Study on the Sustainable Design of Wayfinding Signage System in Tourist Attraction——Taking Lushan Mountain in Jiangxi Province as an Example

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Abstract. The wayfinding signage system of tourist attraction is taken as the main research object in this paper and the idea of sustainable design is used as the guiding thought. Through refining the elements of signage system construction of tourist attraction, a wayfinding signage system is constructed under the idea of sustainable design, which is combined with the design philosophy. Finally, taking Lushan Scenic Spots in Jiangxi Province as an example, the current problems are analyzed and solving strategies guided by the idea of sustainable design are proposed, so as to provide theoretical evidences for the future research on the sustainable design of signage system in tourist attraction.

1. Introduction

1.1. Background Introduction
With the rapid development of economy, people's leisure time is gradually abundant, and tourism is becoming a more and more significant part of people's life. A large number of tourists swarm into the tourist attractions, which brings about environmental problems for the scenic spots. Meanwhile, some problems have also appeared such as irrationality of many wayfinding settings, required information shortage of display panel and so on. Therefore, the construction of a scientific, reasonable and complete wayfinding signage system can not only improve the environment of the scenic spots and shape the image of the scenic spots, but also increase the cultural experience, enhance the popularity of the scenic spots, and become a window for publicizing culture to the outside world.

1.2. Research Status
From the perspective of literature search, the study on wayfinding signage design of tourist attraction started in 2007 and showed an increasing trend year by year as a whole. However, from the searching of the author, there are few studies conducted on wayfinding signage design of tourist attraction which focus on sustainable design. Through sorting out the existing academic literature, the domestic research pays more attention to the tourist attractions in the first-tier and the second-tier cities, while the research is relatively scarce for most of tourist attractions in the third-tier and the fourth-tier cities. Secondly, scholars focus more on the study of sustainable design of public environmental facilities. Finally, in terms of tourists’ practical demands, it is obvious to carry out systematic research on wayfinding signage in tourist attraction. Many tourist signage contents are only closely related to the scenic spots but ignore the tourists’ demands, so that the tourist information needed by tourists can not
be transmitted very well. Foreign scholars have paid attention to the study on the sustainable design philosophy of wayfinding signage system in the early stage, which provides some references for this paper.

2. Overview of Wayfinding Signage System in Tourist Attraction

2.1. Definition of Wayfinding Signage
The design of wayfinding signage system refers to “using concise graphic symbols to express the accurate meaning from the angle of visual communication and carry out information transfer through manifestation pattern from the angle of environmental design”[1]. In short, it is a connecting bridge to guide tourists to conduct independent wayfinding behavior, and provides a comprehensive tourism service system for tourists in tourist attractions, which is convenient for tourists to understand each scenic spot and assist tourists to arrive at the destination safely without asking the way from others. Therefore, before constructing the whole signage system, various design philosophies should be considered comprehensively, which runs through all aspects of the whole scenic spots system.

2.2. Functional Classification of Wayfinding Signage
According to the transmission function, it can be generally divided into five types, including wayfinding signage, guidance signage, explanation signage, name signage and restriction signage(Table 1)[2]. In the planning and design of tourist attractions, it is necessary to combine the characteristics of each region to further sort out the above-mentioned five types of signage in detail, so as to keep the relevance between each other.

| Location Sign | Showing the location of the facility and its relationship with the whole block |
|---------------|--------------------------------------------------------------------------------|
| Guiding Sign  | Guiding the direction to the destination                                        |
| Describing Sign | Showing the intentions of managers and the content of facilities             |
| Name Sign     | Highlight different function of the facility from others                      |
| Restricting Sign | Urging people to keep safety in mind and observe public order               |

3. Sustainable Design Research in Wayfinding System Design

3.1. Proposing the Concept of Sustainable Design
On September 1, 1995, the concept of sustainable product design was first put forward at the international conference "Product Design for Sustainability" held in the United Kingdom[3]. The design concept has been evolved so far, with 3R principle as its core: reduce, reuse and recycle, which aims at displaying recoverability, convenience of recombination and simplification of raw material in the whole life cycle of the goods, thus achieving the purpose of environmental protection.

3.2. Sustainable Design Principle in the Wayfinding Signage System of Scenic Spot
The wayfinding signage system of tourist attraction plays a key role in guiding tourists to conduct wayfinding behaviors. Although the electronic GPS positioning system is popular at present, in the public space of scenic spots such as internal scenic spots, remote mountains, caves and so on, where the tourist experience is not good since they can not use the positioning system smoothly caused by poor signal reception.

