THE "CORE" OF REGIONALISM IN DAI RESIDENTIAL HOUSE: SPONTANEOUS CONSTRUCTION STUDY IN XISHUANGBANNA

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ABSTRACT

The purpose of this study is to explore the self-organization evolution of contemporary Dai residential houses in Xishuangbanna region, and to analyze the "spontaneous" construction behavior by introducing the theory of "self-organization", in order to reveal the core of the architectural style of regionalism residential houses, the mode of spontaneous construction, and the causes of chaos. The study focuses on the typical residential buildings in Xishuangbanna. The study focuses on contemporary self-built houses in typical villages in Xishuangbanna, aiming to understand the construction rules and core elements (core) of their features, and to explore the construction patterns and causes of style and features disorder under the spontaneous construction behavior. Discuss how to maintain and inherit regionalism architectural characteristics in the future.

Firstly, through fieldwork and data collection of Dai folk dwellings in Xishuangbanna region, this study applies the self-organization theory to understand the evolution law of folk dwellings' style and features, and preliminarily reveals the inner logic and core of their spontaneous evolution. On this basis, the similarities and differences of the folk dwellings in different villages in Xishuangbanna are further compared and analyzed.

In the course of the research, firstly, we have explored the root causes of disorder and confusion of contemporary residential architecture in Xishuangbanna villages, and revealed the complex relationship between spontaneous construction behavior and multiple factors such as the natural environment and social culture; secondly, we have identified and established a "core" of residential architecture widely accepted and recognized by the residents, which not only reflects the uniqueness of Dai residential architecture, but also serves as an important carrier of its cultural inheritance; thirdly, we have deeply analyzed the constraints and influence mechanisms in the construction process of Dai architecture, and proposed a mechanism for dominating and coordinating the construction. Secondly, in the spontaneous construction behavior, the "core" of the residential style widely accepted and recognized by the residents is identified and established, which not only reflects the uniqueness of the Dai residential style, but also is an important carrier of its cultural inheritance; thirdly, the constraints and influencing mechanisms of Dai architectural construction process are analyzed in-depth, and the rules of dominating and coordinating the process are put forward, and the key points of

attention in the construction are pointed out, such as the selection of materials, construction technology and functionality.

In the end, this study summarizes the features and cores of Dai dwellings in Xishuangbanna region, and refines the architectural vocabulary of Dai dwellings' cores from the dimensions of dwelling culture, dwelling style and spontaneous construction law. At the same time, for the improvement of existing dwellings and the construction of new dwellings, construction suggestions for maintaining and inheriting cultural characteristics are put forward, which provide scientific basis and practical guidance for the sustainable development of Dai dwellings in Xishuangbanna.

Keywords: law of spontaneous construction, contemporary Dai dwellings in Xishuangbanna, architectural features (core), causes of style and features disorganization

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Yifan Zhang

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CHAPTER 1

INTRODUCTION

1.1BACKGROUND AND PROBLEM STATEMENT

1.1.1 Origin

Several The housing boom have resulted in the creation of a large number of self-built private houses in the countryside.

China implemented rural land reform during the 1950s, a period in which peasants had just acquired land use rights and built houses mainly to meet their basic housing needs. As a result, the houses built were usually relatively simple, with most of them using traditional adobe structures, such as adobe walls and thatched roofs. The houses are small in scale, mostly single-story structures, and their functions are mainly focused on housing, also to meet the needs of agricultural production and living. The self-built houses in this period can well reflect the characteristics of traditional houses.

Between 1975 and 2005, there were two successive The housing boom in China's rural areas. The first occurred in 1980-1990, when the implementation of "reform and opening up" and the "household contract responsibility system" began to improve the rural economy and increase farmers' incomes, ushering in the first The housing boom. The conditions for building houses improved to some extent. Farmers began to experiment with stronger materials such as bricks and tiles, and the

structure gradually shifted from the traditional earth and wood structure to a brick-concrete structure. The scale of houses was also enlarged, and the design of houses began to emphasize practicality and aesthetics (Lu, 2021).

The second time was in 1994-2004. In the "Fifth Session of the Eighth National People's Congress", Premier Li Peng pointed out the need to accelerate the construction of ordinary residential housing, drive the development of related industries, and cultivate new economic growth points (Hou, 1997). In the 21st century, rural real estate construction has entered a modern stage. The government promotes the construction of rural infrastructure and the improvement of rural residents' housing, and encourages farmers to adopt more modern building materials and technologies, which triggers a new round of rural housing construction trend. This The housing boom is characterized by the transition from single-storey to multi-storey buildings, and the large-scale use of reinforced concrete and brick-concrete structures (Lu, 2021) (Figure1.1). The design of houses is more diversified and the functional zoning is more reasonable, such as the addition of independent kitchens and bathrooms. Villa-style luxury farm houses have also appeared in some areas. (Figure1.2)

