

Evolution and Enlightenment of Neighborhood Street System Morphology in Slope Areas in Southwest of China

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Abstract: Street system is one of the important elements of town plan, which is of great significance to the study of urban morphology. From the perspective of regional exploration, this paper analyzes the typical neighborhood street system in slope areas in southwest of China in the four periods of 1949-1957, 1958-1977, 1978-1998 and 1999 to present, with the multi-story residential areas as a sample. The author adopts qualitative and quantitative methods to have a comparative study of the street system form, street length, width and density, plane line type and other morphological elements in the four time periods. It can be concluded that over the past half century, the street system of sloping neighborhood has experienced four stages of development: chaotic period, budding stage, mature phase and differentiation stage. According to the Conzen School, all the morphological changes and innovations in the city reflect the special social, political, economic and cultural requirements of the time. Therefore, in order to understand the inherent law of street system morphological evolution in sloping neighborhood, this paper discusses the dynamic mechanism of street system form change from four aspects: fundamental impetus, internal driving force, extrinsic motive and environment binding force. This article explores the implications of street system evolution of sloping neighborhood, which may be a positive reference for the construction of sloping neighborhood in the new era of the 21st century.

1. Introduction

Neighborhood, CBD and Fringe Belt are the three Spatia Units which make up the whole urban landscape [1]. Neighborhood is the “Basic type” of urban form, which determines the form of our living city to a great extent [2]. The study of neighborhood can be through four elements: plot, street system, architectural layout, architectural three-dimensional shape [3]. Road is the key factor to form the neighborhood itself, and its system has certain stability, which is of great significance to the study of urban form [4].

There is a lot of literature on residential street system. Some scholars discuss the forms of neighborhood roads, such as Discourage Through Traffic in the Peri neighborhood unit [5] and Redburn’s man-car diversion [6], hierarchical road system, Culs-de-sac. Many scholars start from the relationship between people and vehicles in the road mode. For example, Lin Zhongkai and others have summarized the Chinese road model as three modes: coexistence of people and vehicles, partial diversion of people and vehicles, and complete diversion of people and

vehicles. Some scholars start with the relationship between road form and housing, such as Cervero, R. The relationship between road form and living commuting mode is discussed [7]. Some scholars have studied the historicity of residential street systems. For example, Pierre Filion summarizes the North American settlement network as a curved road network from a grid and a modified Grid or Modified Grid, Curvilinear, and a few main streets around a common center (Curvilinear: Surper-blocks Around a Common Centre). The gradual journey to the modern and improved new road network (Contemporary) [8]. Mulong has made a systematic study on the road form of American residential area, and holds that in the 20th century, the shape of American residential road has gone through the development process from grid (Grids) to curved (Curves) to circular (Loops) [9]. Zhang Lili and others believe that China has improved it since the introduction of “neighborhood units” in the 1960s, until the neighbourhood street system has become more diverse in the 1990s. Generally speaking, Neighborhood Street System Morphology has been discussed in the aspects of road system, relationship between man and car, historical evolution and so on, but its main research object is located in western [10], or plain cities. The change process of neighborhood street form in this study area is not known and is worthy of further study.

The purpose of this study is to determine the neighborhood street form in the southwest of China, and how they change over time. According to the Konzern School’s view, all forms of change and innovation in the city reflect the special requirements of the social, political, economic and cultural time at that time. Due to the special geographical location and the relative lag of the social and economic development in the southwest of China, the road construction and development of the region are different from the developed regions. In this paper, we try to find out the laws and features of the neighborhood street development in the Southwest, and to explore the power mechanism behind it.

2. Methodology

2.1. *Sample area*

Chongqing, Sichuan, Guizhou, Yunnan, Tibet and so on belong to the mountainous areas of southwest China. Chongqing is selected as the main case of this study. It is a typical mountainous super-large city, which is located in the upper reaches of the Yangtze River in China. Its unique mountain geomorphological conditions determine that the street shape of the city neighborhood is different from that of other plain cities. In the past 100 years, compared with the changes of other cities in the southwest region, the development mode of Chongqing residential area has many similarities and is more complex.

