On the Spatial Characteristics of Traditional Korean-Chinese Villages Under Space Syntax Theory—A Case Study of Yan'an Village, Helong City

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Abstract. The development status, mainly including the surrounding environment, afforestation and greening, and architectural form, of Yan'an Village was investigated through literature review and field visit. Based on the space syntax theory, the public spaces in this village in 2021 were quantitatively analyzed via Depthmap from the perspectives of connectivity value, integration, and depth value. Finally, the development trends of landscapes in Yan'an Village, Helong City, in recent years were summarized.

Keywords: Traditional village · Korean-Chinese nationality · landscape · space syntax

1 Introduction

Traditional villages bear the weight of traditional farming civilizations with their historical and cultural values increasingly mined, and thus the protection of traditional villages has aroused extensive attention in all sectors of society [1]. In this research, the development and changes of landscapes in Yan'an Village in five different periods (2013, 2014, 2016, 2018, and 2021) were investigated. Based on the space syntax and relevant theory, the structural characteristics of public spaces in Yan'an Village in 2021 were analyzed using topological relations, and accurate data were acquired. Finally, suggestions for the future development of traditional villages were put forward.

2 Research Methods

In this research, Yan'an Village was investigated mainly by means of literature review, field survey and space syntax.

Space syntax, which was proposed and initially used by Professor Bill Hillier [2], mainly consists of the axis analysis method, visual field analysis method, and convex spatial analysis method. In this research, the axis model of Yan'an Village was established by combining the axis analysis method and spatial improvement. Then, this model was
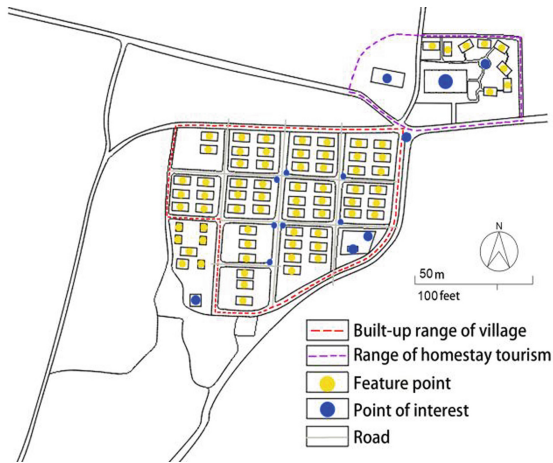
Fig. 1. Public Spaces Extracted from Yan'an Village in 2021.

imported into Depthmap to analyze connectivity value (CN), integration (Rn) and mean depth (MD). Centering on the inner space, public spaces served as nodes in the topology network, and the ligature between such nodes denoted a connection relation [3–5]. Subsequently, the internal structural relations between different spaces in two years were analytically explored. Finally, the changes of Yan'an Village in the development course were summarized.

3 Landscape Development Process of Yan'an Village

3.1 Changes in Housing Structures

In Yan'an Village, which was co-exploited by the Han nationality and Korean-Chinese nationality in 1900, traditional Korean-Chinese dwellings are still reserved on two sides of highways [6]. The new village built in 2017 presents a unified form of brick houses, which are arranged in order, with every six buildings as one unit separated by a road in the village. In addition, a nursing home, convenience stores, bowers, etc. are built in this village (Fig. 1).

3.2 Changes in the Road System

The road system in Yan'an mainly consists of highways, streets and footpaths in front of houses (Fig. 2). After merging in 2017, the road system in the village presents a network-like distribution, but the roads are shared by pedestrians and vehicles, thus leading to low safety and poor practicability. Moreover, road greening is done little, and only some shrub flower belts are planted. Now in 2021, roadside greenbelts are already very complete, and arbors and shrubs are well combined, with the sense of depth and sense of space stressed (Fig. 3).
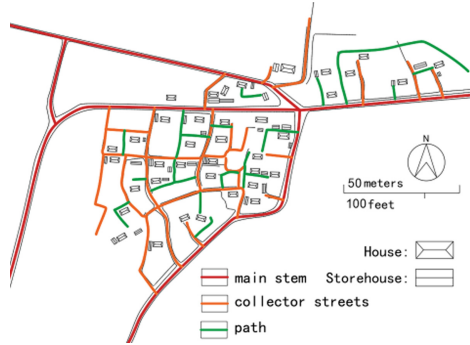
Fig. 2. Road Conditions of Yan'an Village in 2013.

Fig. 3. Road Conditions in Yan'an Village in 2021.