Figure 1.1 Reconstruction or renovation of houses on their original foundations in the context of The housing boom

(https://www.163.com/dy/article/HOA12JEB0553IQSQ.html)

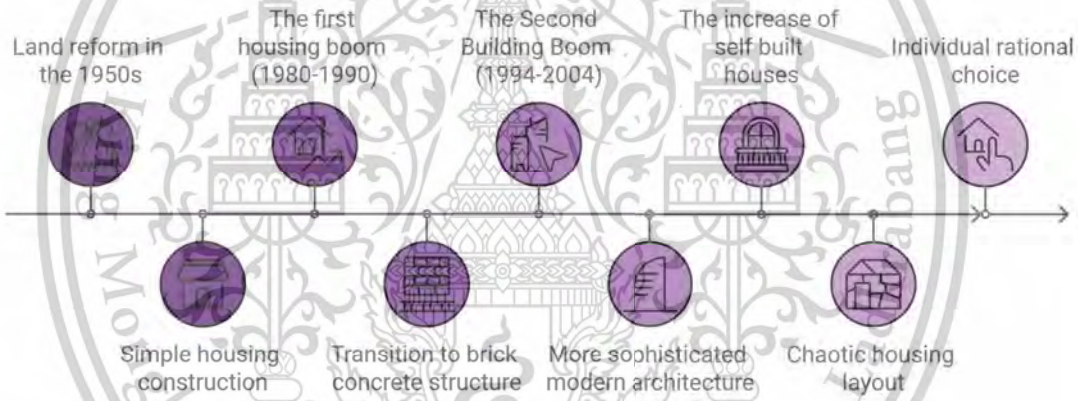


Figure 1.2 The changes brought about by The housing boom

It is precisely because of The housing boom that a large number of self-built rural dwellings have been created, leading to the chaotic and disorderly state of rural residential buildings. According to statistics, from 1980 to 1996 alone, the "per capita living space for rural residents" in China increased dramatically from 9.4m^2 to 21.7m (Zhao, 2010). However, it is worth noting that most of these contemporary rural houses are "self-built houses" rather than "unified houses". From a macro point of view, various kinds of "illegal occupation of arable land",

"private expansion of the residence base", "unauthorized additions" and other irregularities are becoming more and more prevalent, and the lack of unified planning and uneven building quality have resulted in the contemporary rural self-built houses being built. The lack of unified planning and uneven quality of construction have caused the overall appearance of contemporary rural self-built houses to be in a state of chaos and disorder. However, from a microscopic point of view, irregularities are not necessarily irrational. According to Lu Jiansong (Lu,2021), "Violation of rules and regulations reflects the conflict between the rational choice of individuals and the overall value system of the city." In other words, certain irregularities in contemporary rural self-built houses have a certain rationality within their specific groups and territories, which is why they can be widely disseminated among the people and ultimately have an impact on the overall appearance of the countryside. The so-called "disorder" at the macro level is in fact relative to the "overall value system of the city", but at the micro level, the decisions made during the construction of each rural self-built house are the response of each rural family to the changes in the environment in which it is located, after careful consideration. At the micro level, each decision made in the construction of a rural house is the response of a rural family, after careful consideration, to the changes in its environment.(Figure 1.3)

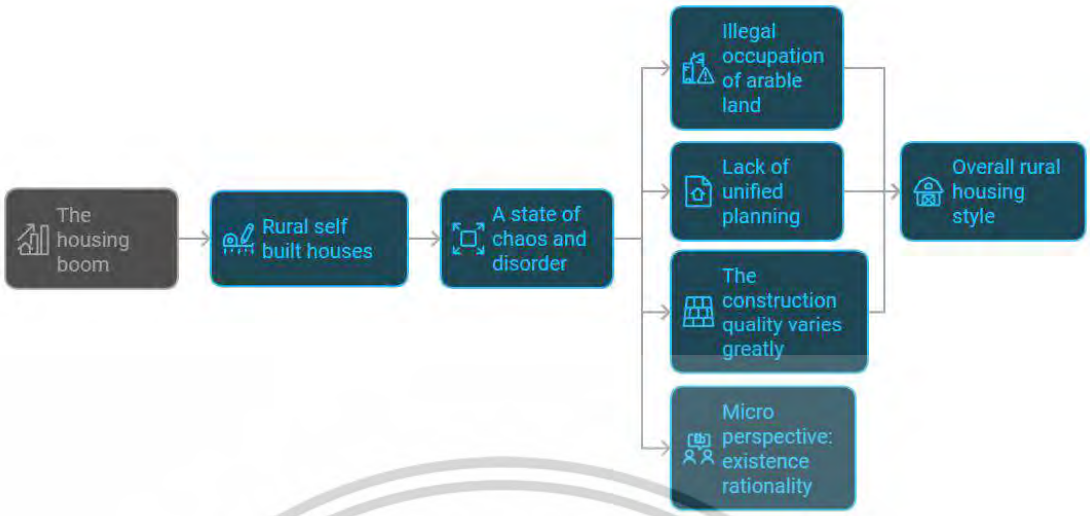


Figure 1.3 Problems arising from spontaneous construction

1.1.2 Social context

There is a close relationship between the rural revitalization strategy and rural dwellings. Rural revitalization is an important strategy promoted by the Chinese government at the current stage, aiming to promote the economic and social development of the countryside, improve the living standards of farmers, and realize the comprehensive revitalization of the countryside.