2.2. *Sample History*

In 1949, the People’s Republic of China was liberated. In the early days of the founding of the People’s Republic of China, there is a large demand for urban construction. In order to alleviate this problem, and to stabilize the social order rapidly and restore the production, the residential area planning and construction in this period will adhere to the “Favorable for production and convenience for life” principle. With the continuous improvement of the overall housing construction system, the implementation of the policy of “unified investment, unified planning and design, unified management” has effectively promoted the construction of residential are-

as. In the early stage of liberation, the focus of urban construction in southwest China was to save the crisis, ensure the safety of life and improve the living conditions, so the construction was carried out in a simple and easy way. From 1960s to 70s, the construction of residential areas in China was slow due to the influence of politics, economy and natural disasters at home and abroad. Most of the residential areas in southwest China are unit settlements established by enterprises. In 1978, China entered the period of reform and opening up, and the state began to carry out housing reform attempts. Enterprise units gradually become the main force of housing investment by self-financing to develop residential areas. Real estate development companies are also beginning to appear. In order to improve the planning and construction level of urban housing in China, the state put forward the policy of "unified planning, rational layout, comprehensive development and supporting construction" in the 1980s. After the 1990s, with the rapid development of economy, the rapid growth of urban population has challenged all aspects of the city, and the development of housing planning has been impacted. Commercial housing began to appear. After 1998, with the introduction of the Circular on further deepening the Reform of Urban Housing system and speeding up Housing Construction, the distribution system of unit welfare housing has been completely abolished. In southwest China, housing is becoming more commercial and market-oriented.

In different urban development periods, the neighborhood road system has a unique material and cultural landscape. The chronological superposition of local social, political, economic, and cultural factors at the time led to changes in the shape of the residential road. Defining the boundaries of different morphological cycles provides a better understanding of the neighborhood road patterns during that period. Different scholars have different understandings of the division of the morphological cycle. For example, Bao Ming divides the living form of contemporary China into pre-foundation (1860-1948), pre-reform and opening (1949-1978), initial stage after reform and opening up (1979/1990), and large development stage (1991/1997). Diversified development stage (1998/2005) and quality improvement stage (2006-present). Cui Qian divided the historical process of the unit settlement into the burgeoning stage before the founding of the People's Republic of China from 1930 to 1949, the development stage of 1949-1978, the dissolution stage from 1978 to 2000, and the differentiation stage from 2001 to the present. It can be seen that the morphological cycle is closely related to major political events and national policies.

This paper summarizes the previous division of time, taking into account major political and economic events, national policies and the particularity of southwest mountain areas. The road shape change process of residential area in southwest mountainous area is divided into four parts: 1949-1957; 1958-1977; 1978-1998; 1998-present.

2.3. Variables

The factors that affect the street shape are road network form, road length, road width, road network density and plane line type. In this paper, the plan of Neighborhood samples built in 1949 in the main urban area of Chongqing is collected, combined with google satellite map and field investigation, the five variables of residential areas in four different periods are analyzed.

The form of road network is linear, tree-shaped, radiate, grid-shaped and so on. The length of the road is the total length of the driveway through the residential area. The width of the road refers to the main width of the driveway in the residential area. The density of the road network is the ratio of the total mileage of the road network to the area of the road network in a certain

area, and its unit is km/km2.. road area ratio is the ratio of road area to built area. There are three main elements of plane line type: straight line, transition curve and circular curve.

