Investigation and study on tourist toilets around large scenic areas—taking Huangshan Scenic Area as an example

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Abstract: Tourist toilets which closely related to the interests of tourists and local people are an important part of the tourism infrastructure. With the process of increasing the importance of the development of large-scale scenic spots, research on the construction of tourist toilets in its surrounding areas should not be ignored. Here we took the large-scale scenic Huangshan Scenic Area as an example to investigate the situation of tourist toilets in its surrounding areas to pay attention to the construction of tourist toilets around large scenic spots and promote the overall development of tourist destinations. Our results showed that problems such as low attention, difficulty in raising funds, mismatch between supply and demand, lack of planning and poor management affect the construction of tourist toilets. Considering the necessity of strengthening the construction of tourist toilets around large scenic areas, we propose strategies for the construction of tourist toilets with multiple sources of funding, joint development, practical priority, construction of special public toilets, and formation of toilet culture. Our results provide a reference for the construction of tourist toilets around large scenic areas and the promotion of local tourism development.

1. Introduction
General Secretary Jinping Xi emphasized that the problem of toilets is not a trivial matter, and it is an important aspect of the construction of urban and rural civilizations. It is necessary not only for scenic spots and cities, but also for rural areas. We must promote this work as a specific work of the rural revitalization strategy to make up for this shortcoming that affects the quality of life of the masses.

A tourist city whose tourism industry must rely on its large scenic spots (termed LSS for short). LSS have undergone the test of time to develop relatively comprehensive and mature, complete infrastructure, and have also been highly developed in terms of development including tourist toilets to meet the basic needs of tourists. Tourist toilets which mainly used for tourists are built for tourist activities. They are distributed among domestic tourist attractions, tourist routes, and other tourist reception places. The target audience is tourists, mainly in tourist activity places\cite{1,2}. It is an important part of tourism infrastructure services and a window of civilization for tourism. In response to the bad phenomenon of tourist toilets such as dirty, messy, and poor, the Ministry of Culture and Tourism has continued to promote the "tourist toilet revolution" through economic subsidies, standardized standards, social guidance, policy support, and advocacy in 2017. The goal is to make clean and tidy and use accessible toilets to cover national tourist destinations\cite{3}.

The surrounding area of a large scenic area refers to a large scenic area that radiates and expands to its surrounding areas, and gradually forms an area with a wider overall scope and tourism service...
functions, including surrounding small scenic areas, passenger terminals, expressways, visitor distribution centers, and entrances to large scenic spots must pass through, etc. There are generally no specific restrictions on their areas. Huangshan Scenic Area (HSA) is an internationally famous tourist attraction. During the process of playing and living in this scenic area, tourists will inevitably have contact with its surrounding areas, and will inevitably use its surrounding tourist toilets. Therefore, the construction of tourist toilets around HSA is directly related to the impression and evaluation of tourists on HSA, and has a very important impact on the development of scenic spot tourism, which should be taken seriously. Thus we carried out a survey to investigate the construction of tourist toilets in HSA and its surroundings. We conducted a detailed analysis of the problems in the survey and proposed some improvement measures.

2. Overview of HSA and Construction Status of Tourist Toilets

2.1. Overview of HSA and its tourist toilets
HSA is located in Huangshan city, Anhui province, with a total area of 1,200 square kilometers. HSA covers Shexian, Xiuning, Shexian, Huangshan district, and Huizhou district of Huangshan city. HSA has beautiful scenery and unique scenery which is famous for its unparalleled strange pines, strange rocks, the sea of clouds, and hot springs. Thus its status in the tourism industry is self-evident. And it is a well-known typical representative in large-scale scenic spots.

Till now, there are a total of 23 tourist toilets in HSA, including 21 water flushing tourist toilets and 2 ecological toilets in areas lacking water resources (Fig. 1). All these basically meeting the needs of toilets for tourists in the flat season. In addition, the internal toilets of the hotel on the mountain and the residential unit will be open to tourists for free to meet the needs of tourists during the peak tourist period.

![Figure 1. Distribution of tourist toilets in HSA](image)

2.2. Status and analysis of tourist toilets around HSA

2.2.1. Overview of Areas Around HSA
LSS usually open multiple entrance gates to meet the needs of a large number of tourists. HSA received a total of 3.38 million tourists in 2018. In order to meet the needs of its tourism development, the scenic area has opened three gates including the south, the west, and the north as the entrance to
the scenic area, of which the southern gate is the most mature. While the east gate is still under development. Hence we selected the surrounding area of the south gate as an example for investigation.