As an important component of rural revitalization, rural housing refers to the housing and living environment of rural residents. The improvement and upgrading of rural dwellings is an important aspect of the rural revitalization strategy, as it is directly related to the living conditions and quality of life of farmers, and is also closely linked to rural socio-economic development.

1. Promoting employment and entrepreneurship among farmers: The rural revitalization strategy is committed to developing rural industries and providing more employment and entrepreneurial opportunities. The improvement of rural dwellings

can attract more farmers to stay in their hometowns and participate in the development of rural industries, thus promoting rural economic growth.

2. Enhancing the quality of life of farmers: Improving the conditions of rural dwellings can enhance the living environment and quality of life of farmers and increase their sense of well-being and acquisition. This will stimulate farmers' creativity and productivity and promote the development of rural society.

3. Protection of traditional rural culture: Rural dwellings usually carry rich traditional culture and historical value. The rural revitalization strategy emphasizes the protection of rural cultural heritage, and the improvement of residential conditions can help to protect and pass on traditional rural culture.

4. Promoting the development of rural tourism: improving the conditions of rural dwellings can enhance the attractiveness of the countryside and promote the development of rural tourism. The development of rural tourism can help increase farmers' income and promote the diversified development of the rural economy.

5. Improving the overall image of the countryside: the improvement and upgrading of rural dwellings can change the overall image of the countryside, making it more beautiful, clean and modern. This will help attract more resources and investment into the countryside and promote rural development.

Therefore, the rural revitalization strategy is closely related to rural dwellings, and by improving the conditions of rural dwellings, it can promote the comprehensive revitalization and sustainable development of the rural economy and society.

The strategy of "rural revitalization" has put forward new requirements for the construction of public infrastructure services, and the reform of the "three rights" of rural land ownership, contracting rights and management rights has promoted the two-way flow of urban and rural populations as well as resources, and increased the possibility of social capital to enter the countryside(Xie & Li, 2020). possibility (Xie & Li, 2020). For architecture and space, there is a huge contradiction between the previous top-down operation mechanism and the free development of the countryside as well as the rational evolution of architectural form, therefore, the generation and evolution mechanism of rural architecture should be studied in depth, and an architectural renewal and innovation model combining endogenous logic and external intervention should be sought, so as to push forward the rational evolution of rural architecture and improve the adaptability of the countryside to the modern social environment.

The confusion of the construction of village houses is characterized by authenticity and universality, which is one of the major problems to be solved urgently in China's urban and rural development. Based on the background of rural revitalization, cultural revitalization and cultural self-confidence, the construction of village houses should meet the function of the local people and at the same time find the characteristic style of architecture. The selection of this topic is a direction that scholars of village space, environment and architecture should focus on and study, and it is also a responsibility that cannot be shirked.

1.1.3 Theoretical background

In essence, the "contemporary house", like the "traditional house", is a result of "spontaneous building" (Rudofsky, 2011) (Spotaneous Building). They evolved from the "traditional houses" but were influenced by modern civilization, which led to the disorder of the traditional way of building and the gradual disappearance of the traditional appearance of the countryside. Today, "contemporary houses" are controversial. Critics see them as, "Spontaneous residential construction lacking effective macro-control and guidance, mostly focusing on short-term benefits and blindly imitating urban architectural patterns, producing a large number of disorderly and chaotic residential forms of low quality." (Wu, 2015) While a more moderate attitude does not judge the advantages and disadvantages of "contemporary residential" itself, but from the perspective of the study of "spontaneous construction", it is believed that "spontaneity is the fundamental driving force for the formation of regionalism commonality, and is the most important factor in the formation of regionalism commonality". Instead, from the perspective of "spontaneous construction" research, it is argued that "spontaneity is the fundamental driving force for the formation of regionalism commonality, which is the key to exploring the mechanism of generating architectural regionality." (Lu, 2021) Therefore, this paper will take several typical villages in Jinghong City, Xishuangbanna, Yunnan Province as samples of residential houses, and through the study of their generative mechanism, we will further understand the connotation of "spontaneous construction", and carry out in-depth exploration and empirical evidence of the

evolutionary trend and core of evolution, so as to summarize and summarize the guiding principles that are suitable for the development of residential houses.