3. Analysis/Results

3.1. The chaotic period (1949-1957)

	Oishi village	Handan Steel Village	Coal Mine Design Institute Dormitory	Model village	Songlinpo	Special steel manufacturer
						
Base area	0.55ha	2.42ha	2.02ha	2.71ha	3.09ha	1.04ha
road system	Road network without planning	Road network without planning	Community – home	Community – home	Community – home	Community – home
Road network shape	/	/	Grid	Grid	Culs-de-sac	Culs-de-sac
Plane line type	/	/	straight line	straight line	straight line	Straight line + easing curve
The density of road network	/	/	27.36 km/km ² Road area ratio 10.94%	47.58 km/km ² Road area ratio 26.70%	36.80 m/km ² Road area ratio 13.57%	41.64 m/km ² Road area ratio 12.49%
The road length	/	/	552 m	1289 m	1138 m	434 m
Road width	/	/	4 m	5 m	7 m, 2 m	3 m

Road system

At the beginning of the founding of the people's Republic of China, there was a serious shortage of housing. At this stage, the road planning of residential areas is in a neglected position, and there is no corresponding road network planning. After the completion of residential construction, except for the unusable part of the mountain area, the rest of the space exists in the form of roads. When the road and the site are mixed together, the surface is almost completely hardened. As long as it can meet the traffic of the vehicle, it can be used as a road, forming a mixed space of passage and movement.

Road network shape

Most of the Neighborhood do not have a car network, and the Neighborhood with a road network are mainly Grid, Culs-de-sac. Among the selected samples, Coal mine design institute dormitory and model village living area road network form are Grid. The road network form of Songlin slope and special steel factory area is basically in the form of Culs-de-sac. Combined with the topographic characteristics of mountain area, the road system conforms to the contours to reduce the height difference. However, these two road network shapes rarely cover the entrance.

Plane line type

Most neighborhoods with road network are straight lines, and a few of them are the combination of straight lines and transition curves.

The density of road network

The area of dormitory land in coal mine design institute is 2.02ha, the density of road network in residential area is $27.36 \text{ km} \leq \text{km}^2$, and the road area rate is 10.94%. The land area of residential area in Mengfan Village is 2.71 ha, the density of road network in residential area is $47.58 \text{ km} / \text{km}^2$, and the road area rate is 26.70%. The land area of Songlin slope residential area is 3.09 ha, the density of road network in residential area is $36.80 \text{ m} / \text{km} \sim 2$, and the road area rate is 13.57%. The land area of special steel manufacturers is 1.04ha, the density of road network in residential area is $41.64 \text{ m} / \text{km} \sim 2$, and the road area rate is 12.49%.

The road length and opening

The length of dormitory network of coal mine design institute is 552m, the length of residential area of model fan village is 1289 m, the length of residential area of Songlin slope is 1138 m, and the length of road network of special steel manufacturer area is 434 m. During this period, there are many intersection points between the outer roads in the main urban area of Chongqing, and the degree of closure of the residential area is not high. For example, the road boundary of dormitory of coal mine design institute overlaps with that of external road, there is no clear entrance to residential area, people can enter the interior of residential area at will, and the privacy is extremely weak.

Road width

The width of the road network in the dormitory of the coal mine design institute is 4m, the width of the road network in the residential area of the model village is 5 m, the width of the road network in Songlingpo residential area is 2 m, the width of a small part is 7 m, and the width of the road network in the family area of the special steel plant is 3 m. The width here is the average width of a path. In detail, the same road is not equal in width. During this period, most of the road widths did not exceed 4 m.

Conclusion

At the beginning of the founding of the People’s Republic of China, the residential road system is basically without system or planning; single form of road network; plane line type is mainly straight line; the density of the road network and the ratio of road area are high. Poor privacy of the road, and the road width is basically less than 4 m. The whole period is characterized by chaos.

