

# Analysis of Regional Differences in Cultural Consumption Levels and Influencing Factors in China

Tianlong Cong

School of Mathematical and Civil Engineering, Beijing Institute of Technology, Zhuhai, 519000, China

**Keywords:** Entropy Method; Cluster Analysis; Factor Analysis Introduction

**Abstract:** With the advent of the consumption era, the role of cultural consumption in the social structure and social reconstruction has become more and more obvious. In this paper, we define cultural consumption in China by selecting 14 indicators from 31 provinces and cities in 2019, using the entropy method to characterize the concept of cultural consumption, and using the K-means clustering method to study the pattern of geographical differences in the level of cultural consumption in China; Factor analysis is used to investigate the causes of regional differences in consumption levels; this paper concludes that the differences in cultural consumption levels in China spread from the east to the west, and that the four main factors leading to the uneven development of cultural consumption levels in China are consumption levels, cultural development potential, cultural atmosphere and the quality of cultural products.

## 1. Introduction

### 1.1 Current Status of Research

Lin Dongsheng [1] addressed the issue of the transformation direction of the cultural industry. Guan Weihua et al [2] studied the pattern of cultural consumption in China from 1987 to 2008 using the Mann-Kendall method. Shen Yuming et al. [3] analyzed the spatial characteristics of service industry development in three major regions by using correlation analysis and regression analysis. Shi Qiang [4] analyzed the income gap. Yang Xiaoguang[5] analyzed the geographical differences of the economy by using the method of Dennison's Factor Analysis. Wang Xiaolu [6] studied the income of residents of various social classes in urban and rural areas in China.

### 1.2 Research Content and Ideas

- (1) Weighting to the set of cultural consumption level variables by the entropy method.
- (2) To study the regional differences of cultural consumption level in China through K-means clustering method, and to analyze each cluster to study its cultural consumption development.
- (3) To study the causes of regional differences in cultural consumption levels in China through factor analysis.

## 2. Data Sources and Definitions

In this paper, refer to the theory of consumer behavior "consumer purchase intention and purchasing power" as the criteria for selecting cultural consumption-related indexes, and combine with the specific situation of cultural consumption in China, the data are selected from three aspects: cultural consumption environment, cultural consumption intention and cultural consumption satisfaction, see our table 1 below.

## 3. Analysis of Cultural Consumption Levels by Regions Based on the Entropy Method

### 3.1 Entropy Weighting

$$e_j = -k * \sum_1^m P_{ij} * \log(P_{ij}), k = \frac{1}{\ln(m)} \quad (1)$$

Table 1 Indicator system of cultural consumption index measurement

First-level indicator		Second-level indicators	
consumption environment	0.420441	X1 Internet cultural enterprise income	0.368599
		X3 Service sector's share of GDP (%)	0.003310
		X4 GDP per capita	0.035658
		X5 The proportion of cultural industries (%)	0.012871
consumption environment	0.269381	X6 Cultural Consumer Price Index	0.000003
		X2 The number of cultural enterprises	0.204540
		X10 Proportion of urban facility building area	0.058118
		X11 Proportion of urban population	0.006723
Willingness to consume	0.135566	X8 : per capita disposable income	0.025314
		X9 Cultural expenditure per capita	0.059069
		X12 education level	0.036348
		X13 User annual traffic	0.014835
consumer satisfaction	0.174612	X7 Total tourist trips	0.174592
		X14 Cultural Consumer Price Index	0.000020

### 3.2 Analysis of Cultural Consumption Levels by Region

The following table ranks the cultural development of each province and city after calculating the weights (see Appendix for the rest of the table). Among the top five cities, Jiangsu, Zhejiang and Shanghai are the center of cultural consumption in the south, while Beijing is the only city in the north with a high level of cultural consumption. The sixth to tenth places are mainly in the Middle East. This indicates that China's cultural consumption level is centered in the east and decreases in the east-west direction, see our table 2 below.

Table 2 Overall ranking of cultural consumption levels

region	score	rank	region	score	rank	region	score	rank
Beijing	3.96	1	Jiangsu	2.05	5	Hunan	6.65	9
Zhejiang	3.11	2	Hubei	1.10	6	Fujian	7.00	10
Guangdong	2.96	3	Tianjin	5.89	7	Chongqing	6.32	11
Shanghai	2.14	4	Sichuan	5.85	8	Shandong	6.20	12

