

Exploration and Design of Minnan Fishing Port Market Based on Catalyst Principle

Jijing Gu¹ Fei Yan² Shijie Deng³ Min Cai⁴ Zihan Wang⁵

^{1,2,3,4,5} Fuzhou University, Xiamen, Fujian 361000, China

ABSTRACT

The fishing port market is a high-density commercial and trade area with limited public space stock. This study attempts to construct a micro update model for infrastructure based on modular fishing port markets, with the trading population of fishing port markets as the main users, with their daily activities as the perspective, with humanized design methods and discipline thinking as the guidance, and with the public space environment of fishing port markets as the focus and carrier. While studying the relationship between the fishing port market community and the environment, this study explores how user-based humanized design can better integrate the micro update design of the fishing port market based on the environment and considers how to integrate the concept of sustainable development into the entire design process. In theory, it summarizes the existing model of micro update of infrastructure in fishing port markets, which focuses too much on the environment, aims to solve the relationship between “human, behavior, scale and demand” and “human, environment and space”, and proposes the existing model of micro update of space in fishing port markets based on the concept of putting people first and humanized design, with modular design methods as a means, thereby providing a practical and sustainable space design scheme for the research of humanized and modularized scientific integration of the fishing port market industry. In practice, it is hoped that while providing a scientific and sustainable sales platform for fishery populations, it will also address the lack of spatial environment and functions of the fishing port fish market, provide a good modular spatial renewal for fishery populations at the experience process level, and create a high-quality and efficient seaport market space based on the perspective of multi-dimensional space, complex functions, flexible restructuring, energy conservation and environmental protection, while building a beautiful life scene for fishery populations, to meet the requirements of maximizing income and living social experience.

Keywords: *Fishing port market, Urban catalyst, Modularization, Humanization, Traditional trading space.*

1. INTRODUCTION

The exploration and design of the Minnan fishing port market covers elements of the cultural field and concepts of the Minnan Dan people, combining local cultural traditions, modern commerce, and environmental considerations, fully showcasing the unique historical and local values of the Minnan region. Through an analysis of the historical evolution, industrial structure, cultural connotation, and economic role of the fishing port market in the region, this article delves into the cultural background and economic significance of the fishing port market in the Minnan region, in

order to explore and update the design of the market. Starting from actual needs, it aims to promote the innovative development of the fishing port market and the culture of the Dan in Fujian Province, and better promote the tourism industry and global exchanges in Fujian Province.

1.1 Background of the Study

The Minnan fishing port market has irreplaceable value and characteristics and has been under the embrace of fishing culture for hundreds of years. This article aims to provide a platform for material exchange to ensure the economic

livelihoods of local residents. This cultural tradition can be traced back to the Ming Dynasty and widely existed in marine fishing villages, gradually developing into a unique social and cultural phenomenon. At the same time, the development of fisheries in Fujian Province can't be separated from the joint efforts of people from different social, economic, and cultural backgrounds.

1.1.1 The Value of Fishing Port Markets in Fujian Province

The spatial renewal of fishing port markets is to create conditions for the sustainable and healthy development of modern fisheries and coastal economic society. Fishing port markets are conducive to promoting the gathering of resource elements such as logistics, stream of people, capital flow, and information flow. Creating a

comprehensive fishing port market that integrates aquatic product trade, cold-chain logistics, and leisure fisheries in accordance with local conditions can promote the improvement of fishery quality and efficiency, ensure that fishermen live and work in peace and contentment, and ensure that fishing areas thrive and have a long history of fishery culture. The comprehensive construction of fishing port markets can improve the living standards of fishermen and their fishing production and service capabilities, thereby promoting the infrastructure construction of fishing port markets, while promoting the organic integration of fishing production, circulation, and consumption, and promoting the integrated development of related industries, thereby becoming an important platform for promoting the economic and social development of coastal areas.

