



Design of Digital Display Platform for Rural Settlement Space Optimization under the Vision of National Space

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Abstract—Therefore, this paper takes rural settlements as the research object, and on the basis of national spatial vision, based on the inner corners of rural settlements, proposes a dual-oriented research and technical route, using multidisciplinary theories and methods to analyze the spatial evolution of rural settlements. Many discussions have been carried out on the process, mechanism and optimization. On the basis of reviewing the research progress on the evolution process of rural settlement space, this paper summarizes the driving mechanism of settlement space evolution under the action of multiple factors such as physical geography, social economy, policy system, etc. To promote the differentiation of the internal space of rural settlements, while innovating traditional space, and gradually produced new spaces such as cohesive living space, diversified production space, new communication space, and compound service space.

Keywords—*Digital Display, Rural Settlement Space, Space Optimization, National Space*

I. INTRODUCTION

The gradual rise of the network society has constructed a new social form and structure, and has influenced the historical process of human beings [1]. The concept of "network society" was first proposed by Manuel Castells, who believed that "network society" is not an imminent social structure, but the only social structure. It analyzes the ongoing Emerging, new social structures" [2]. In the network society, the traditional things and order will be gradually broken, the dialectical existence of productive forces and production relations will be given new meanings [3], and the social structure, time-space logic, and political rights will be reconstructed [4].

General Secretary Xi Jinping put forward a "five-in-one" construction plan in the construction of new countryside [5]. In the construction of new countryside, in addition to focusing on economic construction, political construction, cultural construction and social construction; at the same time [6], the construction of ecological civilization should be included in the strategic concept of Beautiful China. The establishment of the "five-in-one" strategic layout not only accelerated the process of urban-rural integration [7], but also greatly promoted the development of rural economy. Rural settlement is a phenomenon and process in which rural residents interact with the surrounding natural, economic [8], social and cultural environments, and is the main form of population settlement in my country. The rapid development of urbanization has promoted the process of transformation from "rural China" to "urban China". During this process [9], rural settlements have undergone developmental transformation, spatial reconstruction, and changes in farmers' lives and production methods [10]. Although this change has improved the production and life of villagers the conditions have also led to

many problems in the rural space [12], such as the modernization of the living space surface, the insufficient development of the production space, and the urgent need to improve the ecological space [13].

Rural space is the "reserved land" for the transformation from "quantitative change" to "qualitative change" in my country's urbanization [14]. How to realize modernization of rural space in the process of implementing the rural revitalization strategy has important practical reference significance [15]. It is a rural settlement with certain spatial structure and functional attributes composed of elements such as green space, public space and other living and production facilities [16]. The formation and evolution of rural settlements are closely related to the natural ecological environment and the stage of social development, and their scale [17], shape and internal structure reflect the comprehensive relationship between human activities and the natural and social environment. Since the 1970s, geographers represented [18] by Hu Zhenzhou and Jin Qiming have carried out systematic research on the landscape types, spatial distribution, structural forms and influencing factors of rural settlements [19], especially the causes and types of rural settlements in typical areas.

The development of rural tourism in my country since the 1990s has achieved remarkable results [20], and a large number of well-developed tourism-oriented villages have emerged. The rapid development of the tourism industry in the countryside has brought great opportunities and challenges to the construction of rural settlement spaces. Tourism-oriented villages contain rich resources [21], and tourism-oriented villages with different resource structures present a diversified trend in the development of spatial forms. The research on the spatial form of tourist-oriented rural settlements under the new normal is conducive to the sustainable development of villages [22], and then provides a good reference for the planning and design of contemporary rural space and urban space. Building beautiful villages is one of the important measures to improve the quality of life of farmers [23], promote the economic and social development of my country's rural areas, accelerate the process of urban-rural integration [24], and promote the construction of new rural areas and ecological civilization.