## 4. Analysis of Geographical Differences in Cultural Consumption Levels

### 4.1 Clustering of Cultural Consumption Level Differences

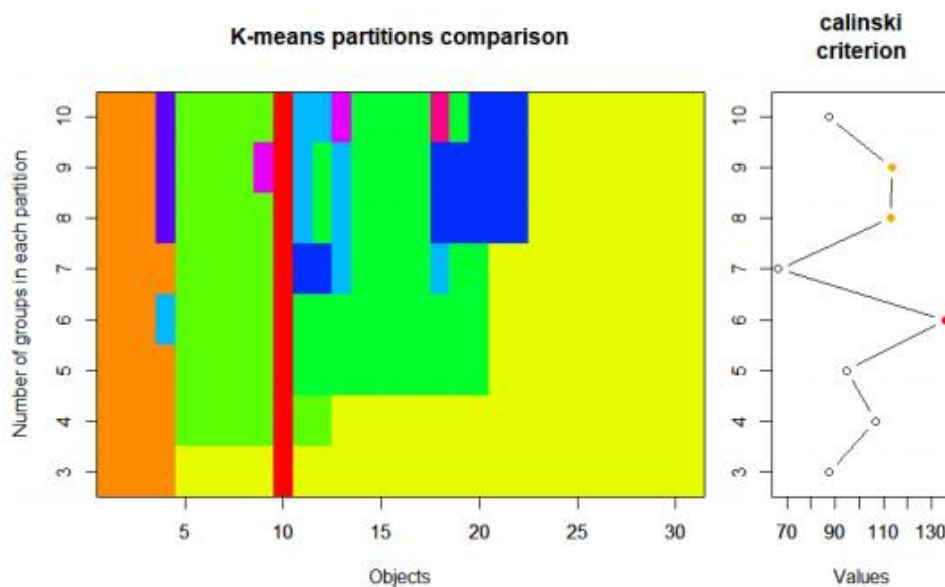


Figure 1 Calinski-Harabasz criterion for determining the number of clusters

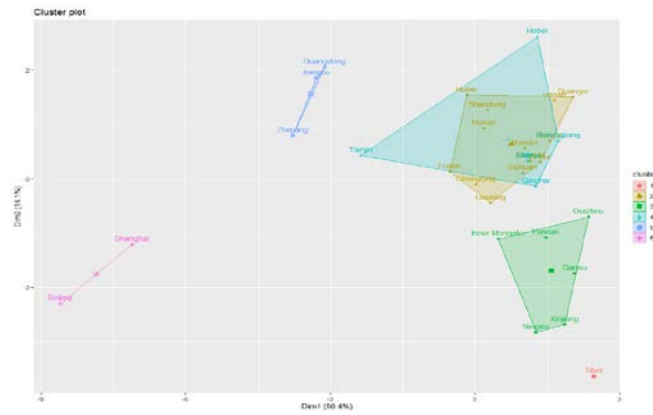


Figure 2 Geographical distribution of cultural consumption levels

The interlocking of the two categories is due to the compression of the original 14-dimensional spatial structure into a 2-dimensional plane, see our figure 2 above.

To facilitate identification, the representative cities in each category are summarized in the following table, see our table 3 below.

Table 3 K-means clustering results by city and province

	Each cluster cities				
A	Beijing	Shanghai			
B	Zhejiang	Jiangsu	Guangdong		
C	Hubei	Henan	Guangxi	Hunan	Shandong
	Jiangxi	Hainan	Shanxi	Anhui	Sichuan
	Fujian	Chongqing	Liaoning		
D	Hebei	Tianjin	Heilongjiang	Qinghai	Jilin
	Shanxi				
E	Neimenggu	Yunnan	guizhou	Gansu	Xinjiang
	Ningxia				
F	Xizang				

Combining the graphs and tables, it is easy to see that the spatial differences in cultural consumption are obvious, with Beijing, Tianjin and Hebei as the cluster centers in the northeast, and Jiangsu, Zhejiang and Shanghai as the centers in the southeast. The whole China is centered on the east and spreads to the west.

## 4.2 Summary of Cluster Analysis

### 4.2.1 Class a Type

The overall characteristics of Cluster A are: higher education level, higher income, and higher cultural purchasing intention. (Per capita disposable income is 36% higher than the third place).

### 4.2.2 Type B

Cluster B, with Guangdong, Jiangsu, and Zhejiang as one of the categories, also has distinctive characteristics, and the most significant variable in both cities is the number of cultural enterprises above the scale: the local government in category B still chooses to build larger cultural building areas, which is a good indicator of the importance the government attaches to cultural construction.

### 4.2.3 Type C

The biggest difference between Type C and Type A and B is the X13 annual flow per capita. The X13 annual volume per capita in both categories A and B is lower than the average.

When analyzing category C, it is easy to see that most of the indicators are lower than the national average, and the cities in categories D, E, and F also show this pattern: uneven geographical development.

### 4.2.4 Type D

The cities in category D are those with advanced cultural consumption concepts but insufficient

consumption capacity, this can be seen from the per capita expenditure on culture, education and entertainment in X9. Although the percentage of cultural consumption is very high, the actual cultural consumption is not high and is lower than the national average due to the influence of GDP per capita.

#### 4.2.5 Categories E and F

The cultural consumption system in the central and western minority regions is not linked to traditional economics and is difficult to quantify. The per capita consumption of volume in this data is only a proxy for cultural attention in mainstream media in minority regions, and cannot be realized. It is like a spectator watching a ball game on stage, not participating in it.