3.3 Landscapes and Green Plants

Yan'an Village is exceptionally advantaged in natural sceneries, and now it is a green rice cultivation base due to the presence of fertile farmlands and abundant natural resources [7]. Hence, the local government has created the new village into a characteristic folk customs village integrating sightseeing and tourism, and built coffee shops and homestay inns beside paddy fields to attract tourists. In this village, the courtyard landscape varies a lot from household to household, and most plants are small arbors in combination with small shrubs, which will not block out light rays, and can beautify the environment.

3.4 Public Facilities

There were no public facilities in Yan'an Village during 2013–2014, and a plaza was built for villagers after the rebuilding. The plaza is mainly composed of a basketball court, table tennis tables, characteristic seats, bowers and fitness equipment (Fig. 4). This plaza becomes the main activity space for villagers. Moreover, garden sculptures related to the folk customs of the Korean-Chinese nationality are newly established at each road junction in this village (Fig. 5), some of which can be used for resting. In addition, such sculptures not only beautify roads but also are of certain practicability.

Fig. 4. Bower and Fitness Equipment.

Fig. 5. Folk Customs Sculpture.

3.5 Change Analysis of Yan'an Village

The scale of Yan'an Village is continuously expanded, accompanied by the ever-increasing house buildings, ever-improved economic conditions, and more systematic roads, making it convenient for daily trips of villagers. Moreover, the categories of green plants are increased, not only road greening is intensified, but moreover, family courtyard greening becomes more abundant. People pay more attention to spiritual enjoyment in addition to material prosperity. The complete public facilities provide villagers with more activity spaces, and meanwhile, exhibit the Korean-Chinese culture to tourists. From 2013 to 2021, Yan'an Village has continuously enriched its own public space contents and come into the present shape. As for its future planning and development, the advantages and disadvantages of Yan'an Village will be analyzed through the space syntax theory, and the corresponding suggestions will be provided.

4   Spatial Axis Analysis of Yan'an Village

In this research, axis modeling was performed for the analytical research on Yan'an Village mainly based on three parameters—connectivity value, integration and mean depth.

4.1 Integration Analysis

Integration refers to the agglomeration or discrete degree of one space with other spaces in a system [8]. After axis modeling (Fig. 6) and operation via Depthmap, the axis with a

high integration level was regarded as the core of the whole space. In general, the result obtained by Integration (HH) shall prevail.

As shown in Fig. 7, the maximum value and minimum value of integration of Yan'an Village were 2.05 and 0.483, respectively. From the center of the village to the periphery, the integration showed a progressive declining trend. The three transverse axes were red with the integration ranging from 1.917 to 2.05, indicating the strongest publicity and the highest accessibility in this region, which, therefore, was the place with many activities generated in the whole village. Here, sculptures, trash cans and supermarkets with Korean-Chinese characteristics were arranged, which were convenient for people to appreciate and purchase. The four longitudinal axes were orange, with weaker publicity and accessibility than the aforementioned axes. Within the built-up range of this village, the plaza and bowers were located at the lower right corner, and their axes were blue with the integration level of 0.483–0.765, indicating the weak publicity and accessibility and few activities generated in this region. If built here, the bowers and plaza would not be used a lot. Given this, the plaza and bowers could be built nearby red axes, which were convenient for human activities and resting. Though separately built from the whole village, homestay inns were featured by small accessibility and strong privacy according to the values presented, so they were convenient for people to take a rest.

4.2 Connectivity Value Analysis

The connectivity value denotes the number of spaces intersecting with a space in a system and reflects the spatial correlation of spaces [9]. It is generally believed that the greater the value of connectivity, the better the accessibility and the more convenient connection to the surrounding environment. As shown in Fig. 8, the maximum value and minimum connectivity values of Yan'an Village were 21 and 1, respectively. In this village, longitudinal and transverse axes were red and orange, since they are located in the center of the village, with flat terrains and regular road orientations, which can connect many roads without lack of main stems. In addition, they are core spaces in the village that are strongly associated with surrounding areas and generate great influences on such areas. Here is rightly Yan'an New Village built for relocation, in which houses are relatively concentrated and roads are neat and orderly, mostly showing a cross shape, along with an increasing visual span and great spatial permeability. Therefore, the overall connectivity value of spaces in Yan'an Village is high. Nevertheless, the spaces in this village are generally single, and the overall interestingness can be enhanced by adding some recreational facilities, shopping malls, etc. in the future.