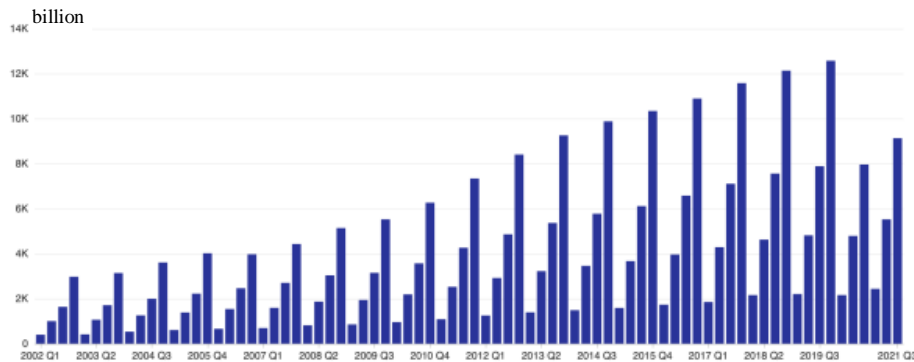


Figure 1 Total output value of China's fisheries. (Image source: China iiMedia Data Network)

The resources of fishing port markets in Fujian Province have significant advantages and characteristics, but there are also many problems. It is urgent to rationalize the layout and establish a sustainable modern "fishing market". Fujian Province has a long and tortuous coastline, a vast sea area, and abundant fishery resources. ("Figure 1", "Figure 2")

At the same time, it also has many fishing areas, such as Dongshan County, Xiapu County, major fishing towns, Huangqi Town of Lianjiang, Xiangzhi Town of Shishi, Shenhu Town of Jinjiang, and so on. Fujian Province is a major marine province and a major fishery province. With the continuous development of industries in coastal areas and the continuous promotion of coastal town construction, the importance of fishing port markets is becoming increasingly prominent.

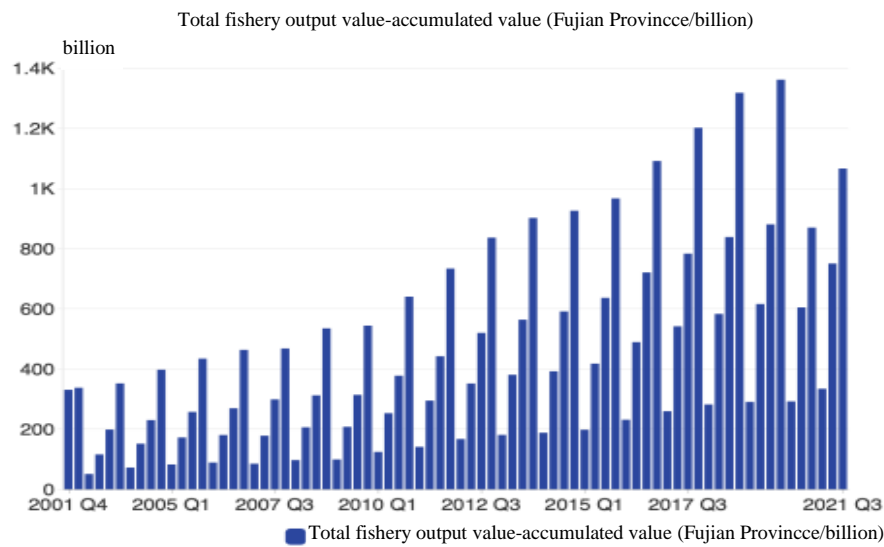


Figure 2 Value accumulation and purchase way numerical diagram of fishing port markets in Fujian Province. (Image source: China iiMedia Data Network)

Developing fishing port markets is conducive to promoting the inheritance of fishery culture in Fujian Province. Fujian has a long history of fisherman culture. The “Dan people” in its fisherman culture are descendants of the ancient Yue ethnic group, mainly engaged in fishing and water transportation in coastal harbors. For generations, they have lived in the boat, accompanied by water, and struggled with wind and waves for a long time. They are known as “the greatest navigator in ancient China”. Before liberation, they drifted on the sea all year round, also known as “Gypsies” on the sea.