3.2. Budding stage (1958-1977)

	Mold center living area	Fuqiang Four Village	Lamp Factory Dormitory Area	Xinhua Four Village	Berlin Three Villages	Politics and village
						
Base area	1.78ha	1.53ha	0.83ha	2.03ha	4.7ha	2.48ha
road system	Road network without planning	Road network without planning	Community – home	Community – home	Community – home	Community – home
Road network shape	/	/	Culs-de-sac	Culs-de-sac	Crossroad + Culs-de-sac	Crossroad + Culs-de-sac
Plane line type	/	/	Straight line + circular curve	Straight line + circular curve	Straight line	Straight line + easing curve
The density of road network	/	/	48.27 km/km ² Road area ratio 19.31%	33.65 km/km ² Road area ratio 8.86%	23.95 km/km ² Road area ratio 9.58%	32.56 km/km ² Road area ratio 13.03%
The road length	/	/	400 m	683 m	1137 m	809 m
Road width	/	/	4 m	4 m, 2 m	4 m	4 m

Road system

From 1958 to 1977, the internal road layout of the residential areas in Chongqing's main urban areas was mostly unsystematic and rarely planned. This article only lists 2 unplanned and unsystematic residential areas (Mold Center Living Area, Fuqiang 4 Village). The road is divided by the outline of the mountain, the vertical terrain and the vegetable plot, and the shape and size of the road are also different. The roads of the remaining 4 settlements in the six sample settlements are systematic. The boundaries of the roads in the residential area are clear, and the line widths of the same road are basically the same, such as Xinhua Village. The initial classification of roads began to appear, mainly including the two-level planning system of the residential area. There are a small number of vehicle roads in the three villages of Berlin and the three villages of politics and law, but the overall is mainly pedestrian roads with hard paving.

Road network shape

Road forms include Crossroad, Culs-de-sac, Grid, etc. Among them, the square grid network mainly appears in the strip residential building area; Culs-de-sac is more common in the layout of residential buildings such as scattered and free-style. The cross does not appear to be in a specific pattern. Taking the three villages of the political and legal districts of the Southwest University of Political Science and Law in Chongqing as an example, in the strip-shaped residential building area on the west side of the base, the road layout adopts a square-shaped road network form, and the road has a community-two-level planning system for the household road; In the area where the scattered residential buildings are laid out, the roads adopt the Culs-de-sac structure; in the area on the south side of the base, some roads adopt the shape of a cross-shaped road network.

Plane line type

They are mostly a combination of straight and circular curves. For example, the internal roads of Xinhua Village are cut by height difference, vegetable fields, green areas, etc. Most of the road boundaries are curved according to the direction of the mountain, while the road boundaries adjacent to the wall are linear. The road plane is completely determined by the terrain conditions of the base.

Road network density

The land area of the dormitory of the lamp factory is 0.83ha, the density of the road network in the residential area is 48.27 km/km², and the road area ratio is 19.31%. The land area of Xinhua 4 Village is 2.03 ha, the density of road network in residential area is 33.65 km/km², and the road area ratio is 8.86%. The land area of the three villages in Berlin is 4.7ha, the density of the road network in the residential area is 23.95 m/km², and the road area ratio is 9.58%. The area of land for political and legal construction is 2.48ha, the density of road network in residential area is 32.56 m/km², and the road area ratio is 13.03%.

Road length and opening

The length of the road network in the dormitory area of the lamp factory is 400m, the length of the Xinhua Sicun road network is 683 m, the length of the road network in the three villages of

Berlin is 1137 m, and the length of the road network in the village of Zhengfa is 809 m. There are many or seamless connections between the internal roads of the settlements and the external roads, and the privacy of the neighborhood is extremely weak. For example, in the three villages of politics and law, the internal roads on the southeast side of the settlement are completely seamlessly connected with the external roads, and the introversion is not strong.

Road width

The width of the road network in the dormitory of Dengtouchang is 4 m, the width of Xinhua Sicun Road is 2 m, the width of the network of Berlin Sancun Road is 4 m, and the width of Zhengfa Sancun Road is 4 m. At this stage, the road system in the residential area of Chongqing's main urban area began to have certain planning, and the road began to be flexibly set according to the terrain.

Conclusion

There has not been a structural change in the road system; elements such as the road system and the shape of the road network have begun to sprout.

