TOURISM DESTINATION COMPETITIVENESS EVALUATION IN SICHUAN PROVINCE USING TOPSIS MODEL BASED ON INFORMATION ENTROPY WEIGHTS

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ABSTRACT. This study applied the combined methods of Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) and Information Entropy Weights to evaluate the tourism destination competitiveness (TDC) of 13 cities in Sichuan Province. In the empirical study, IEW was used to determine the subjective weights of four aspects and 26 evaluation indexes, which have the influence on TDC. In addition, applying the essential ideas of TOPSIS, chosen alternative should have the shortest geometric from the positive ideal solution (PIS) and the longest geometric distance from the negative ideal solution (NIS), to conduct a comprehensive evaluation and sort-based analysis. In the end, the essay arranged the TDC of 13 cities in Sichuan Province from high to low, then produced policy recommendations. The results represent that IEW & TOPSIS were an efficient and effective way to evaluate TDC.

1. Introduction.

1.1. The definition of tourism destination competitiveness (TDC). Tourism destination is the most critical and essential element of the overall tourism system, which provides the most basic traveling experience for visitors. Crouch & Ritchie considered that tourism destination competitiveness is an ability which can improve residents’ quality of life [4]. In addition, they defined TDC from the perspective of the sustainable development of tourism industry, the ability that supplying ideal travel experience, attracting more visitors, improving residents quality of life, and protecting the natural and cultural resources for the further generation. In accordance with Porters competitive theory, Hassan defined TDC as the ability that integrating and creating the resources of tourism destination, and converting into sustainable tourism product [10]. Buhalis consider that TDC is the ability to create economic prosperity. Obviously, all the viewpoints above reach a consensus on sustainable development is the core connotation of TDC [3]. From the aspect of the market, Hauteserre considered that TDC is the ability to maintain and enhance market position and shares over time [5]. Yoon considered that TDC is the ability to create and combine tourism value-added products, thus maintain market position [18].

The concept of TDC is relative, Kozak & Rimmington consider that determining the closest competitor is the most important part, because the strength of TDC
fluctuates according to various competitors, in addition, different season generates different competitor [13]. Gooroochum & Sugiyarto consider that the measurement of TDC is related with the base year and the reference object [8]. Dwyer & Kim consider that TDC is the ability, which can provide better products and services than others [6].

1.2. Classical evaluation indicators and models. Crouch & Ritchie model was raised in 1993, which depend on Potters diamond Model. This model considered that TDC was made up of core resources, attraction, supporting factors and destination management. Enright & Newton (2004, 2005) referred that TDC should take industry management into account in practical level [7]. Dwyer & Kim model thought that the evaluation indexes of TDC not only contain the subjective factors, such as attraction of destination; but also contain objective factors, such as international tourism receipts [16]. However, there is no case study to prove the effectiveness of Dwyer & Kim model. At present, due to the concept of TDC being not unitary, then quantitative methods and evaluation indexes are complexity and diversity. Mainstream methods are variance analysis [14], analysis of factors [9], multi-scale analysis [12], regression model analysis [17] and etc.

2. Evaluation procedures and methodology for TDC.

2.1. Methodology of TOPSIS & IEW. TOPSIS is a multi-objective decision-making method, which was firstly developed by Hwang and Yoon in 1981, and Yoon made further development in 1987 [11]. TOPSIS refers that evaluation object has the shortest distance from the positive ideal solution (PIS) and also has the longest distance from the negative ideal solution (NIS), then it is optimum.

Evaluation procedure of TOPSIS method:

a. Constructing standard matrix

\[ x' = (x'_{ij})_{m \times n}; \ i = 1, 2, 3..., \ m; \ j = 1, 2, 3..., \ n \]

b. Confirming positive ideal solution \( x^+ \) and negative solution \( x^- \), setting the \( j \)th property solution of positive ideal solution \( x^+_j \) is \( x^+_j \), and the \( j \)th property solution of negative ideal solution is \( x^-_j \), then:

\[ x^+_j = \max \ x'_{ij}; \ x^-_j = \min \ x^-_{ij}; \ j = 1, 2, 3..., \ n \]

c. Calculating the distance of each project to positive ideal solution \( d^+_i \) and negative ideal solution \( d^-_i \):

\[ d^+_i = \sqrt{\sum_{j=1}^{n} (x'_{ij} - x^+_j)^2}; \ d^-_i = \sqrt{\sum_{j=1}^{n} (x'_{ij} - x^-_j)^2}; \ i = 1, 2, 3..., \ m \]

d. Calculating proximity of each project \( C_i \), and arranging good and bad order depend on numerical order.