The overall style and features of the countryside is not a simple, static picture, but a complex, dynamic social network composed of countless rural families, and the rural self-built house is the most sincere embodiment of its characteristics. Therefore, this study takes contemporary rural self-built houses as a sample, and uses the Self-organization Theory in the Complex Adaptive System Theory to analyze it. organization Theory" in the "Complex Adaptive System Theory" to interpret it, and explore the issues of its style and features management and guidance and control direction.

1.1.4 Current situation of rural dwellings in Xishuangbanna

Current situation: the traditional Dai dwellings cannot meet the functional needs, the newly built dwellings lack characteristics, the architectural style is chaotic, and the private buildings are built in a haphazard manner.

With the change of the times, the residential architecture in Xishuangbanna region is also changing. Changes in architecture are closely related to the living environment, lifestyle, people's residential needs, and the context of the times. Existing traditional dwellings and newly built dwellings are constantly changing and intermingling. Traditional buildings represent the local culture, but with the process of modernization, people's lifestyles have changed, and traditional buildings can no longer meet the needs of modern people's lives, resulting in the disappearance or alienation of traditional buildings, and residents will make spontaneous additions and

expansions to the original buildings. (Figure1.4) Traditional houses have also revealed many defects and problems in terms of their utilization functions. At the same time, the few old buildings that have been preserved also face the problem of how to protect them. Therefore, these newly established buildings should have preserved the traditional features and also be responsive to the needs of modern life.

Figure 1.4 Traditional buildings in Man Yuan Village, Xishuangbanna, with building extensions (photo by author, February 2023)

Along with this, there are also new types of buildings integrating modern technology, Han culture and foreign culture, which are better than traditional buildings in terms of function and living experience, but in the process of development, there are also many problems, such as: lack of cultural characteristics of the building, serious invasion of foreign cultures, the building has become uniform, chaotic styles, and haphazard construction. (Figure1.5)

Figure 1.5 The chaotic architectural style of Manjingbao Village; Serious unauthorized construction of buildings (filmed by the author in February 2023)

The continuous change and development of self-built dwellings in Xishuangbanna villages have created today's relatively chaotic and disorganized architectural forms and building patterns. The phenomenon of residential development in some areas of Xishuangbanna needs to be elaborated with the framework of self-organization theory. Self-organization theory intervenes in the study of vernacular architecture, aiming at expanding the research boundaries of the field of architecture, broadening the research horizons of residential architecture, and making the study of rural construction issues more scientific. Mr. Fei Xiaotong used "differential order pattern" [1] to describe the internal structural characteristics of traditional villages, and this ethical ideology is accompanied by the relationship between blood, township, and karma, which is reflected in the village society and

[1] See: Fei Xiaotong. The Classic Collection of Native China [M]. Beijing: People's Publishing House, 2008: 25 In the differential order pattern, everyone forms a network centered on himself. This is like throwing a stone into a lake, with this stone (individual) as the center point, forming a circle of ripples around it, and the distance of the ripples can mark the closeness of social relations.

life [2], forming a kind of non-verbal descriptive logic of the vernacular. It is this underlying logic that regulates and guides the generation of rural environmental space, and becomes the abstract but concrete invisible rules in the evolution of vernacular houses. The disorder of the villages does not only remain in the superficial features such as architectural variations, industrial model changes, and lifestyle changes, but is also more deeply reflected in the internal social relationship structure such as the demise of clan etiquette, the decay of ethics and morality, and the tilting of the value orientation. The disorder in the architecture of typical villages in Xishuangbanna is not a sudden change at a specific time and place, but has universal characteristics and is a typical representative of the disorder in most villages in China.

The impact of industrial civilization and the development of market economy have led to the transformation of China's village architectural system from traditional to modern, and the traditional buildings in the villages have been gradually replaced by reinforced concrete buildings when new building materials and buildings appear, and these changes are not only reflected in the outlook of the village buildings, but also penetrate into the mechanism of the generation and evolution of the buildings. Understanding the mechanism of architectural generation in Xishuangbanna, exploring the causes of disorder and order in architectural style and features,

[2] Lineage, i.e., the clan relations of direct and collateral lineage. Geographic affinity, that is, with common or similar geographic space (environment) caused by the special close relationship, such as hometown relationship and neighbor relationship. Karma, i.e., the special close relationships arising from frequent interactions triggered by once existing or existing studies, professions, careers, etc., such as window relationship, teacher-student relationship, colleague relationship, comrade-in-arms relationship, upstream and downstream industrial chain relationship. Chinese people form a "differential pattern" based on blood, kinship and geography, with the individual as the center, layer by layer, forming a kind of relationship network. Even in today's industrialized and modernized world, blood and geographic ties are still deeply rooted.

clarifying the rules of its construction and evolution, and exploring the core of architectural style and features will be the focus of the research.

