Interactive Landscape Renovation Based on Sustainable--Take the Tingrui U-ME Landscape Design Project as an Example

Yin Zhang, Huihong Yang* and Shiqing Wei

School of Arts and Design, Wuhan Institute of Technology, No. 206 Guanggu 1 Road, East Lake New Technology Development Zone, Wuhan city, Hubei Province, China
Email: 1633790831@qq.com

Abstract. In this paper, from the perspective of humanism, aiming at the existing buildings in the modern commercial space, the problem of the trap of consumerism, as well as lack of humanistic care in landscape and architecture, the landscape renovation design is carried out. We explored the people psychological experience in the commercial landscape, tried to integrate interactive elements, new materials, various energy savings and other methods into the commercial landscape, so as to improve the relationship between the commercial landscape and people, replace passive appreciation with landscape subjective initiative, further improve the harmonious man-machine environment, and build a beautiful and harmonious landscape environment.

1. Introduction

In order to build an attractive commercial landscape in a city full of business districts, the design should not only satisfy the basic form representation and function while ignore the physical or psychological impact of landscape design on people in life, leading to a one-sided and indifferent representation of "landscape is just plants". Although the commercial space without the harmony between people and environment can satisfy the function of traffic, recreation and appreciation, it only forms a unilateral environment mapping to people, which is basically the same as other commercial landscape function, resulting the designed commercial space cannot highlight its own characteristics and thus loses its core competitiveness.

2. Current Situation of Tingrui U-ME Commercial Plaza

2.1. Current Situation of the Site

The Tingrui U-ME commercial space belongs to Hanyang District, Wuhan city, Hubei Province. The site is adjacent to The East Golf Course on the south, Wuhan Municipal Construction Group and Country Garden Taifu International on the east, two large sports fields on the west, and two large communities on the north. The commercial space is located at the intersection between Taizihu North Road and Furong Road. The project is oriented as a highly competitive commercial land with new product ideas, with a total land area of 25,077 m², a total construction area of 75,156 m², the basement construction area of 28,805 m², plot ratio of 3.0, building density of 34.9%, and 2,188 motor vehicle parking spots (as shown in figure 1)
The existing hard pavement of the site is three-color bush-hammered marble; the wall of the water pool is built with black marble, and the overall shape and form lack vitality or even rigidity (As shown in figure 2). The southwest side of the site near the main road is an open space, and the landscape parerga are relatively concentrated on this side, while the northeast side is a semi-open space with fewer landscape parerga. Such function distribution hinders people's desire to explore the whole site, and also blocks the people flow sharing.

The construction of the Tingrui U-ME commercial space has greater development potential and development vision compared with the surrounding completed projects. The innovation of Tingrui U-ME will be the main means to attract passenger flow. Within three kilometers of the project area, there are several large communities with a resident population of nearly 30,000 (the total population of Zhuankou is 320,000), and the resident population will reach 50,000 after the house delivery and occupancy of the neighboring communities. There are five or six large enterprises entered around the project at present, and the office population is about 3,000. In the future, when the Zhuankou Headquarters base and Yongwang base are developed and mature, the office population will break through 20,000 in the next two years. Taking advantage of this opportunity, Tingrui U-ME set the product positioning at the two key attack points of youth and vitality, and launched an open commercial block in line with the future population model.

2.2. Current Condition of Vegetation

There are a large number of landscape flower beds at the southwest main entrance of Tingrui U-ME; the landscape pools are in a depth of 500 mm and in rich plant species, which have scattered height in distinct levels. The flowerbed is planted with radix ophiopogonis on the bottom, and the middle level is planted with pittosporum ball, purple leaf barberry and rhododendron, and photinia serrulata and osmanthus trees, with a standing plate of Tingrui U-ME in it, to create the entrance landscape with great ornamental value and logo. However, due to the lack of maintenance, the survival rate of plants is low, resulting in the poor landscape effect after completion for a period of time. The ginkgoes are planted in the atrium of the commercial plaza as ornamental trees, playing the function of gathering and distributing. And hardware facilities with the function of gathering and distributing should be added on this basis to enhance the primary and secondary relation between nodes in the whole site. There are big trees such as zelkova schneideriana, camphor tree and Koelreuteria planted on the road.
side near the Jiji Electric Power Group to enclose the plaza, but the layers are not rich enough and lack of ornamental value (As shown in figure 3).