\[ c_i = \frac{d^-_i}{d^+_i + d^-_i} \]

Francisco Balibrea introduced the notion of topological entropy in setting of non-autonomous systems [2]. José M. Amigó and ángel Giménez reviewed two applications of the min-max symbols to express topological entropy [1]. In this paper, information entropy weight (IEW) is introduced as a new dimension of weights for MCDM. The concept of entropy was first proposed by Rudolf Clausius in 1865,
which was used as the physical parameter to describe energy degeneration, then was broadly used in thermodynamics. Information entropy was proposed by C. E. Shannon in his paper A Mathematical Theory of Communication in 1948, which referred that information redundancy was related with the probability of every symbol (number, letter or word), in other words, uncertainty [15].

Information is a measurement of order of a system, in contrast, entropy is a measurement of disorder degree of a system, the absolute value of both index is equal.

Considering n conditions of a random event:

\[ \varepsilon_1, \varepsilon_2, \cdots, \varepsilon_n \]

Then each probability is:

\[ p_1, p_2, \cdots, p_n \]

Then the information entropy of random event is:

\[ H = -k \sum_{i=1}^{m} P_i \times \ln(P_i) \]

In above equation, k is greater than zero, then H is constant greater than zero. The greater of H, the greater of uncertainty of event and vice versa. 0 \leq P_i \leq 1, (i = 1, 2, ..., n), in addition, when \( P_i \ln(P_i) = 0 \), \( p_1 = p_2 = \cdots = p_n = \frac{1}{n} \) entropy H reaches the maximum value \( k \ln(n) \), and the random event has the biggest uncertainty. Entropy weight, set m evaluation objects, n evaluation indexes, according to the real condition of evaluation object, and the primary decision-making matrix is \( X = (x_{ij})_{m \times n} \), \( x_{ij} \) presents the state value of the ith object on the jth index. The standard matrix of X is:

\[ x' = (x'_{ij})_{m \times n} \]

When evaluation index is benefit-oriented:

\[ x'_{ij} = \frac{x_{ij} - \min(x_{ij})}{\max(x_{ij}) - \min(x_{ij})} \]

When evaluation index is cost- oriented:

\[ x'_{ij} = \frac{\max(x_{ij}) - x_{ij}}{\max(x_{ij}) - \min(x_{ij})} \]

When evaluation index is exponential type of interval, set as the proper interval, then adopting the equation below to standardization

\[ x'_{ij} = \begin{cases} 1 - \frac{\max\{\beta_1-x_{ij}, x_{ij}-\beta_2\}}{2\beta_2}; & \text{if } x_{ij} \notin [\beta_1, \beta_2] \\ 1; & \text{if } x_{ij} \in [\beta_1, \beta_2] \end{cases} \]

In conclusion, the above equation not only solved the non-fairness problem between each index, but also conduct forward-oriented treatment to each index, and then it would be benefit to comparative evaluation.

2.2. Evaluation procedures.

1. Standardization of various and different indexes.

\[ x'_{ij} = \frac{x_{ij} - \min}{\max - \min} \]

\[ x_{ij} \]

\[ 1 \leq j \leq n \]
2. Depending on matrix \( X' = (x'_{ij})_{m \times n} \), then the information entropy is calculated by:

\[
H_j = - \frac{1}{\ln n} \sum_{i=1}^{m} f_{ij} \ln f_{ij}, \quad i = 1, 2, \ldots, m; \quad j = 1, 2, \ldots, n.
\]

3. We used the function below to avoid the insignificance of \( \ln f_{ij} \):

\[
f_{ij} = \frac{1 + x'_{ij}}{\sum_{i=1}^{m} (1 + x'_{ij})}
\]

4. Then we calculated deviations in the coefficients of indices \( j \), called \( G_j \):

\[
G_j = 1 - H_j
\]

5. The weights of \( w_j \) is determined as:

\[
w_j = \frac{G_j}{\sum_{j=1}^{n} G_j} = \frac{1 - H_j}{n - \sum_{j=1}^{n} H_j}
\]

