



Urban Integration and Sustainable Architectural Design for Multiple Pavilions

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Abstract. Since the proposal of "integration of industry and city", Meizhou Industrial Park has taken advanced manufacturing, leisure and tourism industries as its specialties and leading industries. It is important to study the new mode of industrial integration integrating "tourism, processing of prepared vegetables, exhibition and leisure experience" as an important part of the development of the real economy. In this paper, through the concept of "multi-pavilion integrated" culture and sports comprehensive architectural design, the industry of prepared vegetable industry and industrial tourism are integrated. The article shows the design scheme of a multi-court project with the theme of prefabricated vegetables located in Meijiang District, Meizhou City, Plot JN040101. The article outlines the project background and current situation as well as the location analysis, surrounding environment analysis, traffic analysis, SWOT analysis and crowd analysis of the base, while showing the design conception and design results overview of the multi-pavilion project scheme. This design is hoped to provide a program reference with reference value for the same type of industry-city integration and multi-pavilion integration project, and at the same time help the development of Meizhou industrial park, Meizhou prefabricated vegetable industry and industrial tourism.

Keywords: Urban Integration; Sustainable Architectural Design; Multiple Pavilions; prefabricated vegetable industry; Architecture and Environmental Design.

1 Introduction

As the population continues to grow and urbanization accelerates, in order to cope with the demand for resource utilization and increasing material and cultural needs, the architectural concept of "multi-pavilion" has begun to take center stage in architectural design; the development of prefabricated vegetable industry and industrial tourism has provided diversified choices for people's life, culture and tourism. The integration of industry and city has brought new opportunities and challenges to these fields.

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During the United Nations Climate Change Conference (COP28) in December 2023, the first global assessment [1] states that reducing the ecological footprint and keeping global warming below 1.5 °C in accordance with the Paris Agreement [2] is imminent due to the slow progress towards decarbonization targets across all sectors [2]. Particularly in the construction sector, customers and users in the building industry are increasingly recognizing the importance of sustainable buildings due to the intensification of climate change [3]. Recent studies propose a harmonized framework for the assessment of the building value chain, but point out the importance of integrating assessments, including the whole building process (Roostaie et al. [4]), assessments related to specific building types (Phillips et al. [5]) or environmental risks and hazards (Jia et al. [6]). Promote new buildings through the implementation of energy efficiency retrofit measures, increase the refurbishment rate of existing buildings - in line with the "New Wave of Refurbishment" initiative - and provide market-ready, technologically mature solutions for professionals [7]. Promote new renewable energy solutions [8] and adopt emerging solutions such as digital logbooks and refurbishment passport tools [9] or blockchain [10] to manage and store building data.

Integrating the functions of multiple pavilions into a single building requires effective spatial planning and design, rationalizing the functional areas of the different pavilions and ensuring coordination and fluidity between functions. In this project, the architectural design concept of "multi-pavilion" is used to integrate the prefabricated vegetable industry and industrial tourism, to explore the practical effects of multi-pavilion architectural design in the integration of industry and city, and to propose valuable reference solutions to meet the opportunities and challenges, to help the innovative development of these fields, and to realize a win-win situation for both economy and culture.

2 Case Studies and Preanalysis

2.1 Location Analysis

The project is located in the center of Meijiang District, Meizhou City, in the middle of the ring road, Jianying Park Avenue and Ruyi Road intersection of the plot JN040101, land belongs to the Jiaying New District Jiangnan New City. Jiangnan New City continues the original landscape pattern and urban veins, in accordance with the concept of "river as the axis, mountain as the landscape, lake as the heart, continue the city veins", in line with the concept of industry-city linkage and industry-city integration, highlighting the direction of the headquarters economy, commercial and financial, cultural and creative industries. The area focuses on perfecting the living facilities, including the construction of education, medical care, culture and entertainment and other public service facilities, and at the same time, creating a livable environment, planning and constructing green belts and parks, providing leisure and recreational space, and improving the quality of life of the residents. The multi-pavilion project is in line with the demand for development planning, combining the

prefabricated vegetable industry and industrial tourism in the form of a multi-pavilion, driving the joint development of the region and industry. (Figure 1).