Based on the signage system design of tourist attraction under the concept of sustainable design, this paper considers how to establish a scientific, reasonable and standardized wayfinding signage system combined with the 3R principle on the premise of reducing the pollution and damage to the resources and environment of scenic spots as far as possible, which can not only improve the environment of tourist attractions, shape the image of scenic spots and guide tourists to complete
tourist activities, but also deepen tourists’ appreciation of scenic spots' culture, enhance the influence of tourist attractions and become a window for the publicity of scenic spots.

4. Introduction of Lushan Scenic Spots in Jiangxi Province

4.1. Geographical Location and Climate
Lushan, a national 5A scenic spot, is located in Jiujiang City, Jiangxi Province and lies in the lakeside of the Yangtze River and Poyang Lake. The total area is about 358 km², of which the mountain area is about 282 km². Lushan belongs to the northern subtropical monsoon climate, with a typical mountain climate in China, that is, humid climate, low temperature, strong wind, more fog and long frost season throughout the year. Lushan Scenic Spots have abundant rainfall capacity, and become a well-known summer tourist resort at home and abroad, where the summer is pleasantly cool, with the average temperature of 22.5 degrees centigrade[4].

4.2. Site Selection Cause
Lushan Scenic Spots mainly include three major areas: Guling Town Tourist Attraction in the mountaintop of Lushan, Southeast Foothill Tourist Attraction and Northwest Foothill Tourist Attraction. Lushan Mountain has rich ecological species, a large number of plants, birds, mammals, insects, and so on. It is worth mentioning that a significant conference, “The Eighth Plenum of Communist Party of China” was once held in Lushan Mountain, so it is also a famous political mountain. Therefore, in view of the importance of Lushan Natural Scenic Spots and its unique cultural deposits, the author decides to take Lushan Scenic Spots as a case to carry out analysis and research.

5. Existing Problems in Wayfinding Signage System of Lushan Scenic Spots in Jiangxi Province
Through field survey and interview with tourists, the problems are summarized as follows:

5.1. Lack of Uniformity of Wayfinding Signage
The wayfinding signage system in the scenic spots lacks the overall uniform coordination and normative standard, and the systematization is low. Materials, colors and styles are widely different, and the disharmony between the color used in the wayfinding signage and the environment of the scenic spots seriously affects the visual beauty of the scenic spots as a whole. For example, the wayfinding signage of Hanpoting and Yingzuishi differs greatly in form and content. The wayfinding signage explanation board of Hanpoting uses dark wooden color as the keynote. The whole style is supported by several pieces of battens, and the boards mutually combine and constitute as the main content display. The content of the explanation is only bilingual introduction in Chinese and English of the scenic spot without pictures. While the main tone of explanation board of Yingzuishi is the combination of bottle green and light green. The signage style is a modern style, consisting of a large panel surrounded by a protection framework. The layout both includes introduction text and a number of pictures presentation of scenic spots, as well as current location map.

5.2. No Updating and Maintenance in Time of Wayfinding Signage
Because of the long-time settings for many wayfinding signage in the scenic spots, the contents have been blurred. The signage boards have been faded seriously, and have broken without maintenance and updating in time. For example, the explanation signage boards in the scenic spots such as White Deer Grotto Academy, Lushan Botanical Garden and others have badly broken and the text can not be recognized clearly.

5.3. Formalization of Information Transfer in Wayfinding Signage
The font is too small for the contents of most signage boards in the scenic spots, which can not satisfy the tourists in sightseeing process of reading and play its role. For example, the Chinese characters and
English letters are too small in the signage board of tour bus passenger notice in the Lushan Scenic Spots, which is not conducive to the information transmission.

5.4. Unreasonable Layout Composing of Wayfinding Signage
The information content of wayfinding signage is too small in the scenic spots, so the tourists can not get the necessary information from the explanation signage board of the scenic spots. For example, the explanation information contents of Tiebi Peak and other scenic spots are quite limited, but the layout of guide signage board is too large. The proportion of text content and the area of signage board is unbalanced, resulting in too many blanks in the layout of explanation signage board, which leads to unnecessary waste.

5.5. Patch Placement of Wayfinding Signage System
Because the wayfinding signage is not synchronous with the development time of some scenic spots, many signage board are temporarily placed at the later stage, or several signage boards are placed in the same place, which not only destroys the overall aesthetic feeling, but also seriously wastes and damages natural resources.