6. Next, determining the positive and negative ideal solutions:

\[
X^+ = \left( \max_{1 \leq i \leq m} x_{i1}, \max_{1 \leq i \leq m} x_{i2}, \ldots, \max_{1 \leq i \leq m} x_{in} \right)
\]

\[
X^- = \left( \max_{1 \leq i \leq m} x_{i1}, \max_{1 \leq i \leq m} x_{i2}, \ldots, \max_{1 \leq i \leq m} x_{in} \right)
\]

7. Then calculating the separation measure:

\[
d^+_i = \sqrt{\sum_{j=1}^{n} w_j (x_{ij} - x^+_{ij})^2}, \quad i = 1, 2, \ldots, m; \quad 0 \leq d^+_i \leq 1
\]

\[
d^-_i = \sqrt{\sum_{j=1}^{n} w_j (x_{ij} - x^-_{ij})^2}, \quad i = 1, 2, \ldots, m; \quad 0 \leq d^-_i \leq 1
\]

8. In the end, calculating the relative closeness to the ideal solution:

\[
c_i = \frac{d^-_i}{d^-_i + d^+_i}; \quad i = 1, 2, \ldots, m; \quad 0 \leq c_i \leq 1
\]

3. **Empirical research of TDC.**

3.1. **Introduction of research object.** Sichuan province is located in the southwest of China, which famous for its abundant natural resources, fertile lands, long history, and multiple minority ethnic cultures. The territorial area of Sichuan is approximately 48.6 million of square kilometers, permanent population is 91 million, administer 21 cities and 182 counties. All-for-one tourism means making tourism industry as a superior industry enabling the organic combination of regional resources, bringing about the development of various industries and the participation of the entire society. Sichuan Province has abundant cultural tourism resources and comprehensive tourism reception system, Chengdu, Leshan, Zigong are the traditional notable tourism cities, however, the relatively backward cities like Yibin, Suining, etc are energetically develop their tourism industries in the trend of All-for-one tourism policy. Consequently, evaluating the TDC of the major cities in Sichuan Province have become increasingly critical in this invariable trend.
3.2. **Sources of data.** The data is mostly collected from Sichuan statistical yearbook 2015, Sichuan environmental statistical journal 2015, Sichuan Environmental Monitoring Centre, and the official websites of Sichuan Provincial Peoples Sichuan Tourism Development Committee, Sichuan Environmental Protection Department.

![Diagram showing the weight of indexes in TDC](image)

**Figure 1.** weight of indexes in TDC

4. **Discussion.**

4.1. **Illustration of the information entropy weights.** The four weights defined by the information entropy are tourism resources reservation, tourism reception capacity, tourism industry strength, tourism supply capacity.
Table 1. Data of tourism resources in Sichuan Province

| City     | Number of national scenic regions | Number of national forest park | Number of national area | Number of national nature protection area | Number of water conservancy area | Number of national geopark | Number of national historical and cultural town | Number of national heritage | 5A tourism area | 4A tourism area | Number of provincial scenic region | Number of provincial nature protection area | Number of provincial historical and cultural town | 5A tourism area | 4A tourism area |
|----------|----------------------------------|--------------------------------|-------------------------|------------------------------------------|---------------------------------|---------------------------|-----------------------------------------------|---------------------------|----------------|----------------|----------------------------------|-----------------------------------------------|-----------------------------------------------|----------------|----------------|
| Chengdu  | 4                                | 4                              | 2                       | 1                                        | 1                               | 6                         | 2                              | 1                         | 34             | 5              | 2                                |                                               |                                               |                |                |
| Guangyuan| 2                                | 2                              | 2                       | 2                                        | 1                               | 1                         | 2                              | 1                         | 15             | 2              | 5                                |                                               |                                               |                |                |
| Luzhou   | 0                                | 1                              | 2                       | 0                                        | 0                               | 2                         | 1                              | 2                         | 9              | 3              | 1                                |                                               |                                               |                |                |
| Leshan   | 1                                | 2                              | 2                       | 4                                        | 1                               | 1                         | 2                              | 3                         | 9              | 3              | 1                                |                                               |                                               |                |                |
| Mianyang | 1                                | 4                              | 3                       | 4                                        | 2                               | 0                         | 1                              | 1                         | 11             | 7              | 5                                |                                               |                                               |                |                |
| Nanchong | 0                                | 4                              | 0                       | 5                                        | 0                               | 2                         | 0                              | 1                         | 7              | 5              | 0                                |                                               |                                               |                |                |
| Aba      | 3                                | 4                              | 2                       | 4                                        | 1                               | 3                         | 1                              | 4                         | 3              | 11             | 6                | 12                                |                                               |                                               |                |                |
| Yibin    | 2                                | 2                              | 0                       | 0                                        | 0                               | 3                         | 1                              | 0                         | 7              | 5              | 1                                |                                               |                                               |                |                |
| Dazhou   | 0                                | 2                              | 1                       | 0                                        | 2                               | 0                         | 0                              | 0                         | 3              | 4              | 1                                |                                               |                                               |                |                |
| Ya’an    | 0                                | 3                              | 1                       | 0                                        | 0                               | 2                         | 0                              | 1                         | 11             | 6              | 4                                |                                               |                                               |                |                |
| Ganzi    | 1                                | 3                              | 6                       | 0                                        | 1                               | 1                         | 1                              | 0                         | 3              | 4              | 17                               |                                               |                                               |                |                |
| Suining  | 0                                | 0                              | 0                       | 1                                        | 1                               | 0                         | 1                              | 0                         | 8              | 2              | 0                                |                                               |                                               |                |                |
| Zigong   | 0                                | 0                              | 2                       | 0                                        | 4                               | 1                         | 0                              | 2                         | 1              | 1              | 1                                |                                               |                                               |                |                |