2.3. Site Lighting
The plaza is a regular rectangle, and the lighting is arranged around the plaza and through the middle, which can provide effective lighting at night (As shown in figure 3).

Figure 3. Existing Vegetation and Lighting System of the Site (shot by the author).

3. Design Principles

3.1. Lightweight Design Principles
In order to adapt to the load bearing of commercial underground garage, the low alkalinity glass fiber cement with high strength and light weight is selected as the base layer material for pavement, and the design elements of vegetation are dwarf tree, shrub and grass, among which the shrub and grass are the main vegetation base. The same is true of parerga and artistic landscapes, with lightness, smallness and refinement as the theme [2].

Figure 4. Plan and Details of Tingrui U-ME Commercial Space (drawn by the author).

3.2. Sustainable Design Principle
Using sustainable design methods, we introduced energy cycle into the site design to realize the recycling of energy forms such as rain water and stepping potential energy, so as to reduce pollution and save costs. We also adopted modular design, which is easy to replace when the equipment is aging or the demand is changed in the future, so as to reduce the construction cost.

3.3. Interactive Design Principles
We replaced passive appreciation with active contact to further harmonize the relationship between people and landscape, build a harmonious landscape environment, integrate vertical landscape and interactive facilities. And the interactive facilities integrated into the landscape can form active attraction and interaction for people in the commercial space without artificial participation [3].
The original lighting form of the site is single, which does not conform to the project positioning, we added tramping lights and large commercial screens to strengthen the young elements of the site.

4. Interactive Landscape Design
Interactive landscape design refers to using interactive facilities to increase the initiative, diversity and interest of the environment, guide people to experience the environment to obtain positive emotions, and make experiencers feel happy by the interaction with environment (See figure 5). The article The Influence of Emotion on Consumer Behavior in China's Economy & Trade Yearbook explored the influence of emotions on business and elaborated that positive emotions can promote consumption to some extent, and an interactive business environment can greatly promote the generation of positive emotions [4]. So we added interactive facilities to enhance the vitality of the plaza, expand the target audience of the commercial plaza, and attract customers, counteracted the anxiety of people using psychology interaction with the surrounding environment, transformed the landscape from a plane to a vertical design, and integrated the "scene shaping" into the landscape design to give people more sensory information.

4.1. Overall Layout
We added the interactive system into nature landscape to make it more active, as a bond linking people and the natural environment, and increase people's happiness. The rich landscape space enables better communication between people and nature, so as to reduce the pressure of urban life and relax their mood. The traditional commercial space is transformed into a comprehensive public space integrating catering, shopping, recreation, sports and entertainment, etc. The integration of a variety of experience facilities enables the entire commercial landscape to provide people with an experience feeling in many dimensions, and more importantly, to increase an open and free experience feeling.

Figure 5. Scene Shape of Tingrui U-ME Commercial Space (drawn by the author).

Except for the commercial street in the lower floor, all the other floors are office areas. The whole site is designed with "water" as the design element, and filled with the concrete image of water pattern, fitting the "River Culture" of Wuhan. The "water pattern" is combined with the water channel and is throughout the site, which plays the role of drainage and irrigation. When it rains, under the guidance of the ground slope and trench, the ground water flows to the northwest corner of the site and is temporarily stored by the rainwater collection pool, and finally circulated to the dry fountain (as shown in figure 6). When the rainwater flows in the channel, it can pass through all the green pools in the site. The size of the channel opening is determined according to the needs of plants in the pools. The channel openings can irrigate the plants in the green pool, and the water with flow direction can solve the problem of algae breeding in the existing dry fountain on the site. By combining the fountain plaza in the site with the irrigation system, the dry fountain water flows to all corners of the plaza through the channels in the ground (As shown in figure 6). The above-ground plants such as green grass can be moisturized and irrigated by draining the water in the channel, so as to reduce the personalaufwand and maintenance cost of greening. The cooperation between the water circulation
system and the rainwater collection system can realize the self-irrigation of the plants in the whole plaza while adding a sense of depth of the ground.