3.3. Mature phase (1978-1998)

	Jiangong Dongcun	Zhiyuan Village	Coal Family Area	Xinhua Village Family Area	Building two village	Cummins family dormitory
						
Base area	2.48 ha	3.2 ha	1.78 ha	1.04 ha	6.01 ha	4.12 ha
road system	Community – group – home	Community – home	Community – home	Community – home	Community – group – home	Community – group – home
Road network shape	Culs-de-sac	Culs-de-sac	Grid	Grid	Ring road	Ring road+Culs-de-sac
Plane line type	Straight line + easing curve	Straight line + easing curve	Straight line + easing curve	Straight line	Straight line + easing curve	Straight line + circular curve

The density of road network	41.34 km/km ² Road area ratio 18.97%	18.35 km/km ² Road area ratio 11.01%	58.90 km/km ² Road area ratio 23.96%	82.91 km/km ² Road area ratio 33.16%	26.57 m/km ² Road area ratio 19.84%	29.87 m/km ² Road area ratio 12.27%
The road length	1026 m	860 m	1064 m	683 m	1597 m	1232 m
Road width	6 m, 3 m	4 m	4 m	4 m, 2 m	9 m, 6 m, 4 m	5 m, 4 m

Road system

From 1978 to 1998, the internal road layout of the residential areas in Chongqing’s main urban areas had certain systems and plans. The sample roads surveyed are all systematic, and the road boundaries are clear. The line widths of the same road are basically the same. With the increase of the number of motor vehicles, the traffic forms of people and vehicles are mixed, forming a community-group-household Road three-level planning system. However, there are some residential road systems that do not have a grading plan, such as the Xinhua Village family area. At the same time, these road systems only appear in part of the settlement. Most of the roads in the residential area are not well planned, and the overall roads in the residential areas are systematically lacking.

Road network shape

There are four types of road layouts: Culs-de-sac, Grid, Ring road, and Crossroad. This article presents only 6 samples. Among them, the internal roads of Jiangong Dongcun and Zhiyuan Village basically adopt the form of Culs-de-sac road network. Jiangong Dongcun is a typical representative. It can be seen from the road map of Jiangong East Village in the above table that the residential roads of residential buildings are tree-like, connecting residential buildings in series. This road layout is better able to adapt to complex terrain conditions and is more flexible in shape. Due to the terrain conditions, the family area of Xinhua Village is completely in the form of Grid, and the family area of the Coal Science Institute also adopts the Grid form. Compared with the Culs-de-sac road network, the number of Ring roads is small. For example, the inner part of the second building is defined by Ring Road, and the residential area is more recognizable and private. The Cummins family dormitory area basically adopts the way of Ring road and Culs-de-sac, which can better adapt to the terrain and enrich the road form.

Plane line type

They are mostly a combination of straight lines and curves. For example, the second village of the building formed a Ring Road due to terrain, vegetation, surrounding buildings and other reasons. The road plane line conforms to the contour line.

Road network density

The land area of Jiangong Dongcun is 2.48 ha, the density of road network in residential area is 41.34 km/km², and the road area ratio is 18.97%. The land area of Zhiyuan Village is 3.2 ha, the

density of road network in the residential area is 18.35 km/km², and the road area ratio is 11.01%. The land area of the family of the Coal Science and Technology Institute is 1.78 ha, the density of the road network in the residential area is 58.90 km/km², and the road area ratio is 23.96%. The land area of Xinhua Village's family area is 1.04ha, the road network density in the residential area is 82.91 km/km², and the road area ratio is 33.16%. The construction area of the second building is 6.01 ha, the density of the road network in the residential area is 26.57 m/km², and the road area ratio is 19.84%. The land area of the Cummins family dormitory area is 4.12ha, the road network density in the residential area is 29.87 m/km², and the road area ratio is 12.27%.

Road length and opening

The length of the road network of Jiangong Dongcun is 1026m, the length of the road network of Zhiyuan Village is 860 m, the length of the road network of the family area of the Coal Science Institute is 1064 m, and the length of the road network of Xinhua Village is 683 m. The length of the road network of Building two village is 1597 m. The length of the road network of the Cummins family dormitory is 1232 m. There are clear entrances and exits in the inner and outer roads of the settlement, and the privacy is strong.