In the matter of tourism resources reservation, it involves every city's total official composite rating tourism resources, such as number of 5A tourism area. In the matter of tourism reception capacity, the quantity of travel agency has the highest weight value, in another word, it represents the high competitiveness of the reception ability. In the matter of tourism industry strength, the domestic tourist income has the highest weight value. Since Sichuan is an inland province, then the domestic tourist income can more objectively reflect the strength of the area than other weights. In the matter of tourism supply capacity, the weights of possession of civil motor-vehicles and public green area per capita were the highest, which means the traffic conditions and carrying capacity were playing an important role in tourism competitiveness, moreover, the area ecological environment is an important aspect to improve tourism competitiveness.

According to the results of surveys, sorting the values of four main weights in a descending order is Tourism industrial strength tourism resources tourism supply capacity tourism capacity, then we can determine that tourism resources reservation has the lightest affection to the TDC. However, the other three aspects play a crucial role in evaluating TDC. Therefore, the further development of tourism capacity, tourism industry strength and tourism supply capacity is the important matter of cities in Sichuan.

4.2. Index analysis of 13 cities.

(1) Tourism resources reservation. In this aspect, the top three are Aba, Chengdu and Guangyuan, and then Yaan, Ganzi and Leshan rank bottom. The rank of weights represents that the authentic distribution of tourism resources in Sichuan province.

(2) Tourism reception capacity. In this aspect, the top three are Chengdu, Suining and Yaan, and then Ganzi, Guangyuan and Zigong rank bottom. Chengdu has the abundant tourism resources, and it is the most advanced city in Sichuan, hence it has the strongest tourism reception capacity. The tourism resources of
Table 2. Data of tourism capacity in Sichuan Province

| City    | Number of travel agency (units) | Number of star-rated hotels (units) | Civilian-owned value added of tertiary industry (%) |
|---------|---------------------------------|-------------------------------------|---------------------------------------------------|
| Chengdu | 462                             | 128                                 | 109.4                                             |
| Guangyuan | 14                         | 20                                  | 108.6                                             |
| Luzhou  | 27                              | 23                                  | 109.2                                             |
| Leshan  | 75                              | 33                                  | 109.9                                             |
| Mianyang| 61                              | 30                                  | 110.0                                             |
| Nanchong| 49                              | 26                                  | 110.6                                             |
| Aba     | 34                              | 19                                  | 110.5                                             |
| Yibin   | 27                              | 15                                  | 110.1                                             |
| Dazhou  | 27                              | 10                                  | 110.4                                             |
| Ya’an   | 12                              | 21                                  | 112.3                                             |
| Ganzi   | 20                              | 9                                   | 107.2                                             |
| Suining | 13                              | 22                                  | 119.2                                             |
| Zigong  | 21                              | 8                                   | 109.4                                             |

Suining are relatively scarce than other cities, however its tourism reception capacity rank among the best, which means the local government would like to develop tourism industry. On the contrary, although Guangyuan has affluent tourism resources, but there is no well developed tourism reception ability to match, it would greatly influence tourists experiences.