The south gate of HSA is located in Tangkou town, Huangshan district. Tangkou town known as the ‘Huangshan Gateway’ is an important hub for Huangshan, and it is the indispensable place for the entrance to the south gate of HSA. The town's tourism resources are extremely rich. Currently, it has successfully developed the Emerald Valley and Jiulong Falls which are two national-level 4A scenic spots. It also includes 6 scenic spots including Fenghuangyuan, Xiangxi rafting, Xintaoyuan, Huangshan Wild Monkey Valley, Dazhuhai, and Tianhu Scenic Area[5].

2.2.2. Analysis and Evaluation of Tourist Toilets in Representative Areas Around the South Gate of HSA

Taking the south gate as an example, we selected Tangkou town, the Emerald Valley, and Jiulong Falls as representatives to conduct field research on the status of toilets. The results are shown in table 1, table 2 and table 3.

As a key distribution center in Huangshan, Tangkou town has comprehensive public toilet basic services (Tab. 1). However, many details are not handled properly. Many toilets lack the internal infrastructure or are seriously damaged. At the same time, the number of public toilets in this area is not consistent with that of tourists. The public toilets are relatively few, and some toilets are unreasonably distributed and inadequately managed. As described, the public toilets are generally simple but can basically meet the needs of tourists.

The number of tourist toilets in the Emerald Valley scenic spot is moderate, and the quality is generally good (Tab. 2). Especially, the management of ecological toilets is orderly and environmentally friendly, but the location of public toilets is not reasonable. While the field investigation found that the Jiulong Falls scenic area is equipped with 3 toilets (Tab. 3). The toilets are distributed at a reasonable spacing distance of about 200 meters, because the length of the Jiulong Falls scenic area is 600 meters. But there are more men's toilets than women's toilets, which are about twice as many as women's toilets. The design is not well-considered, and there are also some detailed problems.
Table 1. Survey of public toilets in Tangkou town

| Location                  | Zhaixi expressway exit | Zhaixi square | Inside Xingguo line distribution center station | Yuzutang next to Xingguo line distribution center station | Huizhou restaurant | Dongling interchange station of Xingguo line |
|---------------------------|------------------------|---------------|-------------------------------------------------|----------------------------------------------------------|-------------------|--------------------------------------------|
| Men's toilet seats (number) | 4                      | 7             | 11                                              | 5                                                        | 8                 | 4                                          |
| Women's toilet seats (number) | 3                      | 7             | 18                                              | 6                                                        | 8                 | 4                                          |
| Disabled toilets          | no                     | no            | no                                              | no                                                       | no                | no                                         |
| Children's toilet         | no                     | no            | no                                              | no                                                       | no                | no                                         |
| Storage room              | yes                    | yes           | yes                                             | yes                                                      | yes               | yes                                        |
| Management room           | yes                    | no            | no                                              | no                                                       | no                | no                                         |
| Management room           | yes                    | yes           | no                                              | yes                                                      | yes               | yes                                        |
| Post management system    | yes                    | yes           | no                                              | yes                                                      | no                | no                                         |
| Pothook                   | no                     | no            | broken                                          | yes                                                      | no                | no                                         |
| Shelving Unit             | no                     | no            | no                                              | no                                                       | no                | no                                         |
| Waiting seat              | no                     | no            | no                                              | no                                                       | no                | no                                         |
| Flush form                | hand push              | hand push     | foot type                                       | foot type                                                | foot type         | simple punch                               |
| Toilet paper holder       | no                     | no            | no                                              | no                                                       | no                | no                                         |
| Dryer                     | no                     | no            | no                                              | no                                                       | no                | no                                         |
| Soap dispenser            | no                     | no            | no                                              | no                                                       | no                | no                                         |
| Hair dryer                | no                     | no            | no                                              | no                                                       | no                | no                                         |
| Anti-mosquito and fly measures | no                 | yes           | no                                              | no                                                       | no                | no                                         |
| Easily finding            | easy                   | difficult     | easy                                            | easy                                                     | difficult        | easy                                       |
| Non-slip blanket          | no                     | no            | yes                                             | yes                                                      | no                | no                                         |
| Mirror                    | yes                    | no            | yes                                             | yes                                                      | yes               | yes                                        |
| Lamp                      | broken                 | yes           | yes                                             | yes                                                      | yes               | yes                                        |
| Toilet repair             | no                     | no            | yes                                             | no                                                       | yes               | no                                         |
### Table 2. Survey of public toilets in the Emerald Valley scenic spot

