

Environmental Protection Application of Design Element Analysis of Xiamen Tourist Souvenirs Based on Analytic Hierarchy Process

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Abstract: Located in the Southeast coast, Xiamen is one of the important tourist cities in southern Fujian. It possess some distinct local characteristics and unique residential style, which is facing Taiwan across the straits, so Xiamen has been chosen as most of the tourism themes in southern Fujian. There are many kinds of tourist souvenirs, but the similarity rate of the existing tourist souvenirs is high, which affects the purchasing desire of tourists. Using analytic hierarchy process (AHP) to evaluate the theme elements and carrier attributes of Xiamen tourist souvenirs, Shi Gangdang was selected as the theme element with the highest acceptance rate. The concept of environmental protection is applied to the carrier to design Xiamen tourism souvenirs with stronger sense of value and higher weight.

1. Introduction

Tourist souvenirs, which are gifts with regional and national characteristics purchased by tourists in the process of travel, are not only an important source of value for the local economy, but also a window business of a city. Nowadays, people are advocating environmental protection traveling, among which the purchase of environmental protection souvenirs in travel shopping also shows one aspect. The theme elements of tourist souvenirs are evaluated by AHP analytic hierarchy process, and the priority of development is obtained. The concept of environmental protection is used to apply these elements to product development. The classification sources of theme design elements of common tourist souvenirs are historical humanities, regional landscapes and folk customs.

1.1. Present Situation of Tourism Souvenirs Development in Xiamen

"Eat, live, travel, travel, purchase, entertainment" six major elements of tourism development in Xiamen is not coordinated, the development of tourism shopping is relatively lagging behind. Tourist souvenirs have a single category and high similarity rate, which makes it difficult to stimulate tourists' desire to purchase. The main reasons for this problem are as follows: Firstly, the awareness of intellectual property protection of tourist souvenirs is poor. With the development of tourism, some departments and institutions begin to attach importance to the development of tourist souvenirs, but when a new best-selling product is developed, similar products will appear quickly on the market. Then there will be price competition, leading to many institutions are reluctant to spend time and energy to vigorously research and development. Second, the theme of the product is not clear. For example, after the popular garland, most scenic spots in the country will see it, which will reduce the desire to buy. In fact, we can add some unique local characteristics on the basis of the garland, which is more interesting and memorable. Third, the product does not distinguish environmental protection elements, mainly reflected in the material, process, packaging and other aspects of the product.

1.2. Design Elements, Classification and Summary of Xiamen Tourist Souvenirs

The design elements of Xiamen tourist souvenirs are classified into three categories: history, humanity, regional landscape, folk customs and customs. Then, the design elements of Xiamen tourist souvenirs can be further refined by several methods. 1. Consult materials from Xiamen Library. 2. Take Xiamen Map for a few days to go to visit Xiamen. Make a circle of the places with more tourists, observe and record the handicraft of each place, and show the categories of tourist souvenirs in the main exhibition areas of Xiamen. Simplify the fragmented real information into design elements listed in tables.

Table 1. Classification of Thematic Elements of Xiamen Tourist Souvenirs

Classification	Specific name
Historical humanism	Taiwan ShiganDang, "wind lion god", Zheng Chengcheng, HuiAn women, God of Wealth from Five Directs, Mazu, emperor Guan, BaoSheng emperor, Egret, Bougainvillea spectabilis Willd
Regional landscape	Gulangyu (Cat Island), Zengcuoan, Haicang Bridge, Xiamen University, Zhongshan road, Wuyuan Bay, Jimei School, Tong An World Studios, NanPutuo Temple, Xiamen terminal building, Dadeng Islands, The architecture of Qilou, Sea, palm, Shapo tail, Oil painting village, Areca bar, Bailu egret island
Customs and public feelings	Marathons, karaoke dramas, Marathons, karaoke dramas, sand tea noodles, gambling moon cakes (it is for Zheng Chenggong to keep his troops from nostalgia in Mid-Autumn Festival), Liyuan opera, Tea culture, Dehua ceramics, Earth Building, Fuzhou Lantern, Sanfang Qi Xiang

Questionnaires were made and the first eight important elements were selected from the above design elements by means of questionnaires in the waiting hall of Gulangyu Island, Xiamen Airport T3 terminal, T4 terminal, Xiamen University seaside and Zengcuo residential quarters. The results are as follows. The votes of the following eight thematic elements are the first eight in turn.

Shi Gandang-Gulangyu-Xiamen University-Tea Culture-"wind lion god"-HuiAn Women-Zheng Chenggong-Marathon

1.3. Find a senior staff from the main departments of Xiamen Tourism Souvenir Design Agency and discuss and evaluate the above topics according to the actual sales situation of Xiamen. This score is slightly adjusted according to the results of the questionnaire survey.

1.4. Evaluation of Theme Design Elements of Xiamen Tourist Souvenirs

Hierarchical analysis can express people's subjective judgment in quantitative form, overarching people's thinking process and quantify decision-making process.