One of the main living areas of the Dan family is the coastal area and Minjiang River basins in eastern Fujian, as well as the Lujiang River basins in Xiamen and Jinjiang River basins in Quanzhou in Minnan. At the same time, at fishing port markets, fishermen gather to tell stories and sing poems to each other based on the relationship between people and the sea, creating a culture of awe, respect for life, and praise for fisheries. The Minjiang River region also has a long history of saltwater song culture.

1.1.2 Challenges of the New Era in the Development of Fishing Port Markets

With the continuous development of society, fishing port markets are facing enormous challenges under the impact of the new era tide. The traditional fishing port market has gradually revealed its historical limitations. The advantages

of economic efficiency in the past are no longer obvious, and the shortcomings are gradually emerging, making it difficult to meet the consumption demand generated by people's yearning for a better life in modern society.

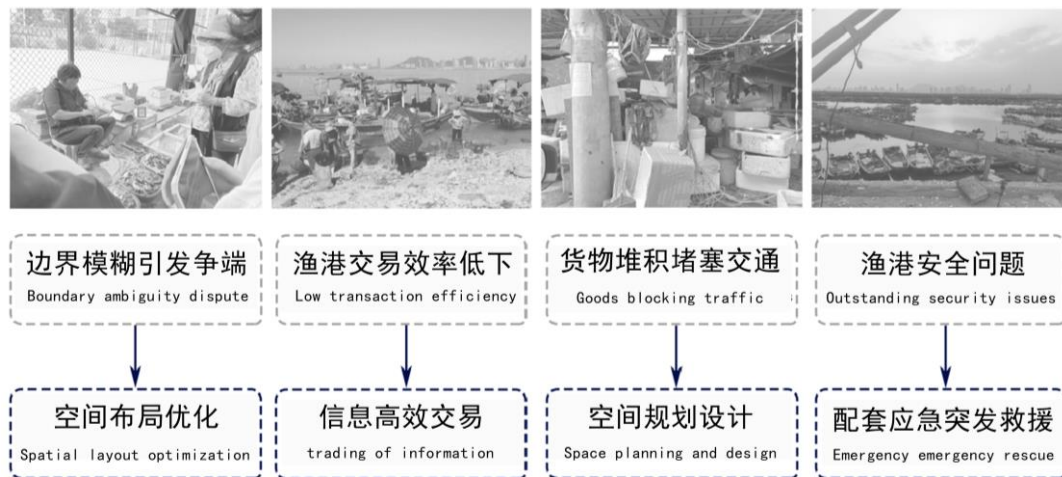


Figure 3 Analysis diagram of Existing Problems in Fishing Port Markets in Fujian Province. (Image source: authors' hand drawing)

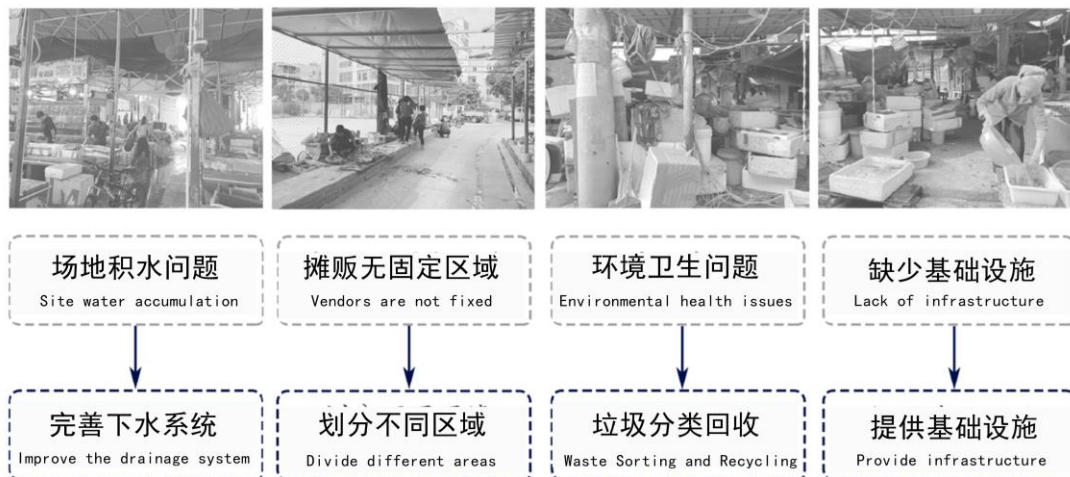


Figure 4 Analysis diagram of existing problems in fishing port markets in Fujian Province. (Image source: authors' hand drawing)