1.1.5 Problem statement

Since the reform and opening up of China, the rapid economic development and the fast-growing level of urbanization have led to great changes in urban and rural style and featuress. Various cultural facilities and living services have been built, and the quality of buildings and living space per capita have been constantly improved, so that people's spiritual and material life has been greatly improved. However, at the same time, in the pursuit of modern life, "the globalization of technology and mode of production has brought about the separation of people and traditional territorial space, and the gradual decline and disappearance of the diversity and characteristics of territorial cultures; the standardization and commercialization of cities and buildings have led to the gradual disappearance of architectural characteristics. Architectural culture and urban culture convergence and characteristics of the crisis." (Wu, 2002) [3] Before China's design industry was completely opened to the outside world [4], the architectural design market was

[3] Wu Liangyong. The Beijing Charter of the International Association for Architecture - The Future of Architecture. Beijing: Tsinghua University Press, 2002:209

[4] In view of the following events, the article takes the 1990s as a division and discusses them. 1986, the former State Planning Commission and the Ministry of Foreign Trade and Economic Cooperation issued the Interim Provisions on Sino-foreign Cooperative Design Projects, which clarified the scope of projects designed by foreign design organizations in China and the qualification examination of foreign design organizations by the competent project departments. 2000, the Ministry of Construction issued the Measures for the Administration of Bidding and Tendering of Construction Projects. In 2000, the Ministry of Construction issued the Measures for the Administration of Construction Engineering Design Bidding, stipulating that "overseas design units participating in the bidding of domestic construction engineering design shall be approved by the competent department of construction administration of the people's government of the province, autonomous region or municipality directly under the central government"; secondly, it is the regulation on the practice of Chinese-foreign cooperative design organizations. 1992, the Ministry of Construction and the Ministry of Foreign Trade and Economic Cooperation issued the Regulations on the Administration of Approval of Chinese-foreign Cooperative In 1992, the Ministry of Construction and the Ministry of Foreign Trade and Economic Cooperation issued the "Administrative Provisions for the Approval of the Establishment of Sino-foreign Joint Venture Design Institutions", which allowed registered design institutions or registered architects and

filled with half-understood imitations of foreign buildings; after that, it became the experimental field for various novel ideas. A large number of hasty and cheap replicas and strange experimental buildings have caused the cultural death of the current architecture and cities, and the proliferation of "continental style" architecture (Figure 1.6) since the 1990s, and the current "competition for inviting 'foreign' architects to create local architectural projects without regard to the conditions". The proliferation of "European-style" architecture since the 1990s (Figure1.6), and the current "desperate attempt to invite 'foreign' architects to create local brand names [5] (Wu, 2022)" not only reflect cultural cowardice, but also the ambiguity of the perception of the essential attributes of architecture. How traditional culture can be continued in the modern context and how oriental culture can be combined with modern civilization is a common question for many architectural practitioners.

registered engineers with strong competitiveness in the international market to set up Sino-foreign joint venture design institutions with design units in China. The Ministry of Construction issued the Circular on Issues Related to the Declaration of Special Engineering Design Qualifications by Foreign Wholly Foreign-owned Engineering Design Consulting Enterprises and Institutions, allowing foreign design organizations to set up wholly foreign-owned design enterprises in China to engage in special engineering design activities, and apply independently for special qualifications of architectural decoration, architectural intellectualization and other engineering design.

[5] Wu Liangyong. General Preface to the Research Library of Chinese Architectural Culture (I) - On the Research and Creation of Chinese Architectural Culture. Central China Architecture, 2002, (6):25-27.

Figure 1.6 A mixed and self built residential building in European and Dai styles (photographed by the author in February 2023)

(1) Theoretical level: lack of research areas

After comparing the literature, nowadays there is insufficient research on the self-organized evolution of regionalism residential architecture in Xishuangbanna region, and the research on the current situation and future development of modern residential buildings in Xishuangbanna is relatively weak.

Comparatively speaking, in the villages in Jinghong area of Xishuangbanna, there are few research monographs that take self-organization theory as the research framework and root theory and typology method to explain the development of Dai folk dwellings, and the depth and breadth of their research are still lacking, which only stay at the surface level of the analysis, lack of systematic sorting, and lack of theoretical framework support. That is to say, it focuses on the material form of residential buildings, and pays little attention to the inner evolution law. Even if it is

mentioned, it is mostly simplified as the cause and effect relationship between the building and the elements of nature, humanities, technology, etc., and it does not go one level further, and it is not possible to mention the mechanism of the role between the "cause" and the "effect", which cannot be stated in words. The mechanism between "cause" and "effect" is seldom mentioned, and it is impossible to explain the principle of the creation and dynamic evolution of diversity. This is also the reason why it is difficult to face the dilemma of how traditions develop.

(2) Cultural dimension: the decline of architectural culture

Under the wave of globalization, the diversity and characteristics of regionalism cultures have gradually declined or even disappeared; and the standardization and commercialization of buildings have led to the gradual disappearance of architectural characteristics. There is a crisis of convergence between architectural culture and urban culture. In the future, the inheritance and rooting of the cultural characteristics of the regionalism houses are very urgent, and in what form will the regionalism culture be developed and inherited.