4.3 Depth Value Analysis

Depth value denotes the minimum number of connections needing to be passed to reach other spaces from one space, and it is in inverse relation to spatial accessibility [10]. It could be observed from the analysis chart (Fig. 9) of depth values in Yan'an Village that the mean depth values of No. 1–6 axes (3.5, 3.673, 3.648, 3.802, 3.985 and 3.936, respectively) were relatively low in the whole axis model, manifesting the strong spatial accessibility in this road segment with high visual attraction and large pedestrian volume and traffic volume. No.7 axis was red with a high depth value, since it was located in
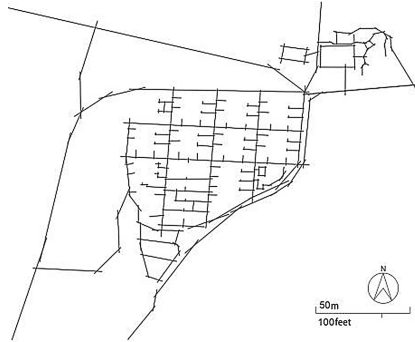
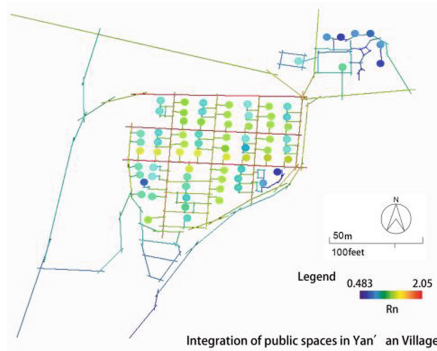**Fig. 6.** Topological Graph of Yan'an Village in 2021.

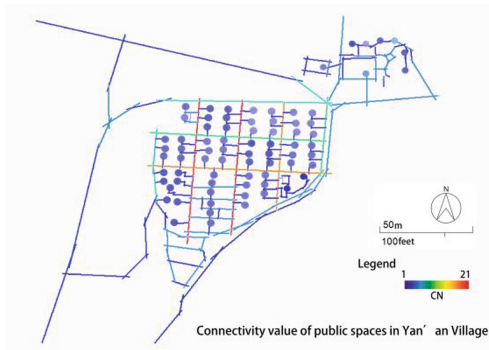**Fig. 7.** Integration Analysis Graph of Yan'an Village in 2021.

Fig. 8. Analysis Chart of Connectivity Value in Yan'an Village in 2021.

the south end of this village, there were few accessible roads, the overall accessibility was weak, and the line of sight could hardly be focused. The depth value analysis can facilitate crowd evacuation in spaces and prevent excessive pedestrian volume.
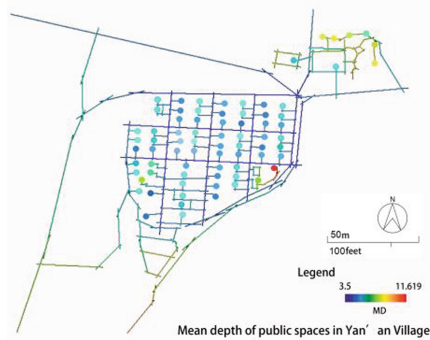
Fig. 9. Analysis Chart of Mean Depth in Yan'an Village in 2021.

4.4   Analysis and Summary

To sum up, the integration is partially high in the north and low in the south in this village. Responding to relevant national policies, Yan'an Village will be created into a new-type traditional village combining the tourism industry, where both paddy fields and coffee shops are built in the north. Therefore, Yan'an Village will develop towards the north for the sake of further expansion. The connectivity value and depth value reveal the high internal accessibility of this village, in which some landmark buildings, shopping malls and other facilities can be built in the future. Nevertheless, the plaza in this village is not convenient for passage with low accessibility, being a relatively private space, in which bowers and seats can be arranged.

5   Conclusion

As a traditional Korean-Chinese village, Yan'an Village possesses unique cultural traditions with considerable protection and development values. Driven by related national policies, cultural export and economic development can be better promoted by combining relocation and tourism. Nowadays Yan'an Village has formed its own characteristics though staying in the process of construction. From 2013 and 2021, landscapes have been gradually enriched and mature in the village. On the premise of guaranteeing the normal life activities of villagers, WeChat or Microblog-worthy places are added, thus attracting more external tourists. In this research, the landscape changes in Yan'an Village in recent years were investigated. On this basis, the obtained data were analyzed by combining the space syntax and related theory, and the landscape changes in this village under the joint action of the tourism industry were summarized. Moreover, the unreasonable aspects were pointed out. In the end, some suggestions for the protection and development of Yan'an Village were put forward.

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