Most markets are formed spontaneously, and the boundaries of trading areas are vague. Most of the vendors are self-employed, lacking a fixed place of business. At the same time, the sanitary problems in fishing port markets are prominent, and packaging of seafood can be seen everywhere. Improper handling of marine organisms such as seafood can lead to environmental health problems, and in the era of the epidemic, it has further deepened the safety risks. The basic functional space is small, just a simple and crude sales space. In addition, issues such as rapid population expansion and environmental metabolic cycle conflicts have significantly deviated from the goals of building safe production of fisheries, prosperity and stability of fishing areas, and coastal socio-

economic development. It is urgent to further strengthen the construction of fishing ports on the existing basis, create conditions for the sustainable and healthy development of modern fisheries and coastal economic society, and promote the development of marine fisheries and promote coastal economic development. ("Figure 3", "Figure 4")

1.2 Concept Definition

Space catalyst, modularization, and humanization refer to important factors that need to be considered in the design and construction process of fishing port markets. Space catalyst refers to enhancing the interactivity and usability of

space through reasonable layout and design, promoting communication and integration between people and the environment; modularization refers to dividing the entire fishing port market into modules that can be flexibly combined and adjusted to quickly adapt to market demand and changes; humanization refers to the consideration of human usage habits and feelings in the design and construction process of fishing port markets. (“Figure 5”)

The settlements and places where the market is located are called market towns. There are many coastal cities in Minnan, and coupled with the topographic characteristics, there are numerous fishing ports. When the development of markets and fishing ports is combined, a unique coastal fishing port market has emerged, assuming important economic functions. Currently, a considerable number of people have participated in the trading of fishing port markets and settled in the fishing port market area to form villages. [1]