(3) Tourism industry strength. In this aspect, the top three are Chengdu, Luzhou and Leshan, and then Dazhou, Ganzi and Yaan rank bottom. The rank objectively reflects each citys earing from tourism.

(4) Tourism support ability. In the aspect of socio-economic support ability, the top three are Chengdu, Ganzi and Nanchong, and then Suining, Yaan and Aba rank bottom. In the aspect of eco-environment support ability, the top three are Yaan, Chengdu and Guangyuan. Yaan has the best eco-environment, it has great potential to develop the tourism industry.

Table 3. Data of tourism industrial strength in Sichuan Province

| City     | Number of domestic tourist arrivals (10000 person times) | Domestic tourist income (100 million yuan) | Number of international tourist arrivals (10000 person times) | International tourist income (UAD 10000) |
|----------|----------------------------------------------------------|--------------------------------------------|----------------------------------------------------------------|----------------------------------------|
| Chengdu  | 18423.02                                                 | 1616.95                                    | 197.8                                                          | 85768.11                               |
| Guangyuan| 2769.43                                                  | 158.69                                     | 0.18                                                           | 40.96                                  |
| Luzhou   | 2539.51                                                  | 2539.51                                    | 0.22                                                           | 57.31                                  |
| Leshan   | 3342.14                                                  | 383.9                                      | 12.79                                                          | 4656.25                                |
| Mianyang | 2821.12                                                  | 277.13                                     | 0.74                                                           | 212.25                                 |
| Nanchong | 3076.5                                                   | 253.28                                     | 0.25                                                           | 71.07                                  |
| Aba      | 2861.34                                                  | 240.78                                     | 15.44                                                          | 2852.81                                |
| Yibin    | 2822.24                                                  | 256.02                                     | 0.17                                                           | 63.21                                  |
| Dazhou   | 1351.01                                                  | 90.36                                      | 0.29                                                           | 99.29                                  |
| Ya’an    | 1658.91                                                  | 108.6                                      | 0.37                                                           | 102.92                                 |
| Ganzi    | 792.66                                                   | 79.03                                      | 6.25                                                           | 1799.29                                |
| Suining  | 2432.79                                                  | 201.09                                     | 0.72                                                           | 148.95                                 |
| Zigong   | 2106                                                     | 200.38                                     | 0.16                                                           | 52.5                                   |
4.3. **Analysis of 13 cities rank.** Depend on the above indexes, we can divide 13 cities into 4 class. The first class contains Chengdu, because the $c_i$ is much higher than other cities. The second class contains Mianyang, Nanchong, Leshan, Luzhou, Guangyuan, Aba and Yaan. In this class the value of $c_i$ is from 0.35 to 0.42.

The third class contains Yibin, Dazhou, Ganzi, and the value of $c_i$ is from 0.30 to 0.32. The fourth class contains Zigong and Suining, and the value of $c_i$ is under 0.30. The results above were calculated by TOPSIS & IEW, furthermore, the particular analysis would accord to these two methods.

**Table 4. Data of economic support ability**

| City       | GDP per capita (yuan) | Total investment in fix asset (100 million yuan) | Passenger-kilometers of highways (10000 passenger-km) | Possession of civil motor vehicles (10000 units) | Total lengh of highways (km) |
|------------|-----------------------|--------------------------------------------------|-------------------------------------------------------|-----------------------------------------------|------------------------------|
| Chengdu    | 70019                 | 6620.37                                          | 1231084                                               | 312.8                                         | 22789                        |
| Guangyuan  | 22117                 | 561.74                                           | 183548                                                | 14.0                                          | 19520                        |
| Luzhou     | 29655                 | 1181.03                                          | 641482                                                | 21.0                                          | 13516                        |
| Leshan     | 37125                 | 863.91                                           | 247432                                                | 22.3                                          | 11058                        |
| Mianyang   | 33558                 | 1080.37                                          | 330848                                                | 37.8                                          | 19887                        |
| Nanchong   | 22639                 | 1244.54                                          | 469942                                                | 27.7                                          | 22446                        |
| Aba        | 27043                 | 383.34                                           | 254599                                                | 10.4                                          | 13218                        |
| Yibin      | 32318                 | 1130.26                                          | 330827                                                | 19.2                                          | 18301                        |
| Dazhou     | 24411                 | 1176.20                                          | 241365                                                | 18.1                                          | 19510                        |
| Ya’an      | 30052                 | 471.40                                           | 106689                                                | 11.8                                          | 6286                         |
| Ganzi      | 18096                 | 465.72                                           | 142998                                                | 7.4                                           | 29584                        |
| Suining    | 24691                 | 913.68                                           | 201427                                                | 13.3                                          | 8805                         |
| Zigong     | 39145                 | 597.61                                           | 183364                                                | 13.8                                          | 6456                         |