In the Tingrui U-ME commercial space, the water in the rainwater collection channel flows slowly, and people sit under the ginkgo trees, forming the artistic conception of "drink the wine in a cup floating in a winding canal", adding an artistic atmosphere to the commercial space. The tramping lights and physical interaction get rid of a day's fatigue quietly. By adding new concept elements into traditional culture, the landscape design has not only Chinese national characteristics, but also the highlights of science and technology in the new era.

4.2. Entrance landscape
The landscape design of Tingrui U-ME commercial space not only satisfies the function of adjusting the spatial structure, but also takes into account the ornamental value. Different combinations of trees, shrubs, and grasses are designed for different functional areas; the entrance landscape has the most abundant levels, forming good greeter effect; while watching the entrance landscape from inside the site, the entrance landscape forms a "borrow scene" together with the rich topography of golf course in the distance, the sense of space of the entire site is elongated, and the high and far landscape collocation can make the viewers to relax pressure better and fit in the environment. The color setting of plants is also a major feature of the site. The ginkgos, albizzias, ophiopogonis, and purple leaf berberis that are retained in the site form the main view for appreciation in the span of a whole year.

![Figure 6. Water-circulation automatic irrigation system and rainwater collection system (drew by the author).](image)

4.3. Main Landscape Nodes
The ginkgo trees in the site are retained as the main landscape ornamental trees; chairs are increased around the ginkgo trees pool, and the PVC materials and anticorrosive wood are used for the chairs to reduce the maintenance cost in the later period; tape lights are set below the chairs to provide night lighting to avoid safety problems that are prone to occur at night; the chairs can be placed under the table to save viewing space if necessary (as shown in figure 7). The ginkgo tree landscape node with crowd gathering drives the attraction of commercial buildings and other parerga, creating a recognizable commercial landscape node.

![Figure 7. Design Sketch of Ginkgo Chairs (drew by the author).](image)
There are many under construction communities around, and the population tends to be younger, so children facilities are added in the space. Participatory spatial structures have become the most popular direction of scene shape at present. For example, Starbucks no longer emphasizes that it is a coffee shop, but becomes a "third space" outside work and life for soaked even without drinking coffee; Eslite Bookstore is not just a store that sells books, but "a meeting place for people of the same kind"; the "collective creation" space has become a holiday destination for people who clock in. It is clear that bricks-and-mortar businesses are striving to become a more interactive and daily public space. The interactivity of the site can be better reflected at night. The rhythm of lights can give people visual impact at night. Every step of people in the site forms interaction with the space, bringing different feelings by integrating vision and body sense.

4.4. Guidance System
Tread sense lights are added to the ground, which illuminates the road by collecting potential energy from pedestrian treading at night, providing good purpose guiding to the people entering the site [5]. The flowing light instead of the previous guiding system makes the guiding more accurate [6]. (As shown in figure 8)

![Figure 8. Schematic Diagram of Ground Lights (from Baidu picture).](image)

5. Conclusion
Several big domestic business groups had already started the transformation of business model, that is, transformed from consuming place into a daily public space without a specific purpose. And the successful examples suggested that the "feeling type space" is mature [7]. Due to the emphasis on the importance of sense of space, interactive commercial landscape effectively enlarged the subjective initiative of experience subjects, and narrowed the share of shopping, catering and entertainment, and made the commercial landscape take part in the interaction in the space to a certain extent, so as to reduce the boring feeling of people for space appreciation, enable commercial space to retain customers in the first place, and create new operating point for the business in turn [8]. The interactive commercial landscape advocates the interaction between people and landscape, inspires landscape designers to no longer rigidly adhere to the form and visual feelings, but turn to more rational design, and focus the design on people that have independent consciousness [9].

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