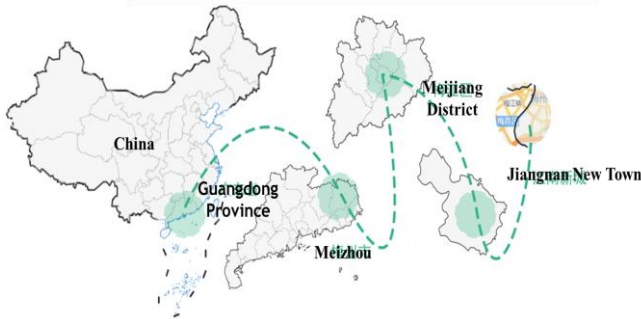


Fig. 1. Project Location Map

2.2 Project Background

In October 2022, the Office of the People's Government of Meizhou City, Guangdong Province, China issued the Notice on Several Measures to Accelerate the Development of the Hakka Prepared Vegetable Industry in Meizhou City, aiming to accelerate the creation of a Hakka Prepared Vegetable Industry Cluster that is influential in the whole of Guangdong Province and even the whole of China. In making full use of the prepared vegetable industry and industrial resources in Meizhou City, it provides a unique sightseeing experience by introducing tourists to scenes of prepared vegetable production and processing through industrial tourism, and promotes the development and publicity of the prepared vegetable industry to increase consumer awareness and acceptance of prepared vegetables, to achieve sustainable development, to protect cultural heritage, and to provide a high-quality tourism experience.

The current research on the multi-pavilion project of industrial tourism for the prepared vegetable industry mainly involves: pavilion layout design, exhibit display mode, visiting route planning, interactive experience projects, etc. It explores how to organically combine multiple pavilions to create a rich and diverse, complementary and coordinated industrial tourism project. As an innovative production mode and tourism mode, with the increasing demand of tourists for personalized and unique experience, the multi pavilion of prefabricated vegetable industrial tourism is expected to become the future development trend.

3 Design Conception

The sustainable building design concept brings together facilities from multiple fields in a comprehensive cultural venue with a multi-pavilion concept that shares resources, facilities and management. By providing a diverse platform for cultural exchange, it creates a high-quality urban space with distinctive features, enhances the image and attractiveness of the city, and promotes the development of urban industries.

3.1 Pre-Thinking

Schematic design was used to determine the location and size of each functional area to ensure a reasonable spatial layout and resource utilization. According to the wind rose map of Meizhou City, due to the prevalence of northeasterly wind, the production area is arranged on the west side to reduce the impact on other venues. For the green axis garden square on the east side, the leisure experience area is arranged on the east side of the base for functional transition, releasing the vibrant atmosphere of the surrounding environment. The project needs to consider how to echo the surrounding environment, including the surrounding environment and surrounding buildings. By extracting the architectural elements around the site and applying them to the shape of the building, the project actively responds to the original topography of the site for landscape arrangement to ensure the visual harmony of the project, reduce the impact on the original landscape, and protect and enhance the landscape value of the surrounding area. Environmental protection and sustainability factors should be considered in the design, such as building roof gardens and arranging green roofs to reduce the impact on the environment and improve the efficiency of resource utilization; and designing elevated ground floor courtyards to improve the microclimate of the building.

3.2 Design Concept

The design should respect and integrate into the surrounding natural and built environment, maintaining a harmonious visual effect and sense of space. The building appearance, material selection and landscape design should be coordinated with the surrounding environment to create a harmonious overall atmosphere. In terms of modeling style, the program extracts the sloped roof style of Time Meizhou Commercial Street and the window style of the Science and Technology Museum and applies it to its own design; in terms of block design, the left and right blocks are staggered back and forth to conform to the shape of the plot, and the use of block interspersed shaping the viewfinder to echo the landscape elements on the east side; in terms of the design of the site, the original layout of the pool is conformed to the layout of the pond combined with the design elements shaping the landscape of Yuet Tong Plaza. Focusing on environmental sustainability and resource utilization efficiency, green building design concepts are adopted. For example, the roof garden creates a green landscape environment, improves air quality, reduces the urban heat island effect, and provides pleasant outdoor space. Utilize renewable energy systems such as solar energy to reduce dependence on traditional energy sources. Rationally plan the functional layout inside the building to ensure that each functional area does not interfere with each other. Optimize the flow design by using large steps and elevated ground floors, so that people can flow smoothly and improve the accessibility and efficiency of the space.