1.2.1 Fishing Port Market

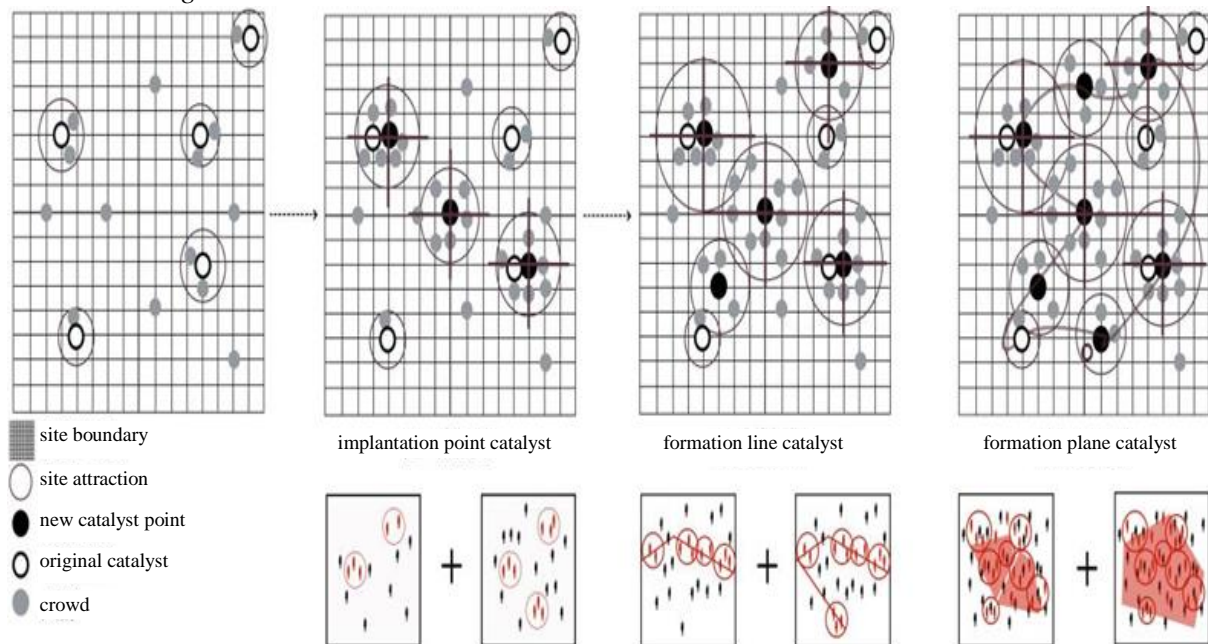


Figure 5 Analytical diagram of catalyst principle. (Image source: authors' hand drawing)

1.2.2 Space Catalyst

“Catalyst” refers to catalysis, which is derived from “substances that can interact with reactants to accelerate the reaction rate and themselves will not be consumed during the reaction process” in chemistry, thereby extending to substances that catalyze and accelerate the development of an item but do not change themselves. [2]

“Space catalyst” refers to the implantation of some catalyst elements in the development of business forms in the space, which interact with the production of catalysts in the associated regions. The implanted point catalysts will organically combine with adjacent elements to generate resonance, and together combine to form larger element catalysts, thereby deriving a series of linkage and evolution, and promoting the development and transformation of the overall

environment in a series of interlocking and surrounding reactions, so as to transform the entire spatial structure into optimization. For the organic renewal of fishing port markets, the catalyst development of public space is to promote the rational development of the entire region, thereby driving subsequent development in the overall environment, and ultimately achieving the ecological sustainable development of the entire society.

According to the theoretical analysis of “space catalyst”, its role can be visualized as: placing a point catalyst in a region or in a city for some scattered urban vitality spaces, and the catalyst points connect to and act on the region, affecting and changing the nature and vitality of the space within its surrounding area, and through the interaction between space and point catalysts, they become a whole, generating larger and newer

catalyst points, continuously affecting the scattered and disordered old spaces near the catalyst points, thereby generating a broader impact. Under this operating mechanism, through the serialized reaction of catalysts, it can change the scattered and disordered original space in space, successfully guide and promote the development of environmental space towards order and ecology, and ultimately achieve the overall urban health and sustainable development goals.

1.2.3 Personalization

Humanized design is based on people's needs, and adheres to the principle of putting people first, shifting the focus on various functions and elements of research to exploring the needs of users, and focusing on how to make the designed product more beneficial to the use of relative populations. This article has conducted sufficient research and analysis when proposing the concept, including the life habits and consumption concepts of the target group, as well as factors that cannot be ignored, such as education level and aesthetic bias, striving to design a humanized, convenient, and pleasant environment with a high degree of comfort.

1.2.4 Modularization

The predecessor of modularization is modulization, which refers to the decomposition of complex systems into modular methods that are more conducive to management and change. Modularization can be used to decompose and reorganize. Each individual module has its own specific functions. When faced with the functional requirements carried by the entire system, all individual modules can be reorganized into a whole to better carry regional functions.

Modules can also achieve basic attributes such as functional composition and flexible reorganization, reflecting the external characteristics of individual modules through functions, connections, services, and conditions, and combining logic to reflect their internal characteristics.

2. SUMMARY OF RESEARCH IN CHINA AND FOREIGN COUNTRIES

In the development of global culture, fishing port markets around the world are constantly evolving and developing, forming various seafood

markets that reflect the cultural, business models, technological applications, social contact, economic status, and future development potential of their respective regions.