(3) Confusion and disorganization of the architectural style and features:

Excessive spontaneous construction may lead to a disorganized and chaotic architectural style and features. Mutual imitation and the influence of modern architectural models may also lead to the convergence or hybridization of architectural styles. In the long run, the architectural features will be slowly lost without macro-control and guidance. Protection is important, but development is the basis of existence.

(4) What are the distinguishing features of Dai dwellings?

In Xishuangbanna villages, the spontaneous construction of local residents' buildings is full of unknowns. In the process of building houses, the residents follow certain rules or consider certain purposes, which may be the local customs, climatic environment, building habits, or the villagers' self-knowledge of building houses or experience gained from observing other residential buildings. In the face of the whole process of spontaneous construction by villagers, we cannot speculate on the needs of the residents or their knowledge of the architectural style from the point of view of scholars or designers. The formation and development of rural style and features is a complex process, not about right or wrong, but only suitable and compliant. The research should find out what is the "core" of residential construction in Xishuangbanna villages. What are the needs of local villagers. By analyzing the problem from different perspectives, such as historical background, social needs, residents' demands, local customs, experience of local construction teams, designers, scholars, etc., we may be able to find a way to apply the evolution of contemporary Xishuangbanna houses.

1.2 RESEARCH QUESTION

(1)How to continue and inherit the characteristics of Dai ethnic dwellings through spontaneous construction;

(2) What factors constrain and influence the construction process of Dai architecture, and how it dominates and coordinates the whole construction process. What should be paid attention to in the construction.

(3) What causes the disorder and confusion of contemporary residential architectural styles in Xishuangbanna villages.

1.3 RESEARCH OBJECTIVES

Research objectives for this topic:

(1) Characterization of Building Exterior Features of Dai Folk Houses: through scientific research methods, summarize and summarize what is the "core" of Dai Folk Houses in Xishuangbanna region, and find out the real core suitable for the development of folk houses; analyze the construction willingness of rural residents and the mode of construction behavior.

(2) Summarizing the law of spontaneous construction of Dai architecture in Xishuangbanna and making suggestions for the future development of Dai dwellings in Xishuangbanna

(3) Find out the reasons for the disorganization of the present Dai residential style and features; Analyze the comprehensive factors to avoid confusion;

1.4 RESEARCH SCOPE

1.4.1 Scope of the study area

Study scope constraints:

Jinghong City, Menghai County and Mengla County are under the jurisdiction of Xishuangbanna, and the samples were selected from several typical villages in Jinghong City, Xishuangbanna Autonomous Prefecture, Yunnan Province, China, for the comparative study. The study area is located in Jinghong City, and the villages are all Dai villages, with architectural styles that are both universal and comparable.

The residential houses in the selected research villages have their own characteristics and different problems. The research villages are in line with the direction of the study, and can be interpreted by self-organization theory, which is convenient for summarizing the evolution law and future development deduction. (Figure 1.7)

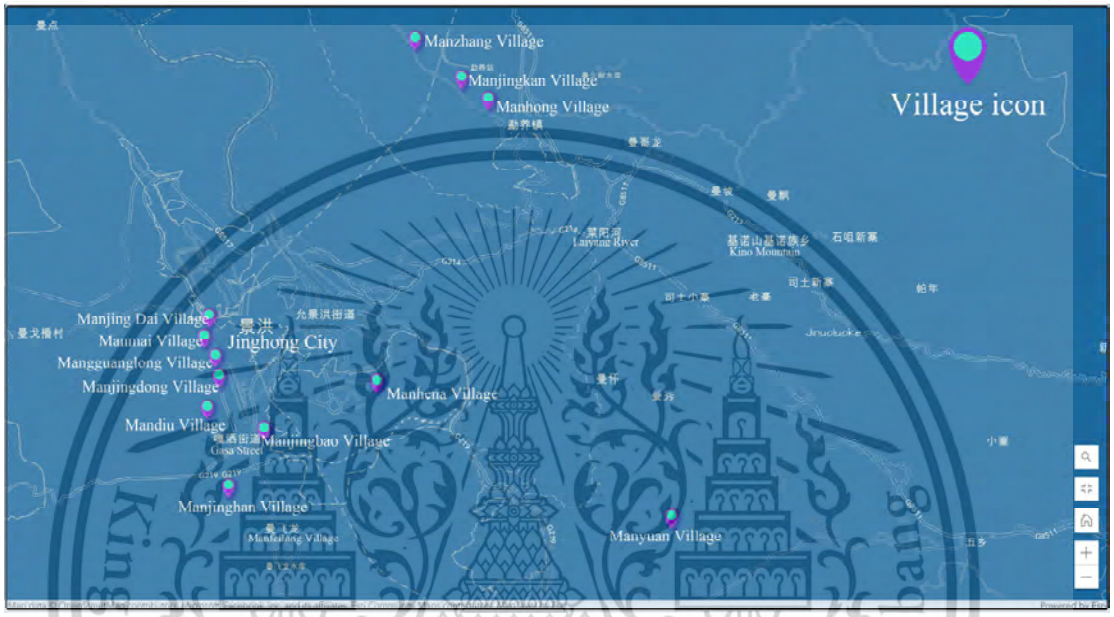


Figure 1.7 Location Map of Typical Villages Involved in the Study (Map Source: ArcGIS Online)