1.4.1. Establishment of hierarchical architecture.

1.4.2. Establishment of Paired Comparison Matrix. The hierarchical structure obtained from step 1 compares the elements between different levels and determines A by two comparisons.

Its matrix A is as follows:

$$A = [a_{ij}] = \begin{bmatrix} 1 & a_{12} & \dots & a_{1n} \\ a_{21} & 1 & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & 1 \end{bmatrix} \quad i, j = 1, 2, \dots, n \quad (1)$$

In constructing matrices, the scale of 1-9 is generally used to determine the importance of each factor (as shown in the figure).

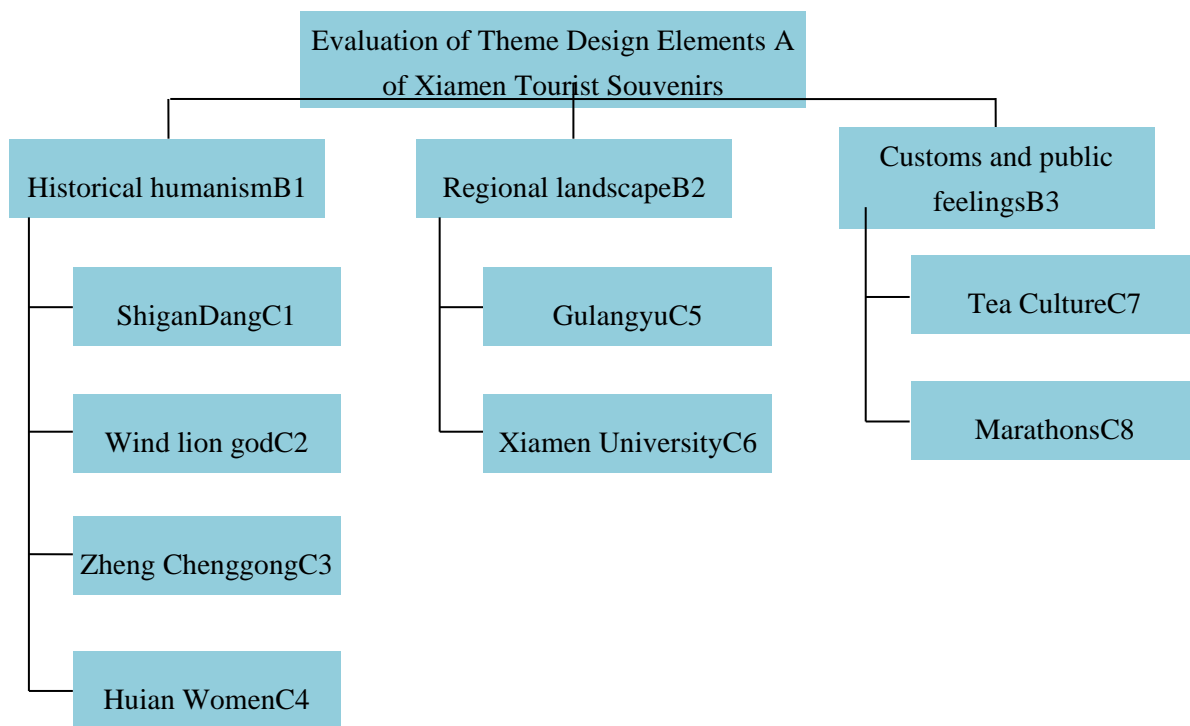


Figure 1. Hierarchical Table of Design Elements for Xiamen Tourist Souvenirs

Table 2. Proportional Scaling Meaning.

Scale a_{ij}	Meaning
1	Represents the equal importance of two elements in comparison
3	Indicates that one element is slightly more important than the other in comparison with two elements
5	Indicates that one element is significantly more important than the other in comparison with two elements.
7	Indicates that one element is more important than the other in comparison with two elements.
9	Indicates that one element is more important than the other in comparison with two elements.
2、4、6、8	The median of the above adjacent judgements

1.4.3. Hierarchical ranking and consistency test. The first step is to add the column values together to get the sum.

Table 3. Judgment Matrix.

	B_1	B_2	B_3
B_1	1	2	3
B_2	1/2	1	2
B_3	1/3	1/2	1

The second step is to divide the elements by the sum of their columns.

Table 4. Elements Divided by the Sum of Columns.

	B_1	B_2	B_3
B_1	0.546	0.571	0.5
B_2	0.6	0.286	0.333
B_3	0.4	0.143	0.167

The third step is to get the relative importance of the average value of each element, i.e. the weight W .

Table 5. Gets Weight W .