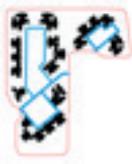
Road width

The width of the construction of Jiangong Dongcun is 6m and 3m, the width of Zhiyuan Village Road is 4 m, the width of the road network of the family of the Coal Family Area is 4 m, and the width of the road network of Xinhua Village Family Area is 4 m and 2 m. The width of the Building two village road network is 9 m, 6 m and 4 m. The road network width of the Cummins family dormitory is 5 m and 4 m. At this stage, the road system in the residential area of Chongqing's main urban area has become clearer.

Conclusion

At this stage, the characteristics of the roads with residential areas have almost appeared, the roads are clearly graded, and the shape of the road network is diverse, and it is in the molding stage.

3.4. Differentiation stage (1998-至今)

	Crown East and Garden	Huayu Windsor Town	Changjiahui	Xuelin Garden	Qingye	Chongqing Institute of Science and Technology
						
Base area	5.3 ha	6.9 ha	8.7 ha	6.34 ha	6.77 ha	15.89 ha

road system	Community – group – home	Community – group – home	Community – home	Community – group – home	Community – home	Community – home
Road network shape	Ring road	Culs-de-sac	Ring road	Ring road	Ring road	Ring road
Plane line type	Straight line + easing curve	Straight line + easing curve	Straight line + easing curve	Straight line + circular curve + easing curve	Straight line + easing curve	Straight line + easing curve
The density of road network	14.75 km/km ² Road area ratio 7.31%	15.13 km/km ² Road area ratio 6.55%	15.31 km/km ² Road area ratio 6.12%	26.14 km/km ² Road area ratio 17.94%	21.72 km/km ² Road area ratio 9.95%	14.88 km/km ² Road area ratio 12.10%
The road length	782 m	1044 m	1332 m	1657.3 m	1470.78 m	2365.14 m
Road width	6 m, 3 m	7 m, 4 m	4 m	4 m, 6 m, 8 m	5 m, 4 m	12 m, 7.5 m

Road system

Since 1998, the road pattern in residential areas has been diversified. At this time, the planning of residential road systems pays more attention to people’s psychological needs, and fully considers the local cultural characteristics, rational use of topography, road landscape, residential Design and environmental planning go hand in hand [8].

Road network shape

During this period, the residential roads have matured and there are obvious planning grades. The Ring road and Culs-de-sac are mostly used. This road layout can better adapt to the complex terrain environment. Residential roads often meet fire protection requirements. With the increase in the number of motor vehicles, in order to ensure the safety of residents in the settlements, the residential areas began to implement closed management, control or even prohibit transit traffic, and achieve partial diversion of people and vehicles.

Plane line type

They are mostly a combination of straight lines and easing curves.

Road network density

Crown East and Garden covers an area of 5.3 ha, with a road network density of 14.75 km/km² and a road area ratio of 7.31%. The land area of Huayu Windsor Town is 6.9 ha, the density of road network in the residential area is 15.13 km/km², and the road area ratio is 6.55%. The land

area of Changjiahui is 8.7 ha, the density of road network in the residential area is 15.31 km/km², and the road area ratio is 6.12%. The land area of Xuelin Garden is 1.04 ha, the density of road network in residential area is 82.91 km/km², and the road area ratio is 33.16%. The land area of Qingye is 6.01ha, the density of road network in residential area is 26.57 m/km², and the road area ratio is 19.84%. The land area of the Chongqing Institute of Science and Technology is 4.12ha, the density of the road network in the residential area is 29.87 m/km², and the road area ratio is 12.27%. Road length and opening:

The length of the Crown East and Garden road network is 1026 m, the length of the Huayu Windsor Town road network is 860 m, the length of the Changjiahui road network is 1064 m, and the length of the Xuelin Garden road network is 683 m. The length of Qingye Road Network is 1597 m. The length of the Chongqing Institute of Science and Technology road network is 1232 m. The community strictly controls the interface with urban roads and conducts closed management of the community.