| Location                          | The Emerald Valley entrance | Intelligent ecological toilet by the Queqiao bridge |
|-----------------------------------|-----------------------------|---------------------------------------------------|
| Men's toilet seats (number)       | 12                          | 4 (Unisex)                                        |
| Women's toilet seats (number)     | 7                           | 4 (Unisex)                                        |
| Disabled toilets                  | yes                         | no                                                |
| Children's toilet                 | no                          | no                                                |
| Storage room                      | no                          | no                                                |
| Management room                   | yes                         | yes                                               |
| Post management system            | yes                         | yes                                               |
| Pothook                           | yes                         | no                                                |
| Shelving Unit                     | no                          | no                                                |
| Waiting seat                      | no                          | no                                                |
| Flush form                        | hand push                   | artificial punching, ecological degradation        |
| Toilet paper holder               | yes                         | no                                                |
| Dryer                             | yes                         | no                                                |
| Soap dispenser                    | yes                         | no                                                |
| Hair dryer                        | no                          | no                                                |
| Anti-mosquito and fly measures    | yes                         | yes                                               |
| Easily finding                    | easy                        | easy                                              |
| Non-slip blanket                  | yes                         | no                                                |
| Mirror                            | yes                         | no                                                |
| Lamp                              | yes                         | yes                                               |
| Toilet repair                     | yes                         | no                                                |
Table 3. Survey of public toilets in the Jiulong Falls scenic spot

| Location         | The Jiulong Falls entrance | Tianrenshuyuan | Jiuquxia |
|------------------|----------------------------|----------------|----------|
| Men's toilet seats (number) | 14                         | 6              | 3 (Unisex) |
| Women's toilet seats (number) | 7                          | 3              | 3 (Unisex) |
| Disabled toilets  | yes                        | no             | no       |
| Children's toilet | no                         | no             | no       |
| Storage room     | yes                        | no             | no       |
| Management room  | no                         | no             | no       |
| Post management system | yes                      | yes            | no       |
| Pothook          | yes                        | no             | no       |
| Shelving Unit    | no                         | yes            | no       |
| Waiting seat     | no                         | yes            | no       |
| Flush form       | hand push                  | foot type      | hand push |
| Toilet paper holder | no                        | no             | no       |
| Dryer            | yes                        | no             | no       |
| Soap dispenser   | no                         | no             | no       |
| Hair dryer       | no                         | no             | no       |
| Anti-mosquito and fly measures | no               | no             | no       |
| Easily finding   | easy                       | easy           | easy     |
| Non-slip blanket | no                         | no             | no       |
| Mirror           | yes                        | yes            | no       |
| Lamp             | yes                        | yes            | yes      |
| Toilet repair    | no                         | no             | no       |

3. The main problems in the construction of tourist toilets around HSA

Tourist toilets are the basic facilities to meet the basic needs of tourists, as well as the display of the image of tourist destinations, nationalities, and countries[6,7]. However, there are still many problems to be solved in the construction of tourist toilets around large scenic spots from the actual survey status. Only by solving these problems can we promote the sustainable development of the entire tourist area.

3.1. Low attention

For tourists, no matter where they are in the tourist area, it is inevitable to have a toilet demand. The degree of tourist demand for tourist toilets is not necessarily related to the level of the scenic spot aside from the quality of toilets. However, it is difficult for the superior government to see the importance of tourist toilets around large scenic spots, and there are very few construction measures and development plans. On the other hand, the development of the scenic spots is generally contracted by development companies, whose natural quality is to seek profits. However, the construction of tourist toilets around large scenic spots has high costs and slow returns, so it would prefer to invest manpower and material resources in other constructions. In addition, the company considers toilets to be insignificant or even unseemly compared with other tourism service infrastructures. So it invests little in the construction of toilets. Unfortunately, it ignores that toilets are the most basic and important service facilities for tourists.

3.2. Difficulties in raising construction funds

The main problem facing the construction of tourist public toilets around HSA is the lack of funds.
The average cost of public toilet construction is 80,000 yuan per square meter, while the average area of public toilets in Tangkou town is about 100 square meters. Therefore, it takes about 1 million yuan to build a public toilet, which is far beyond the financial capacity of the Tangkou town government. Moreover, even if the government decides to add new toilets to alleviate the current difficulty in using toilets, it will take a long time to complete the complicated process of planning, application, approval, bidding, allocation of funds, construction, and acceptance. In this period, it caused inconvenience to tourists. Tourist demand can't wait, and the image of tourist destinations can't afford\[8\].