6. Solving Strategies
According to the existing problems of Lushan wayfinding signage system and combined with the concept of sustainable design, the following solving strategies are put forward in this paper.

6.1. Unified Modeling
According to the system configuration of tourist attractions and considering the present situation of Lushan Scenic Spots, the style and color of wayfinding signage of tourist attractions shall have the unified design. Based on the current situation of the route in the scenic spots, the wayfinding signage of scenic spots are placed on the premise of taking into account the tourists safety and the eye-catching signage boards. In addition, the existing wayfinding signage of scenic spots shall be rectified and merged, and the unreasonable wayfinding signage of scenic spots shall be removed.

6.2. Detachable Structure Design
The structure design that can carry on repeated disassembly and recombination is used. In the assembly and connecting process of wayfinding signage, instead of using chemical glue or adhesive, it should be assembled in a clamping manner as far as possible. On the one hand, it is convenient to re-assemble and disassemble in the later stage. On the other hand, it reduces the damage to the natural environment. Combined with modular design, information content should be updated to reduce unnecessary cost waste.

6.3. Reasonable Font Size
The font size of signage board shall be adjusted reasonably. Survey data on the font size that is easy for the elderly with low vision to read shows that: “When the distance between the human and the observation is about 1 meter, the font size that is easy to recognize is more than 0.9 cm”[5]. Therefore, the font size of the wayfinding signage in the tourist attractions should be planned and designed according to the above-mentioned standards.

6.4. Applicability of Information in Signage Board
A unified design is carried out between the map orientation in the signage board and the tourist orientation. By adding auxiliary graphic symbols, the direction of sight of tourists is marked and the current position of tourists is clearly defined in order to improve the service efficiency for tourists. In view of the fact that Lushan is a national 5A scenic spot, a universal symbol graph and an explanation of English, an international language, are set up in the information of signage board of scenic spots, so as to give consideration to the use of tourists from various countries. According to the difference of the
place where the signage board is placed at present, the planning and configuration shall be carried out reasonably. In the area of introducing the whole scene, “The Wayfinding Map of the Whole Scene in the Scenic Spots” is set. “The Wayfinding Map around the Scenic Spots” is placed for the introduction to the current location of tourists around the scenic spots. “The Wayfinding Signage of Scenic Spots” is placed to guide tourists to go to the main public facilities and “The Name Signage of Scenic Spots” is placed to mark the current location of tourists. The information will be properly classified and collated so that tourists can use it accurately and clearly.

6.5. Simple Raw Material
It is suggested that more simple natural raw materials should be used in the plan and design of signage system in Lushan Scenic Spots. Because the Lushan Scenic Spots belong to typical mountain climate, the climate is humid with low temperature and more fog throughout the year. In view of the fact that the signage system is located in the scenic area of the mountain, stones with different sizes, which are not easily affected by damp and corruption, can be used as the raw materials for wayfinding signage. For example, the design of wayfinding signage system in Xilai Ancient Town, Sichuan Province, uses stones as the wayfinding signage board, and the whole style is unified and close to nature.

6.6. Combination Reduction
The public environmental facility and wayfinding signage set up in the space will be composite, which not only reduces costs but also decreases floor areas. Due to the surge of tourist volume during the peak season of tourist attractions, more space should be saved for tourists to play, so as to reduce the unnecessary waste of land in scenic spots. For example, the wayfinding signage board is combined with street lamps in the Commonwealth Games, to increase the convenience of tourists to use wayfinding signage board at night and save the installation of separate lighting signage boards. The urban wayfinding signage set up in the central district of Osaka, Japan, adopts the composite design method of public environmental facilities and road setting, thus achieving the purpose of being integrated and coordinated with the surrounding landscape.

6.7. Recoverability
In the Lushan system, recycled materials shall be used as much as possible. For example, the large stone-made wayfinding board is used in Zangyunxi Tourist Map in Wuleishan Scenic Spots. Although it is also stone, it uses relative complete natural stone whose shape has not been polished. This kind of stone is usually used to the explanation of scenic spots with relatively fixed information content. Even if the relevant information of scenic spots is updated in the later stage, it can be reused again.

7. Conclusion
Through field investigation and interview with tourists, this study obtains the existing problems of signage system in Lushan Scenic Spots, and puts forward the design strategies of unified modeling, detachable structure design, reasonability of font size, applicability of signage board information, simple raw material, combination reduction and recoverability, so as to provide a reference for the future planning and design of signage system in the scenic spots.

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