Road width

The width of the Crown East and Garden road network is 6 m, 3 m, the width of the Huayu Windsor Town road network is 4 m, the width of the Changjiahui road network is 4 m, and the width of the Xuelin Garden road network is 4 m, 2 m. The width of Qingye road network is 9 m, 6 m and 4 m. The width of the Chongqing Institute of Science and Technology road network is 5 m, 4 m. At this stage, the road system in the residential area of Chongqing's main urban area has become clearer.

Conclusion

At this stage, the road pattern of residential areas has diversified, and the road planning of residential areas has matured and is in a period of differentiation.

4. Discussion

According to the Conzane School, all the morphological changes and innovations in the city reflect the special requirements of society, politics, economy and culture at that time. Therefore, this paper discusses the dynamic mechanism of road morphological change in sloping land from four aspects: basic driving force, internal driving force, external driving force and environmental binding force, and tries to summarize the internal law of the evolution of sloping road form.

The basic driving force mainly refers to the technical process. With the acceleration of urbanization and the improvement of residents' consumption level, the use of private cars has increased, and the way residents travel has changed from walking to vehicles. At the same time, the development of other technologies, such as transportation mode and means, has also affected the change of road form in residential area to a certain extent, such as the widening of the width of residential road, and gradually produced the traffic form of man-car branch and man-vehicle mixed line.

The internal driving force is mainly reflected in the economic level. The transition from planned economy to market economy is affected by the commercialization of housing and the paid use of land. Under the action of market forces, the renewal and construction of urban

residential areas is the result of the choice of market economy, which affects the change of road form of residential areas. With China's market economy becoming more and more open, the proportion of investment in residential areas is increasing, and the Neighborhood Street System Morphology are becoming more and more diversified. The reform and opening up has prompted more and more developers to intervene in housing construction and make residential areas more privatized, such as increasing the control of imports and exports.

External driving force refers to social organization and political power. Urban spatial resources are an important factor for the government to formulate policies, direct intervention and effective organization through administrative power. Administrative power is one of the important ways for urban government to allocate spatial resources. The evolution of Neighborhood Street System Morphology is also the process of resource redistribution under the background of institutional change. From the unit residential area construction in the planned economy period to the commercial housing construction in the market economy period, the political system has always had a great impact on the change of the road form of the urban residential area.

The shape of Neighborhood road is also affected by local topography, climate and other environmental binding. The road form in mountainous areas has natural disadvantages. Because of the large height difference, the urban roads in mountainous areas are usually arranged along the foothills or riparian banks, or the road length is extended to overcome the natural height difference, resulting in a large non-linear coefficient (the ratio of road distance to spatial straight line distance), which makes the actual travel of vehicles longer.

It is worth noting that these factors do not act independently on the shape of residential roads, but interact with each other. Under the interaction of four factors, the current residential road form has been formed. For example, in terms of the street system, from the chaotic period of no planning and disorder to the differentiation period with the "community-group-household" planning structure, the street system inside the house becomes orderly. In the early days of the founding of the People's Republic of China, due to the low economic level and low level of motorization, the Neighborhood Street System Morphology was not considered. After the reform and opening up, with the improvement of the economic level, people are keen on motor vehicle driving, and the Neighborhood has formed a certain road system. However, since the government is the main body of urban street and the developers manage the neighborhood street, the two are not the same starting point of interest, and there is not enough regulation to restrict the relationship between neighborhood street and urban street. Therefore, the neighborhood street system is often separated from the urban street system. On the other hand, due to the topography of mountainous cities, the street system pays more attention to the echo relationship between the topography. Thus the street system has been neglected to some extent.