3.3 General Idea

As the main road in the south of the project, in order to make full use of the advantages brought by the large traffic flow, the pedestrian entrance, i.e., the main entrance, is set in the south side of the base, while the vehicular entrance is arranged in the west side of the base at Jianying Park Avenue in order not to affect the urban traffic. In order to meet the parking demand of the visitors, the internal road of the base is opened on the east side of the base for underground parking. Considering that Ruyi Road on the north side of the base is a secondary road and connected to the residential area, a secondary entrance is opened on the north side of the base mainly for the use of logistic office, and it is connected to the inner courtyard of the building through the elevated ground floor to satisfy the flow of people and fire-fighting needs. On the east side of the base, there is a sub-entrance to meet the evacuation requirements.

Through horizontal division, the entrances and exits of people and vehicles are separated to ensure the safety and smooth flow between pedestrians and vehicles, forming the separation of people and vehicles.

Through vertical division, the main entrance on the south side adopts the design technique of big steps to lead the visitors to the second floor, realizing the internal and external diversion of logistics management personnel and service objects. (Figure 2-3)

1. People flow

Production line: directly diverted to the west side of the production area to enter the workshop. Visitor flow line: through the elevated design of the ground floor, the main entrance on the south side and the secondary entrance on the north side are connected to the north-south pedestrian flow line, and then the entrance steps are used to guide the passenger flow upward to complete the vertical partition with the logistics. Logistics line: the office logistics is independently arranged on the northeast side of the first floor, and the logistics flow line does not interfere with the passenger flow.

2. Traffic flow

The west side of the entrance is mainly used for transportation of prefabricated vegetable production, and the east side of the internal road is mainly used for underground parking, which completes the internal and external streaming.

3. Non-motorized flow

There is a non-motorized parking area on the northeast side of the site to reduce the impact of non-motorized traffic on other traffic.

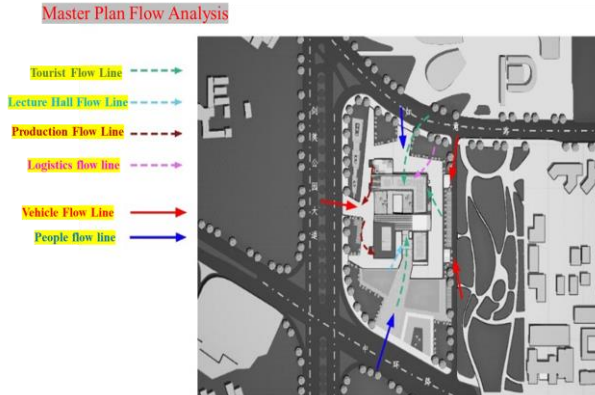


Fig. 2. Master level flow line analysis diagram

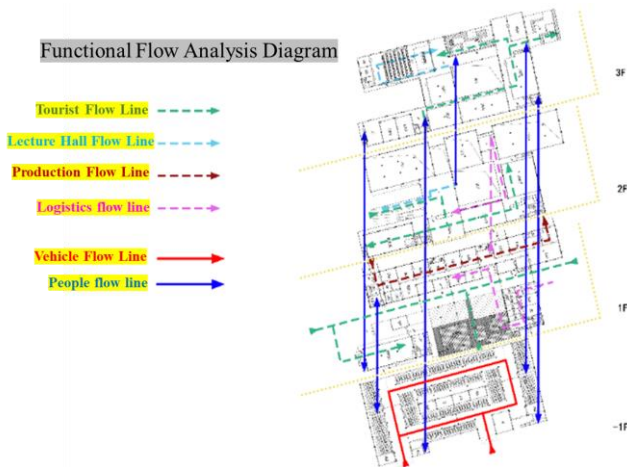


Fig. 3. Functional Flow Analysis Diagram

3.4 Ideas for Modeling

Drawing on the local form of the dragon house, the three-sided enclosure with one side of the main entrance open highlights its importance, making it the focal point of the building, providing an orienting function while increasing the transitional experience between indoors and outdoors. The top floor adopts a concave oblique shape, echoing the inward-looking nature of Hakka culture. At the same time, breaking the shape makes the building block permeable and enhances the building's sense of breathing, avoiding the bulkiness of the block. As the east side is facing the green axis garden square, it echoes with the landscape by interspersing the blocks. (Figure 4).