Man Palm Village and Man Yuan Village: traditional Dai villages with a large number of old buildings. The architectural style of the villages is distinctive, with well-preserved traditional houses and buildings, and basically all the houses and buildings are wooden dry-structure houses. Due to the mismatch between the traditional houses and the modern life style, the residents have also carried out spontaneous remodeling of the buildings. Due to the influence and intervention of many practical problems, there are still many problems that need to be solved urgently;

Mandiu Village: an ancient Dai village with a history of more than a thousand years, the whole village has a clear planning, accessible roads and certain tourist service facilities. Residential buildings are built in accordance with the mountains in a staggered manner. By the end of 2009, the housing of farmers in the village was mainly brick and wooden structures, among which 53 households lived in brick-concrete housing and 35 households lived in brick and wooden structures[6] . The traditional houses are well preserved, but have undergone some spontaneous remodeling and expansion. Newly built dwellings still retain some Dai characteristics, but in different styles, and obvious traces of self-organization can be seen, as villagers build their buildings at their discretion according to their own needs, preferences and economic situation;

Manjingbao Village: The village is highly modernized, and there are public places such as Buddhist temples in the village. The characteristic industry of the village is agro-tourism, so the first floors of some residential buildings are used as commercial space. By the end of 2009, the village's housing stock was dominated by brick-concrete housing, with 95 households living in brick-concrete housing and 25 households living in brick-wood housing. However, the architectural style of the whole village is diverse and mixed, and villagers build and remodel according to their own wishes and needs.[7]

Manhong Village: the village in 2021 in the government led and led, opened a beautiful and livable countryside construction boom, demolition of illegal structures,

[6]https://baike.baidu.com/item/%E6%9B%BC%E4%B8%A2%E6%9D%91/11027632?fr=ge_ala

[7]https://baike.baidu.com/item/%E6%9B%BC%E6%99%AF%E4%BF%9D%E6%9D%91/11018819?fr=ge_ala

cover flower beds, build characteristic fences, buildings are also relatively "unified" of his organization intervention, the whole village building style highly uniform. The roads in the village are flat, clean and tidy, and the whole village appearance has been relatively standardized.

Manghana Village: Manghana Ancient Village is an ancient village with a long history and better preserved traditional features, customs and culture of the Dai people, with a highly unified architectural style. In recent years, with the continuous improvement of the village infrastructure and the improvement of the quality of tourism services, Manghana Ancient Village has also become a popular spot for tourists to visit the village. Its style is unique, the village not only retains the traditional Dai Ganlan Style Architecture, the new buildings are also mostly Dai-style distinctive wooden structures. Surrounded by modern high-rise buildings, the village has formed a distinctive "village in the city" character.

The Government also attaches great importance to the architectural style and planning of Manghana Village. Through the demolition of illegal buildings in accordance with the law, the overall planning and architectural style of the village has been maintained; at the same time, the Government has actively promoted the planning of the village and the development of rural tourism, thus realizing a win-win situation for both cultural heritage and economic development.

Manjinghan Village: Manjinghan Village in Xishuangbanna is a characteristic village that harmoniously blends the traditional flavor of the Dai ethnic group with modern development. The village covers a vast area and possesses a profound

cultural heritage. The buildings in Manjinghan Village are basically modern Dai dwellings, and under the control of the government, the whole village has a high degree of architectural uniformity. The houses are basically Dai buildings with blue roofs and light-colored walls, and the height of the buildings is basically 2-3 floors. Whether new houses are built or old houses are repaired, the villagers will try their best to maintain the original architectural style and characteristics. The government also attaches great importance to the architectural and cultural protection of Manjinghan Village. By formulating strict building control policies, it ensures that new buildings are in harmony with traditional buildings in terms of style, color and materials, and avoids the phenomenon of cultural homogenization.

Manjungdong: Manjungdong village has a rather chaotic appearance, with a high degree of spontaneity in the construction of dwellings. The village buildings are of various forms, materials and colors, which also leads to a lack of uniformity in the look of the village. There are spontaneous unauthorized construction behaviors in the village, and these spontaneous building components also cause damage to the village form. The buildings in the village can also see the traces of influence by foreign cultures. Although some features of the Dai architecture can still be preserved, after the form of variation and cultural intermingling, it looks like an incongruous feeling. The courtyard walls of the buildings are not completely unified and are not constructed in accordance with the norms of beautiful countryside construction.