Taking the urban street network density as an example, the density of the street network is different due to the different scales, categories and terrain of the city. Obviously, the density of the street network in the four stages is greater than the street network density in the plain area during this time period. The same is true for the road area ratio. The street area ratio has a downward trend with the passage of time. Since the reform and opening up in 1978, the housing has been dominated by the market economy. Developers are more inclined to take larger plots and develop faster. Neighborhood street system is often surrounded by Neighborhood and is separated from urban street systems. At this stage, the density of street networks and the density of urban street networks have declined. With the advent of the automobile era, the width of the Neighborhood street has widened. Although the density of the street network has decreased, the street area ratio has increased due to the increase in width.

These factors may have one or two major factors. In mountainous areas, environmental binding plays a major role in street system Morphology. From the perspective of street system., the urban land use in Pingyuan City is in good condition. The street system in neighborhood generally adopts a square grid, with small road fluctuations, small non-linear coefficient and small driving distance. In mountainous cities, due to the large terrain, the street surface is often combined with natural terrain to form a free and irregular road. This kind of street system does not have a fixed form, and the change is large, such as a square-shaped street system, a branch-shaped street system, a ring street system, a cross-shaped street system, and the like. The non-linear coefficient (the ratio of the street distance to the spatial straight line distance) is large, and the actual driving distance of the vehicle is long.

5. Conclusion

From the perspective of regional exploration, this paper analyzes the typical neighborhood street system in slope areas in southwest of China in the four periods of 1949-1957, 1958-1977, 1978-1998 and 1999 to present, with the multi-story residential areas as a sample. The author adopts qualitative and quantitative methods to have a comparative study of the street system form, street length, width and density, plane line type and other morphological elements in the four time periods. It can be concluded that over the past half century, the street system of sloping neighborhood has experienced four stages of development: chaotic period, budding stage, mature phase and differentiation stage.

During the period from 1949 to 1957, most of the residential road systems were unsystematic and unplanned. The shape of the road network was relatively simple, with squares and branches at the end. The plane line type is mainly a straight line, and the part is a combination of a straight line and a gentle curve. The road network has a high density and a high road area ratio. The length of the road is not long, but there are many openings and the privacy is not high. The same road is not equal in width, and the width of the road is mostly less than 4m. Generally speaking, this stage is in the early stage of the founding of the country, showing a relatively chaotic character.

During the period 1958-1977, there was no structural change in the road system. Some roads have a preliminary classification, showing a two-level planning system of residential roads and household roads. The road network form is more free, mainly with crossroads and branches. The road network density rate is still high, and the road area ratio is slightly reduced due to the small road width. The length of the road is not long, the opening is more, and the privacy is not high. Although the construction of residential areas in China was slow due to the influence of political, economic and natural disasters such as the "Great Leap Forward" during the period, the road system began to sprout.

During the period from 1978 to 1998, the road began to be systematically planned, the road classification was obvious, and a relatively complete road planning system appeared. However, there are also a few residential areas that are still affected by topography and still use a mixed mode of roads. The road forms are more diverse, with square grids, crossroads, branches, and rings. Except for the density of the grid network, the density of the remaining forms of road network is almost the same, but the area ratio of all roads becomes higher. The main reason is that the road width is widened. Road openings are reduced and homes become more private. It can be seen that at this stage, the characteristics of the roads with settlements have almost appeared, and the road form has been formed.

After 1998, the welfare housing was gradually phased out, and the commercialization and marketization of housing were promoted. In the competitive environment of the market mechanism, while promoting the development of residential planning, the design also began to take people's needs as the starting point. The residential roads in this period have matured and are clearly graded. The combination of ring and branch ends is adopted. Overall, the road pattern of residential areas at this stage is more diversified on the basis of the original.

Street System Morphology is not formed at a time, but collaged over time. However, in each different era, the main form of living roads will appear, which reflects the characteristics of the times to some extent. In order to understand the inherent law of street system morphological evolution in sloping neighborhood, this paper discusses the dynamic mechanism of street system form change from four aspects: fundamental impetus, internal driving force, extrinsic motive and environment binding force. This article explores the implications of street system evolution of sloping neighborhood, which may be a positive reference for the construction of sloping neighborhood in the new era of the 21st century.

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