**Table 5. Data of eco-environment support ability in Sichuan Province**

| City       | Air quality index | Rate of forest coverage (%) | Public green area per capita (sq.m) |
|------------|-------------------|----------------------------|------------------------------------|
| Chengdu    | 8.95              | 38.4                       | 13.5                               |
| Guangyuan  | 5.99              | 55.3                       | 11.2                               |
| Luzhou     | 6.05              | 50                         | 9.01                               |
| Leshan     | 7                 | 55.47                      | 9.03                               |
| Mianyang   | 6.79              | 52.4                       | 9.63                               |
| Nanchong   | 6                 | 39.8                       | 11.6                               |
| Aba        | 2.98              | 24.95                      | 5.5                                |
| Yibin      | 6.58              | 44.2                       | 13.08                              |
| Dazhou     | 7.66              | 41.5                       | 11.7                               |
| Ya’an      | 6.26              | 63.1                       | 13.08                              |
| Ganzi      | 3.83              | 33.04                      | 9                                  |
| Suining    | 4.9               | 39.01                      | 6.8                                |
| Zigong     | 7.69              | 33.7                       | 11.3                               |

(1) The first class: Chengdu

Chengdu is the capital city of Sichuan province, and also the most developed economy city. Therefore, its tourism industry is also most developed in spite of its very ordinary tourism resources and eco-environment. In the future,
Chengdu should take full advantage of the status of political and economic center to develop its culture and industry tourism. In addition, Chengdu should put more effort into environmental governance, in order to improve its TDC.

(2) The second class: Mianyang, Nanchong, Leshan, Luzhou, Guangyuan

The cities in this class have abundant tourism resource and good economic environment. Mianyang is the second largest city in Sichuan province, and its geographic closeness with Chengdu brought plenty of opportunities. Mianyang should remedy the limitation of tourism capacity, and develop tourism soft strength. Leshan is also close to Chengdu, and it has world-famous Leshan Giant Buddha. Hence, Leshan should making brand depend on its excellent reserves. developing tourism reception capacity and support ability are crucial to Leshans TDC in the future. Luzhou, Nanchong and Guangyuan should improve 4 aspects, and play well with their existed tourism and environmental resources, promoting political and cultural exchange to seek mutual development.

Table 6. Ranking of tourism resources in Sichuan province and the value of $d^+$, $d^-$, $c_i$

| Rank | City     | $d^+$      | $d^-$      | $c_i$       | Rank |
|------|----------|------------|------------|-------------|------|
| 1    | Chengdu  | 0.550814   | 0.669486   | 0.548624    | 2    |
| 2    | Guangyuan| 0.621754   | 0.422017   | 0.404320    | 5    |
| 3    | Luzhou   | 0.850805   | 0.331103   | 0.280143    | 9    |
| 4    | Leshan   | 0.663612   | 0.437401   | 0.397272    | 7    |
| 5    | Mianyang | 0.591847   | 0.578172   | 0.494156    | 3    |
| 6    | Nanchong | 0.769232   | 0.520604   | 0.403620    | 6    |
| 7    | Aba      | 0.477572   | 0.697994   | 0.593752    | 1    |
| 8    | Yibin    | 0.834214   | 0.293777   | 0.260443    | 10   |
| 9    | Dazhou   | 0.861676   | 0.297350   | 0.256552    | 11   |
| 10   | Ya’an    | 0.834464   | 0.350878   | 0.296014    | 8    |
| 11   | Ganzhi   | 0.720549   | 0.517163   | 0.417838    | 4    |
| 12   | Suining  | 0.911916   | 0.154774   | 0.145097    | 13   |
| 13   | Zigong   | 0.898165   | 0.251098   | 0.218486    | 12   |

(3) The third class: Yibin, Dazhou, Ganzi

The cities in this class are not traditional tourism cities, manufacture and energy industry are supporting industry of Yibin and Dazhou, thus these two cities should focus on develop their conventional strengths, in the meantime, they could explore on industrial tourism and handicrafts depend on their industrial foundation. Ganzi is locate in the west of Sichuan, it is economically underdeveloped areas. However, the weight value of eco-environment is in high level standard, Ganzi should develop its tourism reception capacity and socio-economic support ability in the future, in addition strengthening Tibetan culture construction.