### 5. Factor Analysis of Influencing Factors

The provinces and cities in Class A and Class B have developed their cultural consumption better and more fully. the further development of cultural consumption in other provinces and cities needs to learn from the advantages of these provinces, so this paper investigates the reasons affecting the development of cultural consumption in cities by means of factor analysis.

#### 5.1 Modeling

According to the correlation coefficients of the indicators in the table, the correlation coefficients are higher than 0.8 for some variables, which indicates that the correlation between the indicators is strong, and the analysis can be performed by factor analysis. The table below shows the standardized index data, see our Table 4 below.

Table 4 Variance contribution of each factor

	PA <sub>1</sub>	PA <sub>4</sub>	PA <sub>2</sub>	PA <sub>3</sub>
SS loadings	5.76	2.18	1.62	1.05
Proportion Var	0.41	0.16	0.12	0.08
Cumulative Var	0.41	0.57	0.68	0.76
Proportion Explained	0.54	0.21	0.15	0.10
Cumulative Proportion	0.54	0.75	0.90	1.00

From the above table, it can be seen that the combined cumulative contribution of the extracted variance for each sample can reach 76%, indicating that the four factors can already represent 76% of the information of the original data. Therefore, the four common factors can explain the cultural consumption level of 31 provinces, municipalities and autonomous regions well. The factor analysis model of the indicators can be obtained:

$$\begin{aligned}
 X_1 &= 0.74PA_1 - 0.04PA_2 + 0.16PA_3 + 0.54PA_4 \\
 X_2 &= 0.54PA_1 + 0.08PA_2 - 0.01PA_3 + 0.8PA_4 \\
 X_3 &= 0.88PA_1 - 0.17PA_2 - 0.05PA_3 + 0.04PA_4 \\
 X_4 &= 0.79PA_1 - 0.01PA_2 + 0.30PA_3 + 0.45PA_4 \\
 X_5 &= 0.41PA_1 - 0.07PA_2 + 0.53PA_3 + 0.14PA_4 \\
 X_6 &= 0.11PA_1 + 0.48PA_2 + 0.49PA_3 + 0.28PA_4 \\
 X_7 &= 0.10PA_1 + 0.26PA_2 + 0.41PA_3 + 0.81PA_4 \\
 X_8 &= 0.90PA_1 + 0.07PA_2 + 0.28PA_3 + 0.30PA_4 \\
 X_9 &= 0.91PA_1 + 0.10PA_2 + 0.24PA_3 + 0.17PA_4 \\
 X_{10} &= 0.83PA_1 + 0.38PA_2 + 0.22PA_3 + 0.13PA_4 \\
 X_{11} &= -0.18PA_1 + 0.61PA_2 - 0.16PA_3 + 0.39PA_4 \\
 X_{12} &= 0.96PA_1 - 0.07PA_2 - 0.01PA_4 \\
 X_{13} &= -0.19PA_1 - 0.52PA_2 + 0.16PA_3 - 0.09PA_4 \\
 X_{14} &= -0.02PA_1 + 0.68PA_2 + 0.14PA_3 + 0.01PA_4
 \end{aligned} \tag{2}$$

## 6. Summary of Impact Factors of Cultural Consumption Levels

From the results of the factor analysis model, it can be seen that

The first common factor (consumption ability): the main loadings are distributed in X8, X9 and X12, which explain that the main group of culture consumption is the high-income group.

The second common factor (cultural development potential): the main loadings are distributed in X11, X13 and X14, which measure the change in the price level of consumer goods and services related to people's life in 19 years over 18 years.

The third public factor (cultural environment atmosphere): X5 and X6 both describe the importance of the government to cultural consumption.

The fourth public factor (quality and quantity of cultural products): X2 and X7 describe the types of cultural products in the province.

## References

- [1] Shi Qiang, China's Economic Development Strategy and Regional Income Gap [J]. Modern Business, 2003, (3): 19-25.
- [2] Yang Xiaoguang, Fan Jie, Zhao Yanxia. Elements Analysis of China's Regional Economic Growth in the 1990s [J].Acta Geographica Sinica, 2002, 57(6):701-708.
- [3] Wang Xiaolu, Fan Gang. Trends and Influencing Factors of Regional Disparities in China [C]. Report on China's Reform and Development, 2004, (1): 33-44.
- [4] Chen Xiushan, Xu Ying. An Empirical Study on Influencing Factors of Regional Disparities in China [J].Chinese Social Sciences, 2004, (5): 117-129.
- [5] Guo Tengyun, Xu Yong, Yang Guoan. Quantitative analysis of the relationship between regional consumption fluctuations and regional economic growth [J]. Journal of Yantai Normal University, 2004, 20(4): 303-307.
- [6] Li Xiumin, Liu Haibo. The Causes of my country's Regional Economic Growth Disparity [J].Journal of Southwest University for Nationalities, 2009, (12): 89-93.