2.1 Summary of Research on Chinese Fishing Port Markets

Fishing port markets are a traditional culture of life that cannot be simply replaced by new business models in urban life. However, due to some negative factors, the survival of fishing port markets is hindered, which requires updating the vitality of traditional fishing port markets from a multidimensional perspective of cities and buildings. Zhong Yu, a reporter from the People's Daily, once pointed out the current situation faced by the fishing port market in Hainan Province and referred to the fishing port market as the dilemma of "one-meter long fishing market", depicting some fishermen resting on boats docked by the stream, and some fishermen even carrying crying babies. Their whole family can't live without boats. In the early morning, they set out to catch fish, and after returning, the men mended the nets on the boat, while the women needed to pull the caught seafood ashore and sell it. Even if it wasn't sold out, they could only shut the shop after dark. The existence of fishing port markets also provides great convenience to citizens who purchase seafood. Over the years, returning from fishing to setting up stalls has become the way for fishermen to survive. "This is an important traffic lane. Please do not occupy the road and set up stalls. Violation will be dealt with in accordance with the law". Such a notice has been erected on the scene bar. However, beside the notice, the fishmongers are still continuing to do business through roadside stalls.

2.2 Summary of Research on Foreign Fishing Port Markets

Fishing port markets are considered one of the origins of seaport cities in many academic views, such as Jane Jacobs's Urban Economy, which points out that cities are the predecessor of hub markets. After hundreds of years of development, New York Port in the United States and Plymouth Port in the United Kingdom have become quite large-scale fishing port markets. Currently, the development of foreign fishing ports has encountered issues such as emissions pollution, the threat of ecological damage, and the impact of climate change. The development of foreign fishing port markets is moving towards ecological

restoration and resource protection, scientific research, diversified functions, and socialized participation. [3]

3. EXPLORATION AND DESIGN OF MINNAN FISHING PORT MARKET BASED ON CATALYST PRINCIPLE: A CASE STUDY OF XIAMEN CITY, FUJIAN PROVINCE

This design takes the fishing port in Xiamen as an example, conducting on-site research and practice to gain a deeper understanding of the actual situation and needs of the fishing port market. This helps to design and construct more accurately, taking into account factors such as local culture, environment, and social background, thereby effectively improving the applicability and sustainability of the fishing port market.

3.1 Survey of Fishing Port Markets in Xiamen City, Fujian Province

Xiamen City, Fujian Province, with a subtropical climate and abundant intertidal zones in its waters, is regarded as the coastal city with the greatest potential for developing fisheries. The overall sea area there is vast, which is adjacent to the Taiwan Strait, and is connected to five major fishing grounds, namely, east Fujian, central Fujian, south Fujian, outer Fujian, and Taiwan shoal. It covers an area of 136,000 square kilometers, with more than 5,000 recorded marine animals and plants, making it an important marine fishing operation area in China.

3.2 Survey on the Fishing Port Market of Gaoqi Fishing Ground, Huli District, Xiamen City, Fujian Province

Gaoqi fishing port market in Xiamen, Fujian Province was one of the largest fishing ports in Xiamen at that time. There are many commercial areas around, with relatively good commercial activities, mostly fishing by large tonnage vessels. In the past, scattered and different types of fishing vessels have been grouped together according to their types and operations. Fishery production has begun to expand and develop from coastal inland waters to offshore waters, with more fishing and sales to other places. However, it is difficult for small individual fishermen to make a living and most of them have moved to other places.

The fishing port market of Qiongtou Village in Xiamen City, Fujian Province is one of the largest fishing villages in Xiamen. It is located at the east end of Xiamen City, adjacent to the coast, with urban residential areas, commercial areas, historical protection blocks, and fishing village residential areas on the north. Due to the impact of demolition, the fishermen in the area have relocated, leaving many abandoned vessels unorganized and stacked. The remaining villagers sell along the coast and on the streets, with not optimistic livelihoods.

4. SPATIAL EXPLORATION AND DESIGN OF THE FISHING PORT MARKET IN HOUTIAN VILLAGE, TONG'AN DISTRICT, XIAMEN CITY, FUJIAN PROVINCE BASED ON CATALYST PRINCIPLE

Taking the spatial exploration and design of Houtian Village fishing port market in Tong'an District, Xiamen City, Fujian Province as a case study, this paper studies the effects and results of "catalyst" renewal of the fishing port market, and discusses the strategies and methods for optimizing the renewal of the fishing port market from a specific design perspective.

