxi county, which is strongly exclusive in the minds of popular consumers, so nearby areas cannot use its regional brand name because of nature name monopoly. Beside above reasons, Anxi-Tieguanyin has relatively complete industrial ecology and high yield, which can effectively meet the needs of the market by itself without the help of the near region, so it is lack of motivation to expand its competitive advantage.

The Tieguanyin industries of surrounding areas are lack of cultural competitiveness, and have no sufficient advantages to compete with that of Anxi. In the survey, some adjacent areas can develop the oolong tea industry with the aid of Anxi-Tieguanyin's regional brand, but more areas leave the market to its own devices. In order to obtain competitive advantage, such areas utilize lower price to acquire consumers, which hinders longer profitability, technology updates and cultural communication, and then hurt the competitive advantage of oolong tea industry in the long run.

5 CONCLUSIONS

Culture factors play an important role in the competitiveness evaluation of the oolong tea industry. The industrial culture mainly reflects the influence of regional brand culture in the industrial development of oolong tea. The regions which have more efficient regional brand management tend to pay more attention to the development of tea industry, which is conducive to the enhancement of regional brand reputation and the formation of tea culture. The stronger the regional tea cultural atmosphere is, the longer the history of tea industry is, which means the planting technique and tea category are relatively mature. The stronger the regional economic strength is, the higher the investments of tea industry may be increased, which is conducive to the sustained development of the regional brand. The enhancement of regional brand reputation can form strong cultural atmosphere to support the development of tea industry and tea consumption.

The industrial culture of oolong tea has spatial effect. With the aid of cultural spillover effect, make full use of the spatial effect of culture factors to develop tea industry. The spatial spillover effect is an important driving force to improve the competitiveness of industry, which has direct influence on the industrial layout of oolong tea. The oolong tea-producing areas with different resource endowment should reasonably plan the development strategy of oolong tea industry according to the industrial spatial agglomeration effect so as to adapt to the objective conditions and development trend.

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