At the same time, it still faces management problems such as the employment of cleaning management personnel, the purchase of cleaning props, and the inspection and maintenance of equipment and facilities, which all require continuous funding. This places heavy financial pressure on smaller scenic areas. If there lack continuous maintenance and management funds in the later stage, it will easily cause poor management of tourist toilets.

### 3.3. The number of toilets does not match the demand

According to Table 1, it can be found that the number of tourist toilets around Tangkou town is not enough. Especially in the tourist season, the problem of insufficient toilets at passenger stations and tourist distribution centers around the large scenic spots is more prominent. The long queue of tourists to use the toilet is common, which brings embarrassment and great inconvenience to tourists, affecting the face and image problems of HSA and Huangshan city.

### 3.4. The layout lacks integrity and scientificity

Large scenic areas are different from their surrounding areas. The department responsible for its development is not a unified entity. For example, HSA is managed by the Huangshan District Management Committee and the Garden Development Branch of the HSA Development and Management Company. While its surrounding areas are developed by other developers. All these cause HSA and its surrounding areas to develop separately, failing to take into account integrity and unity. In addition, the development of the surrounding areas is usually not parallel and uniform, resulting in large differences in the shape and style of toilets built in the same area and the layout of some toilets are unreasonable.

### 3.5. Poor management

Although the quality of toilet construction in tourist areas around the HSA has improved significantly, there is a prominent problem that the later management is seriously inconsistent with its grade standards. We found that the toilets in many service areas around HSA were not cleaned properly. The toilet door latches, hooks, faucets, lights, dryers, hand trays, and soap dispensers were damaged for a long time, causing waste of resources. All these problems reflect that the later management completely fails to meet the design level standards.

### 4. Feasibility analysis of tourist toilet construction around LSS

The impression on tourist toilets is often the first impression formed by foreign and foreign tourists on tourist destinations. Clean and convenient toilets represent the cultural qualities and humanities of a region, adhering to the concepts and principles of considering tourists[9]. Therefore, it is of great significance to strengthen the construction of tourist toilets around large scenic spots to improve the image of the city, reflect the national charm and national image.

#### 4.1. Increase government investment and raise funds through multiple channels

In terms of the allocation of infrastructure construction funds such as public toilets in scenic spots, we suggested that the superior departments conduct investigation and analysis first. Then allocate funds for projects that meet the standards after the feasibility analysis to solve the problem of ‘lack of strength while the spirit is willing’.

According to the inspiration of small advertisements posted in public toilets, we also suggested to
co-operating with enterprises in the way of attracting investment to help them promote. Accordingly, the enterprises should help to solve the funding problems to build tourist toilets in the surrounding areas of large scenic spots. For example, a public toilet in Germany was sponsored and built by the Coca-Cola Company. The shape of the Coca-Cola beverage bottle was built in accordance with the company's requirements, which is not only unique and novel but also has good publicity effects. Attracting investment not only solves the problem of capital, but also strengthens the cooperation between scenic spots and enterprises, and truly achieves coordinated development and mutual benefit.

In recent years, many cities have introduced commercial toilets and achieved success. Popularly, they operate tourist toilets with marketization, adopting mutually beneficial development models such as "public toilets + shops" and "public toilets + ticket offices". The commercial operation and tourist public toilets are skillfully combined to operate so that the construction and management of tourist toilets around large scenic spots are more dynamic and more sustainable. Although the toilet construction costs slightly higher in the early stages, the post-maintenance cost of the toilet put into the market is greatly reduced. In the long run, the maintenance costs not only will be saved, but the merchants must do their best to maintain the hygiene of the toilet to protect their own image.

4.2. Scientific planning and management, a joint development with LSS
Large-scale scenic spots and their surrounding areas are all part of a complete tourist destination. Therefore, the construction of tourist toilet infrastructure in large-scale scenic spots should lead to the development of their surrounding areas. The surrounding areas should use the large-scale scenic spots as examples and guidance to improve the quality standards of tourist toilets and form a whole with large scenic spots. Thereby improving the quality of tourism services in the entire tourist destination.