The 18th National Congress of the Communist Party of China, the Third Plenary Session of the 18th Central Committee and the "No. 1 Central Document" clearly stated that we should further promote ecological civilization and the construction of a beautiful China, and build beautiful countryside. In recent years, the Party and the government have continuously deepened the reform of the agricultural system and transformed the outdated agricultural production methods. At this stage, farmers are also constantly moving towards a well-off society.

II. THE PROPOSED METHODOLOGY

A. Homeland Space Vision

In the network society, the Internet breaks the time and space constraints of traditional society, reducing distance and time to zero [6]. At the same time, it has broken various cultural and institutional barriers between countries, regions and regions, gathered various element flows guided by information flow, and formed an efficient flow space. The earth expands people's production and living space. Resource is a general term for substances, energy and information developed by human beings and beneficial to human beings or to human development. Compared with the urban area in my country, the rural area in China is relatively large and occupies a large natural space. Therefore, the rational allocation of rural space resources is of great significance to the development of rural economy.

$$d_i = Th_i - W_i \quad (1)$$

$$\min_{\beta} \|H\beta - T\| \quad (2)$$

"Resourceization" of rural planning and design is the rational allocation of rural resources. In the past ten years, due to the constraints of my country's economic development, rural economic development has been relatively backward, and its potential huge space resources have not been fully tapped. From the average population of administrative villages and natural villages, there are more villages in the plains and less hills. From the perspective of the average population of administrative villages and natural villages, the scale of the villages in the II area represented by the set is larger, and the villages represented by the monkeys? The average population size is relatively small compared to the population, and the data is based on the village population density analyzed by ArcGIS. From the perspective of the population density and scale of the villages in Quanliangjian, the population density and scale of the villages are relatively large. The spatial structure level of rural settlements consists of three levels: regional rural settlements, group rural settlements and single rural settlements.

The spatial structure of regional rural settlements can generally reflect the regional differences in settlement characteristics. The spatial structure of group rural settlements is used to represent the spatial relationship of different levels of settlements. Its internal space organization and layout. Existing studies have mainly explored the characteristics and laws of spatial evolution of rural settlements from the regional and village levels, based on changes in location, scale, form, function, and landscape characteristics. There are many types of tourism-oriented villages, and domestic scholars divide them in many ways. According to the tourism mode, they can be divided into natural ecological type, folk culture type, tourism agricultural type, and leisure and vacation type; according to geographical location, they can be divided into urban suburban type and urban suburban type.

B. Rural Settlement Space Optimization Algorithm

Various development factors are the basic conditions for rural development. From the perspective of the current development of my country's rural areas, agriculture is the main pillar industry for rural economic development. In recent years, auxiliary industries such as tourism have appeared in rural areas. From a certain aspect, rural resources can be divided into natural resources and human resources. This

article will classify them from these two aspects. In this way, a classification system of rural spatial resources is constructed, and different resource approaches are found for rural resources according to different resource systems.



Fig. 1. Rural Settlement Space Optimization Algorithm

In general, the settlement structure showed a trend of change from uniform distribution to agglomeration. Compared with the loess hilly areas in the west, the hilly and mountainous areas in the south, and the traditional agricultural areas in the central part, where the fragmentation degree of settlement patches is intensified and the degree of intensive land use is relatively low, the spatial pattern of settlement land in the economically developed areas in the east tends to be regular, and the degree of land use intensity in settlement space gradually increases. enhanced. Even within the southern Jiangsu area, compared with the relatively backward Ningzhen area, the rural settlements in the economically developed areas represented by Suxichang are stronger and larger in scale. The concept of "spatial form" is widely used in geography, architecture, urban and rural planning and other disciplines. It is a concept with extensive connotation and extension. Domestic scholars have done many studies on the spatial form of rural settlements. The definition is also relatively broad, mainly including the layout and internal spatial organization of rural settlements. Rural settlements are gradually formed in a specific natural geographical environment and human and historical development, and the development of rural settlement space, due to the differences in its scale, location, resource environment, and regional culture, forms a different combination of spatial element structures.