(4) The fourth class: Zigong, Suining

The cites in this class are weak in 4 aspects, theoretically, they are inadequacy with tourism industry. Nevertheless, they have certain development
space in tourism industry, then they should exploit potential tourism reserves deeply and make up for the deficiencies.

5. **Conclusion.** The combination of TOPSIS and IEW methods offered a new approach to evaluate TDC as the case of Sichuan province. The adoption of IEW to identify the weight of evaluation indices gives rise to more objectively results. Furthermore, the evaluation results of 13 cities TDC are accurate and subjective, the local governments can determine their pros & cons, then carrying out the symptomatic treatment to the problems to improve their TDC in future.

There are definitely interaction effects between the Tourism capacity, tourism industrial strength and tourism supply capacity, however, to what extent the cross actions are and what the mechanism of actions are, these all need further study.

**Acknowledgments.** Authors would appreciate the anonymous reviewers for their insightful and constructive comments and suggestions, which have been contribute to improve the manuscript and our future research. This work was supported by the Fundamental Research Funds for the Central Universities (No. skqy201739) and Social Science Research of Sichuan Province for the Twelfth Five-year Plan (Nos.SC15A007 and SC15C005).

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Table 7. The ranking of $d^+$, $d^-$, $c_i \sum$ and $c_i$ of Sichuan province

| City     | $d^+$  | $d^-$  | $c_i \sum$ | $c_i$   | Rank |
|----------|--------|--------|------------|--------|------|
| Chengdu  | 0.548624 | 0.675920 | 0.821033 | 0.689029 | 0.063536 | 0.963469 | 0.938135 | 1 |
| Guangyuan | 0.404320 | 0.082014 | 0.521311 | 0.230843 | 0.667666 | 0.747360 | 0.434335 | 0.367533 | 6 |
| Luzhou   | 0.280143 | 0.112238 | 0.391590 | 0.261333 | 0.534428 | 0.665398 | 0.401014 | 0.376040 | 3 |
| Leshan   | 0.397272 | 0.188430 | 0.100891 | 0.187347 | 0.620986 | 0.710113 | 0.424631 | 0.374209 | 4 |
| Mianyang | 0.494156 | 0.172713 | 0.065708 | 0.290007 | 0.618434 | 0.679011 | 0.494560 | 0.421167 | 2 |
| Nanchong | 0.403620 | 0.172697 | 0.067671 | 0.314230 | 0.552984 | 0.696641 | 0.415205 | 0.373437 | 5 |
| Aba      | 0.593752 | 0.147701 | 0.075804 | 0.155042 | 0.600000 | 0.809579 | 0.466066 | 0.365357 | 7 |
| Yibin    | 0.260443 | 0.124600 | 0.062927 | 0.260751 | 0.664843 | 0.772534 | 0.372809 | 0.325500 | 9 |
| Dazhou   | 0.256552 | 0.130295 | 0.014377 | 0.246821 | 0.644315 | 0.795963 | 0.360217 | 0.311558 | 10 |
| Ya'an    | 0.296014 | 0.205756 | 0.022808 | 0.089644 | 0.775321 | 0.797052 | 0.435391 | 0.353274 | 8 |
| Ganzhi   | 0.417838 | 0.012189 | 0.018965 | 0.339838 | 0.289152 | 0.726247 | 0.341513 | 0.301211 | 11 |
| Suining  | 0.145097 | 0.386398 | 0.048660 | 0.089012 | 0.888811 | 0.857872 | 0.283852 | 0.248617 | 13 |
| Zigong   | 0.218486 | 0.090295 | 0.041909 | 0.158598 | 0.599268 | 0.842061 | 0.296213 | 0.260230 | 12 |
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Received June 2017; revised December 2017.

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