	B_1	B_2	B_2	权值 W
B_1	0.546	0.571	0.5	0.539
B_2	0.6	0.286	0.333	0.406
B_2	0.4	0.143	0.167	0.237

If the ratio exceeds 0.1, the result of pairwise comparison is inconsistent. If the ratio is less than or equal to 0.1, the consistency of pairwise comparison is considered to be reasonable. The specific steps are as follows:

The first step is to multiply the values of the first column by the weights of the first item, multiply the values of the second column by the weights of the second item, repeat the following actions for all column vectors, and then add the rows together to get a vector called weighted sum:

$$0.539 \begin{bmatrix} 1 \\ 1/2 \\ 1/3 \end{bmatrix} + 0.406 \begin{bmatrix} 2 \\ 1 \\ 1/2 \end{bmatrix} + 0.237 \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 2.062 \\ 1.15 \\ 0.619 \end{bmatrix} \quad (2)$$

Step 2: Divide the weighted sum vector obtained in the first step by its relative criterion weight
History and Humanities $2.062/0.539 = 3.826$

$$\text{Regional landscape } 1.15/0.406 = 2.833 \quad (3)$$

Customs and customs $0.619/0.237 = 2.612$

The third step calculates the average value of the second step, expressed in max.

$$\lambda_{\max} = \frac{3.826 + 2.833 + 2.612}{3} = 3.09 \quad (4)$$

Step 4 Conformity Indicators (CI)

$$CI = \frac{\lambda_{\max} - n}{n - 1} = \frac{3.09 - 3}{3 - 1} = 0.045 \quad (5)$$

Step 5 Computing Consistency Ratio (CR)

$$CR = \frac{CI}{RI} \quad (6)$$

Whereas R is the consistency index of randomly generated pairwise comparison matrix, the value of RI is related to the number of items to be compared, and its value is determined as follows:

Table 6. RI Reference value

n	3	4	5	6	7	8
RI	0.58	0.90	1.12	1.24	1.32	1.41

Then:

$$CR = \frac{0.045}{0.58} = 0.078 \quad (7)$$

To sum up, the consistency ratio is acceptable below 0.1; therefore, the pairwise comparative consistency of level B is acceptable. Using the above method, the other factors affecting the design elements of Xiamen tourist souvenirs are compared in pairs, respectively, as shown in Figure 6.

Table 7. Scoring Table for Subject Elements of Xiamen Tourist Souvenirs

	Shi Gandang C_1	wind lion god C_2	Zheng Chenggong C_3	Huian Women C_4	Gulangyu C_5	Xiamen University C_6	Tea Culture C_7	Marathons C_8	W
C_1	1	2	3	4	2	2	3	6	0.256
C_2	1/2	1	2	3	2	2	2	5	0.186
C_3	1/3	1/2	1	2	1/2	1/2	1/3	4	0.083
C_4	1/4	1/3	1/2	1	1/4	1/3	1/2	3	0.055
C_5	1/2	1/2	2	4	1	2	3	5	0.248
C_6	1/2	1/2	2	3	1/2	1	3	2	0.128
C_7	1/3	1/2	3	2	1/3	1/3	1	2	0.094
C_8	1/6	1/5	1/4	1/3	1/5	1/2	1/2	1	0.038
$\lambda_{\max} = 8.656$ CI=0.094 CR=0.067<0.1									

From the above description, it can be seen that the CR < 0.1 judgment matrix has the principle of consistency, so the weights of each element are credible. From the weight distribution value in the criterion level B, the highest value of historical humanities is 0.539. Therefore, in Xiamen tourist souvenir design element selection area, historical humanities are the best choice, followed by regional landscape, and finally customs and folklore. In criterion level C, the most important value of weight is Shi Gandang 0.256, followed by Gulangyu, wind lion god, and Xiamen University.

2. Environmental Protection Design of Xiamen Tourist Souvenirs

There are many concepts of environmental protection in tourism, such as the choice of transportation modes, the protection of cultural heritage and natural resources, and the purchase of appropriate tourist souvenirs. This paper mainly summarizes the following points in the environmental protection design of tourist souvenirs:

Accurately grasp the market and develop suitable tourist souvenirs. Based on the above results, it is concluded that the sequence of thematic elements that can be developed first can make reasonable arrangement of product development and reduce waste of resources, which is also a manifestation of environmental protection.

Select environmental protection materials. In the selection of tourist souvenir materials, we should try our best to select environmental protection components, which are conducive to degradation or decomposition.

Choose environmental protection technology. There is also environmental protection technology in the process, such as reducing the process link or using green decorative materials.

Environmental protection packaging. The selection of packaging materials can be recycled to prevent over-packaging.

3. Conclusion

Firstly, the AHP hierarchical analysis method is used to evaluate the important design elements in the development of Xiamen tourist souvenirs, which have the highest weight in terms of history and humanities from a broad category. It may be that the recognition of history and humanities is high, and the acceptance of the additional carrier customer groups is wide from a small category to see Shi Gandang, Gulangyu, wind lion god, Xiamen University is in the top four. In order to develop efficiency, factors such as inventory turnover can be developed with additional carriers in this order. Then, using the ranking results, we can develop tourism souvenirs in line with the market, and reduce the waste of time or material resources. The concept of environmental protection should be

taken into account in the whole process of developing Xiamen tourist souvenirs, so that green tourist souvenirs can be designed to achieve sustainable development.

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