The spatial form of rural settlement is the materialized form and state presented after the spatial elements form a whole through a certain structural relationship. Further focusing on the spatiotemporal pattern of the network society, it is found that the differentiation of the social structure leads to the change of time and space, and the rise of the network society leads to the obvious differentiation of the social space, forming three basic spatial forms.

C. Design of Digital Display Platform for Rural Settlement Space

The development and transformation of information technology has provided technical support for space-time compression, which has impacted people's traditional understanding of geographic space and geographical separation. elements to form a "flow space". Castel put forward that "the flow space is the material organization of the social practice of sharing time through flow", and the flow space pays more attention to the spatial flow of elements, which strengthens the cross-time and space, decentralization and free opening of the network society. The formation, distribution and development of rural settlements are inseparable from the resources and environment. Different resource allocation patterns will affect the formation of different spatial patterns of



rural settlements. The allocation of resources is one of the important factors affecting the changes in the spatial form of rural settlements.

$$\min \|X\|_0 + \lambda \|E\| = DX + E \quad (3)$$

$$J = \|X\|_i + \lambda \|E\|_{2,1} + \frac{\nu}{2} \quad (4)$$

Rural settlement is a resource carrier, and natural resources, human resources, and social resources are all important components of it. A reasonable resource allocation model will have a positive impact on rural resource utilization. For tourism-oriented villages, tourism resources are an important resource for their economic development. If tourism resources are regarded as a collection, then natural resources, human resources, and social resources are all subsets. The network society is a free and open complex giant system, the information technology paradigm does not evolve into a closed system, but into an open multilateral network, emphasizing the networking of various elements of society, and realizing the openness and inclusiveness of society. In the network society, the organic interaction between nodes and between nodes and cores forms a social network. Nodes have the property of being free and open, and multiple nodes are aggregated to form a network, which also has the property of being free and open.

At the same time, everyone in the network society is free and equal, enjoys various rights and interests fairly, expresses opinions freely, and participates in various affairs freely. In-depth research has been carried out on the spatial evolution form and evolution stage of the hollow village, and some scholars have discussed the changes of public space and the changes in the form and utilization mode of living and living space under the background of hollowing out villages.

CONCLUSION

Guided by the rural revitalization strategy, based on the spatial problems of rural settlements in the process of urbanization, this paper takes Yicheng as a research case, and uses technical methods such as on-site visits, questionnaire surveys, data analysis, and the deduction of the ArcGIS comprehensive evaluation model for rural settlements. This paper summarizes the development characteristics and existing problems of the production, living and ecological space of rural settlements, and proposes a development model of "basic unit of production villages + compound rural units" that adapts to the development of rural settlements. Facility sharing, service networking. With the reduction of the spatial scale of research and the increase of time sections, many abrupt phenomena and detailed differences will be clearly observed, and it is necessary to grasp the evolution characteristics of rural settlements at the regional level.

References

[1] Zhang Duchuan. Research on the optimization of rural settlement space in Henan Province from the perspective of "beautiful countryside" [J]. China Agricultural Resources and Zoning, 2019(2):6.
 [2] Zhao Changhui. Discussion on the optimization of the spatial pattern of rural settlements from the perspective of urban-rural integration [J]. Industry and City: First Half Month, 2020(2):1.
 [3] Li Jiajia, Geng Hong, Gao Peng. Research on the optimization strategy of rural settlement space under the background of rural revitalization - taking Yicheng City, Hubei Province as an example [C]// Sharing and