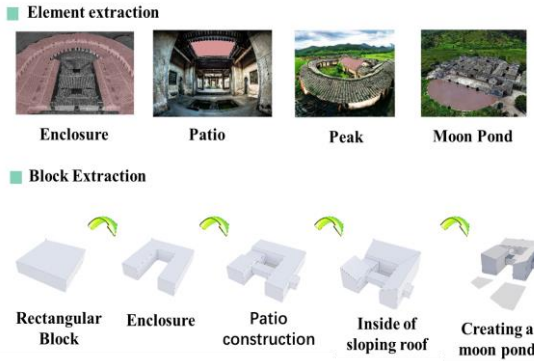


Fig. 4. Element Extraction and Block Nudging Chart

4 Design Results

Meizhou City "Hakka Hui City prefabricated dishes multi hall" architecture and environmental design project is located in Meizhou City, Meijiang District center, in the middle of the ring road, jianying park avenue and Ruyi Road intersection of the plot JN040101. the project planning land of 3.0573 hectares, the total floor area of 1.6462 hectares, the building area of 5274.8 square meters, building density of 17.3%, green area ratio of 30.7%, with 154 parking spaces. 5274.8 square meters, building density of 17.3%, green space rate of 30.7%, plot ratio of 0.54, with 154 parking spaces, the number of floors of the building is 4 floors, including an underground floor and three floors above ground.

4.1 Styling

Overall, it adopts the design technique of combining the real and the imaginary, forming a sense of hierarchy through the changes of real and imaginary modeling. The window openings on the façade form a sense of rhythm through the up and down movement of the window holes. The second floor experience area adopts floor-to-ceiling windows to maximize the introduction of natural light and vision. The floor-to-ceiling windows can connect the indoor and outdoor spaces organically, providing a sense of openness and a wide view. The third floor showroom area draws on the style of window holes of Hakka houses, setting small windows on the wall to increase the beauty and uniqueness of the building. (Figure 5).



Fig. 5. Shape Showing Diagram

4.2 Stereoscopic Rendering

Architectural design elevation rendering (Figure 6).



Fig. 6. Stereoscopic rendering

4.3 Bird's Eye View

Aerial view of the southeast side of the building (with green plants and light railings on the roof) (Figure 7).



Fig. 7. Aerial view of the southeast side of the building

4.4 Main Entrance

Rendering of the main entrance of the building (Figure 8).



Fig. 8. Take the mirror on the south side

4.5 Effective Diagram of Major Landscape Nodes

Architectural Design Major Landscape Node Effect (Figures 9-10).



Fig. 9. Effective diagram of major landscape nodes



Fig. 10. Two-point perspective

5 Conclusions

Through the design and research conducted in this paper, it can be understood that the multi-pavilion architectural design integrating the prepared vegetable industry and industrial tourism is of great significance for the development of industry-city integration in Meizhou. The multi-pavilion project program creates a new mode of industrial integration of cultural and sports integrated space by organically combining the elements of prefabricated vegetable processing, exhibition and leisure experience. The design of the project takes into account the location advantage, transportation convenience, and the surrounding environmental factors, providing visitors with rich and diverse experience and visiting opportunities.

In addition, the design and research in this paper also provide a reference architectural design for the same type of industry-city integration and multi-pavilion projects. Through the location analysis, surrounding environment analysis, transportation analysis, SWOT analysis, crowd analysis and design conception of the selected base, the architectural and environmental design scheme of "Hakka Hui City Prefabricated Vegetables Multi-pavilion" in Meizhou City is derived. This design not only has cer-

tain practicality, but also can provide new ideas and directions for the integration of Meizhou city and the development of Meizhou industrial park. Due to the closed state of the site, it is impossible to investigate the detailed data of the site, and there is a lack of investigation and statistics on the wishes of local residents, so the design and conception of the program is deficient, and there are certain challenges in practice.

In conclusion, the goal of this study is to explore the industrial integration of the prefabricated vegetable industry and industrial tourism through the architectural design concept of multi-pavilion integration, and to provide a reference program of some value for local industry-city integration and multi-pavilion integration projects. It is hoped that this design scheme can help the development of Meizhou Industrial Park, Meizhou Prefabricated Vegetable Industry and Industrial Tourism for enterprises and government.

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