4.1 Current Situation and Surrounding Business Types of Xiamen Coastal Romantic Line Fishing Port Market

The fishing port market in Houtian Village is located at an important position in the eastern node, and is an important area to ensure the full development of the eastern space. Its renovation and reconstruction mainly faces the following issues that need to be addressed. First, there is the problem of water accumulation in the field. The accumulated water in the market is not conducive to ensuring environmental sanitation, and it is difficult to clean. Secondly, there is no fixed area for street vendors, and most street vendors are from the bottom of the society, who do not have a fixed income. Thirdly, there are issues like environmental health, lack of infrastructure, disputes caused by blurred borders, inefficient trading in fishing ports, cargo accumulation and traffic congestion, and safety problems in fishing ports.

4.2 Population Analysis

Fishermen are the founders and pioneers of fishing ports, and are one of the most important

factors in the formation of fishing ports. Fishermen in Xiamen mainly rely on shellfish harvesting and catching marine food, with footprints throughout the island and surrounding island stations in Xiamen. They are the earliest founders of the Xiamen fishing ports, and there is a situation where

the interaction of fishermen migrates to the surrounding areas. Fishery production is characterized by strong seasonality, high mobility, and high risk bearing, with frequent changes in the fishery population. ("Figure 6")



Figure 6 Population analysis and consumer portraits at Houtian Village fishing port market in Tong'an District. (Image source: authors' hand drawing)

4.3 Spatial Renewal Strategies for Xiamen Houtian Village Fishing Port Markets

Taking Houtian Village in Xiamen City as an example for design, it is beneficial to ensure the employment and livelihood of local fishermen, and to ensure the livelihood of the people in the fishing port market within its space. Moreover, Houtian Village has a rich marine cultural heritage. By optimizing the fishing market, not only can the cultural elements be better displayed and inherited, but it can also provide a foundation and support for the development of cultural tourism in Houtian Village, thereby driving the development of the entire economy.

4.3.1 Being Based on the Concept of Space Catalyst

Combining the theory of catalyst and urban micro renewal, this paper proposes a transformation strategy of introducing variable space catalysts to

transform traditional fishing ports and achieve their revitalization. This study amplifies the attraction ability of the place itself, generating more activity events, generating more attraction in more activity events and interacting groups, and generating more activities based on attracting more people, thereby achieving a process of overall circulation.

4.3.2 Being Based on the Concept of Human Engineering

Through investigation and research, it is found that the behavioral characteristics of residents are closely related to the settings of their environment, and there are significant differences in the behavioral characteristics of residents of different ages. Therefore, in space construction, special attention should be paid to humanized settings, and the spatial scope of the landscape, the shape and scale of public facilities, and the optimal environmental parameters for adapting to the human body are determined based on the relevant test data of the human body's scale, psychological space, activity field, and interpersonal interaction space, providing a scientific basis for design. [4]

4.3.3 Being Based on the Modularization Concept

From the perspective of the spatial function of fishing ports, this article uses the modularization concept to design the device from three perspectives: multi-dimensional space, space folding, and efficiency and convenience. Under this concept, it not only provides for storing the trading goods of fishermen, but also promotes rational spatial planning, enabling people to trade in the fishing port market space, and improving the efficiency and warmth of the humanized design. [5]

4.4 Device Design of Fishing Port Markets

The design of the fishing port market device is based on balanced considerations from multiple perspectives and levels, including functional requirements, participants, visual perceptions, market demands, and environmental protection.

4.4.1 Device Structure Description

From a functional perspective, guided by the modularization concept, it designs devices from four perspectives: multi-dimensional space, functional composition, flexible reorganization, and energy conservation and environmental protection. It provides storage of fishermen's goods and transaction space, while promoting rational planning of stalls and crowd diversion, and providing reasonable transaction space for the use of people in the fishing port market space on the basis of not occupying streets. It is based on an efficient and healthy humanized design, ranging from the optimal market transaction spacing and stall impact distance to combining counter height and window distance. According to ergonomic theories and various types of mobile devices, the device height range is set at 214-224 cm, and has passed the performance testing of materials. Material selection analysis can be seen in "Table 1".