Quality - Proceedings of the 2018 China Urban Planning Annual Conference (18 Rural planning). 2018.
 [4] Mao Qihong. Research on the spatial characteristics and pattern optimization of rural settlements in Zhejiang Province under the background of beautiful countryside: taking Zhejiang Province as an example [J]. China Agricultural Resources and Zoning, 2021, 42(2):8.
 [5] Feng Yingbin, Long Hualou. Research progress and prospect of spatial reconstruction of rural settlements in mountainous areas of China [J]. Advances in Geography, 2020, 39(5):14.
 [6] Wu Mingjie. Research on the optimization of rural spatial layout in hilly and mountainous areas under the background of ecological civilization [D]. Shandong Agricultural University, 2020.
 [7] You Shang, Jiang Jingfeng, Xie Yunyi. Reconstruction and optimization of the "Three Lives" space of rural homestay settlements from the perspective of self-organization theory: A representative shared farm in Hainan Province as an example [J]. Southeast Academic, 2019(3): 10.
 [8] Cheng Linshu, Cui Xiaochen, Wang Shuxiao. The characteristics of rural settlements in China and the scientific criteria for ecological livability [J]. 2020.
 [9] Li Han, Yang Wenjing, Liu Jiahui. Research on the temporal and spatial evolution of rural settlements and its problems [J]. Shanxi Architecture, 2020, 46(14):2.
 [10] Sun Yang. Research on the reconstruction of new rural community living space based on the perspective of farmers [D]. Qufu Normal University, 2019.
 [11] Wu Mingyan. Rural living space optimization strategies under the changing lifestyles of residents: Taking Yicheng City, Hubei Province as an example [C]// 2019 China Urban Planning Annual Conference. 2019.
 [12] Niu Yin hao. Discussion on the optimization of the spatial layout of rural areas from the perspective of global tourism: Taking the Weichi-Chencun-Mituo Village area in Nanzheng County as an example [J]. Architecture and Culture, 2019, 000(001): 177-178.
 [13] Niu Yin hao. Discussion on the optimization of the spatial layout of rural areas from the perspective of global tourism: Taking the Weichi-Chencun-Mituo Village area in Nanzheng County as an example [J]. Architecture and Culture, 2019(1):2.
 [14] Ren Ping, Sun Daoliang, Hong Buting, et al. A Construction Method Based on Rural Settlement Spatial Morphology Model: CN112733237A[P]. 2021.
 [15] Jia Kaiyang, Qiao Weifeng, Wang Yahua, et al. Village-scale territorial spatial planning in the context of rural revitalization: cognition, function and construction [J]. China Land Science, 2019, 33(8):16-23.
 [16] Li Xu. Research on rural residential space in Hotan area from the perspective of beautiful rural construction [J]. Architectural Technology Research, 2021, 4(1):13-14.
 [17] Dai Jun, Chen Wenjun, Shen Shujuan. Spatial optimization of rural settlements in plateau mountainous areas based on comprehensive disaster risk assessment: Taking Ledu District, Haidong City, Qinghai Province as an example [J]. Disaster Science, 2021, 36(4): 8.
 [18] Huang Yan, Chen Shuyan, Tang Sai. Design and implementation of provincial-level land and space basic information platform under the background of government digital transformation [J]. Land and Resources Informatization, 2019(5):6.
 [19] Wang Linlin, Shen Zhen. Urban renewal and space optimization from the perspective of land space [J]. Real Estate, 2021(3):1.
 [20] Huang Yaping, Zheng Youxu. Morphological types and spatial system characteristics of rural settlements in the Jiangnan Plain [J]. Geographical Sciences, 2021, 41(1):8.
 [21] Ye Qiang, Pan Ruoquan, Zhao Yao. Temporal and spatial evolution characteristics of rural settlements in Chang-Zhu-Tan ecological green heart area under land use control [J]. Soil and Water Conservation Research, 2021.
 [22] Tu Shuangshuang, Zhou Xingying, Longhualou, et al. Research progress and prospect of spatial evolution and optimization of rural settlements [J]. Economic Geography, 2019, 39(11):8.
 [23] Su Qin, Liang Wen. The Enlightenment of the Spatial Evolution of Rural Settlements to the Overall Development of the Poverty-stricken Villages and Concentrated Areas [J]. Caixun, 2018(19):1.
 [24] Wang Yifei, Yuan Qing. Research on the inheritance and optimization of rural settlement spatial style based on morphological gene bank: Taking rural settlements in Heilongjiang Province as an example [J]. Planner, 2021, 37(1):9.