4.3. Designing landscape features and building ecotourism toilets
Surrounding areas of large-scale scenic spots have a lot to do in toilets to enhance their own competitiveness. In today's society, more and more attention is paid to nature, ecology, and environmental protection. If the construction of tourist toilets is hard and cold reinforced concrete, it is difficult to match with tourist destinations. For natural landscapes, the landscape of toilets is particularly important. Therefore, the design of tourist toilets should actively integrate the geographical environment and cultural elements, show environmental protection and ecology in construction, take the lead in providing ‘the third toilet’. In terms of operation and management, ‘Internet plus’ is applied to realize ecological, tasteless, standardized, humanized and intelligent. For example, a tourist toilet in the Emerald Valley uses wooden materials and a typical horse head wall design named Huizhou charm to combine the characteristics of the attraction and even gave the toilet an elegant name "Changxuan". It not only did not destroy the nature of the scenic spot but added a little charm and characteristics to the scenic spot.

It may be the right choice for the surrounding areas of large scenic spots to build eco-friendly eco-tourism toilets, as protecting the ecology is the eternal subject and responsibility of mankind. The ecological toilet has the advantages of low investment cost, no pollution, water conservation, organic fertilizer recycling, unisculated, and so on, which can better demonstrate its economic benefits, social benefits, and environmental benefits, more in line with the sustainable development strategy of our country. So it should be vigorously promoted and improved. In addition, the demand for toilets in some places may be concentrated in a certain tourist season for the large-scale scenic areas. It will cause a waste of resources to construct tourist toilets for this purpose. Some mobile public toilets can be used appropriately to solve this problem. On the one hand, it can effectively alleviate the tourist demand for tourist toilets during the tourist season. On the other hand, it can make full use of the mobility characteristics of mobile public toilets to meet the needs of different locations in different periods. It can also be reused to fully maximize utility and save construction costs.

4.4. Transform toilet behavior into toilet culture and toilet art
The management of civilized toilets only treats the symptoms but not the root causes. It is necessary to
conduct extensive publicity and education to improve the quality of residents and tourists, advocating civilized toilet use and forming a toilet culture. Due to the lack of toilet supervision and management around LSS, there is a phenomenon of ‘indulgence’ among tourists, and the destruction of toilet infrastructure and public health environment when using toilets. Even the best management cannot solve the toilet problem if the quality of tourists is poor. Therefore, the surrounding areas of large-scale scenic spots should pay attention to publicity and education for tourists to use the toilet, and local residents should set an example to affect tourists. It is necessary to update people's understanding of tourism toilets and strive to consciously form a civilized toilet culture by the establishment of warm reminders, publicity boards, personnel supervision, reward and punishment systems, and so on. In addition, the government departments in the surrounding areas of LSS can regularly organize activities such as toilet design competition, questionnaire filling for tourist toilets to invite residents and tourists participation. It is worth to create toilet art with the wisdom of the public by setting up certain incentives to stimulate public participation, broaden public opinion, and concentrate public power.

4.5. Reasonably design men's and women's toilets, reflecting humanistic care
If it found that the ratio of men's and women's toilets in tourist toilets around LSS is unreasonable, it should be corrected in a timely manner. The number of women's toilets should be appropriately increased in the necessary areas to make the balance reasonable. The rationalization of the ratio of men and women should be taken as a key design principle in the planning of tourist toilets, which fully reflects the importance and respect for women and humanistic care. The double-layer design of the toilet can save floor space and more easily protect women's privacy and avoid unnecessary embarrassment under the premise of maintaining the same toilet seat. At the same time, some special facilities can also be built in the tourist toilet. For instance, the public toilet at the entrance of the Emerald Valley Scenic Area around HSA installed a radio to introduce the Emerald Valley Scenic Spot, improving the service level of the entire scenic spot. Playing music in the toilet can become a propaganda medium for scenic spots and cover up the sound of the toilet, which is very humane and reflects humanistic care.

5. Summary
The development of tourist toilets around large scenic areas is gradual, and there is still a long way to go. The surrounding areas must also adhere to the long-term sustainable development path. Admittedly, the construction of tourist toilets is the foundation of tourism. Therefore, strengthening the construction of tourist toilets around large scenic spots requires the strong support of the government, the support of social enterprises, the active participation of the public, and the guidance and assistance of large scenic spots. It is necessary to integrate financial resources, technology and culture to create a new tourism toilet that is in line with people's conditions, humane, ecological and environmental protection, and aesthetic, so as to promote the infrastructure construction of the whole tourism destination and the sustainable development of tourism.

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