Table 1. Material selection analysis table

Indicator	Pc structure	Steel structure	Wood structure	Indicator	Pc structure	Steel structure	Wood structure
Operating difficulty	Generally	Generally	Easily	Insect prevention	Good	Best	Easily
Ecological and environmental protection	Preferable	Comes second	Best	Seismic performance	General (7)	Very good (9)	Very good (9)
Indicator	Pc structure	Steel structure	Wood structure	Indicator	Pc structure	Steel structure	Wood structure
Days for construction	Short	The shortest	The longest	Main material resources	Rich	Rich	Less
Heat resistance coefficient	Small	The largest	The smallest	Constructive cost	Low	High	The highest
Fire resistance	Poor	Good	Poor	Corrosion resistance	Good	Preferable	Poor

It uses eight steel materials with a diameter of 15 cm and a length of 214 cm as its main support space, which is divided into two spaces, and the size of the trading space is set at 560 * 300 * 220 cm, which serves as a market trading area when used. It sets the storage space at 320 * 210 * 220 cm as a rest and storage space, determines the size of the sales cabinet as 90 * 45 * 90 cm, and divides the interior into three spaces on the left, with each space size set at 60 * 45 * 30 cm, as a display area for selling products, and the right space is divided

into two spaces, each with a size of 45 * 45 * 30 cm, as a shrimp and crab placement area. According to the spatial scale and site relationship of Houtian Village market, in order to achieve the most efficient and reasonable guidance of market trading groups, the circulation adopts a "convex" structure to arrange device stalls.

4.4.2 The Artistic Form of Devices

It differentiates the design of different shapes, colors, and accessories of the device based on the different needs of seafood to maintain vitality, and divides the device into regions. For example, blue can be used as the main color tone for low-temperature fish, and patterns can be designed based on the early morning seawater color as a source of inspiration, and then be applied to the appearance of the device. It uses local materials such as stones, deadwood, and phoenix wood as accessories, known as hanging decorations. On this basis, it uses artistic fonts to divide various schools of fish. For another example, it selects white as the main color of seashell seafood, and places some small seashell artworks to echo it. Light yellow and brown represent crabs and turtles. It aims to provide more explicit visual guidance and psychological cues for people using the device at the fishing port market, improve the recognition of market trading areas, and display the characteristics of various types of seafood.

4.5 Description of the Environment Where the Fishing Port Market Device Is Located

Houtian Village, located in Tong'an District, Xiamen City, is located in the southeast coast of China and belongs to the subtropical monsoon climate. In summer, the average temperature is high and rainstorm often drops suddenly. In winter, the average temperature is about 15 degrees Celsius, with less rainfall. Therefore, based on the basic function of selling and placing devices, it uses an aerated oxygen machine to maintain the oxygen in the water while lowering the water temperature, and uses UV lamps to prevent mosquito interference. At the same time, it designs corresponding elements as guiding landmarks based on the different forms of vision of various types of seafood devices, improving the recognition of the trading device space. In terms of lighting design at night, it uses different visual patterns to guide people based on lighting, increasing the artistry of the takeout area and improving the efficiency of the night fishing port market.

- Rest space environment

According to the results of field investigations, and based on the sales needs of some fishermen, it provides expandable rest and storage space in the market area, with public and private spaces set up respectively. It scientifically plans the layout form, artistically handles the appearance form and style, innovatively designs the table and chair form, and

reasonably sets the seat height, providing fishermen with a comfortable sales and rest environment.

5. CONCLUSION

In the new era of rural revitalization, this study redesigns the fishing port market area. According to objective conditions and the needs of the trading population at the fishing port markets, and in compliance with the principles of scientific and humanized design, designers are required to jointly create and maintain an orderly, stable, and efficient social environment with a mindset of “people's worries, my thoughts; people's thoughts, my actions” from fishermen to sales groups, and seek a harmonious relationship between science and convenience, efficiency, and flexibility.

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