Manmai Village: Although there is a certain degree of uniformity in the

architectural style of the village, there are still many confusing factors in the whole. Most of the buildings are modern Dai dwellings. There are a few traditional Dai buildings. The building floors are basically within three storeys. Although there is a fusion of modern and European styles in the architectural style and components, the Dai characteristics of the whole village are still distinctive. The Government also controls and intervenes in the construction of the village.

Manjing Dai Village: The village is mainly composed of modern Dai dwellings. There are a few old Dai buildings of the third generation. The style of the whole village can reflect the characteristics of the Dai ethnic group, but the degree of unity is not high, and it is relatively chaotic. The buildings of the whole village imitate each other to a high degree, and the European style is more popular in the village, and the village appearance generally shows the style of European+modern+Dai. The newly-built residential houses show a strong European style, and the Dai-style characteristics have been greatly weakened. The floors of newly built or under-construction dwellings are on the high side, resulting in visual unevenness.

Mangguanglong Village: The architectural style of the village is relatively unified, with distinctive Dai characteristics. However, there are acts of unauthorized construction, with high autonomy and styles of building materials and colors, which have a certain impact on the unity of the village appearance. The floors are basically below the third floor, ensuring the degree of visual unity. Tourists enter the village all year round, so the government has certain controls and requirements on the construction of residential buildings in the village. The courtyards of the village have

also undergone unified repair and renovation, all of which are made of red brick with low walls and decorated with plants, which makes the appearance of the village more unified.

Manjingkan Village: the architectural style of the village is relatively unified, and the architectural form is basically the traditional Dai dwellings with brick wood structure or wood structure of the Dai people. In terms of life adaptability, it has been transformed to meet the needs of modern life mode. However, in the process of reconstruction, the behaviors of building without permission and using cheap materials led to certain damage to the architectural style. There are also multiple types of new residential buildings in the village. There are new wooden structure dwellings, European and Dai mixed, modern Dai style forms, etc.

The research scope is mainly in several typical villages in Jinghong City, Xishuangbanna. The research process may include but not limited to the above villages. Some adjustments will also be made at a later stage according to the research data and research needs; (Table 1.1)

Table 1.1 Basic Information of Typical Villages in Jinghong District, Xishuangbanna

Number	Village name	Nation	Situation of Village Houses	List of affiliations
1	Manzhang Village	The dai nationality	Traditional dwellings are well preserved	Traditional Characteristic Tourism Village
2	Manyuan Village	The dai nationality	Traditional dwellings are well preserved	The Fifth Batch of Chinese Traditional Village List
3	Manjingbao Village	The dai nationality	Mainly building new residential buildings; The architectural style is chaotic	The second batch of traditional Chinese villages in Yunnan Province
4	Manhong Village	The dai nationality	Mainly building characteristic residential buildings; Unification of style and appearance	Beautiful and livable countryside
5	Mandiu Village	The dai nationality	The forms of residential buildings in different periods. The architectural style is relatively unified	The second batch of Chinese ethnic minority characteristic villages in Yunnan
6	Manhana Village	The dai nationality	Traditional residential buildings are well preserved; Newly built residential buildings have a unified style and distinct Dai ethnic characteristics;	The second batch of traditional Chinese villages in Yunnan Province
7	Manjinghan Village	The dai nationality	New residential buildings are the main focus; Unified architectural style	The third batch of "Chinese Ethnic Minority Characteristic Villages"
8	Manjing Building	The dai nationality	Most of them are newly-built residential buildings; Chaotic appearance;	not have
9	Manmai Village	The dai nationality	Moderate uniformity in architectural style; There is a certain degree of disorder;	not have
10	Manjing Dai Village	The dai nationality	Has certain Dai ethnic characteristics; The appearance is somewhat chaotic; European style infiltration is severe;	not have
11	Mangguanglong Village	The dai nationality	Moderate uniformity in appearance; There is a certain degree of disorder; Dai ethnic characteristics;	Natural Village
12	Manjingkan Village	The dai nationality	The architectural style is relatively uniform; Traditional brick and wood structure buildings are predominant; Distinctive characteristics;	Dai nationality characteristic villages

1.4.2 Study population and sample definition

(1) RESEARCH OBJECTS

The research object of this paper is mainly defined as "the architectural appearance of Dai contemporary self-built houses", and the research will introduce the principle of self-organization to interpret the self-built houses with regionalism characteristics, and take the "spontaneous architecture" as the main research sample,

and mainly focus on the rural Dai houses in Xishuangbanna region to carry out research. The research will introduce the principle of self-organization to interpret the self-built houses with regionalism characteristics. The samples include villagers' self-built houses, unauthorized extensions, and self-built houses with certain external interventions. Compared with the pre-planned houses, these buildings are more numerous and are basically built by the builders and users who make decisions independently and spontaneously.

(2) SAMPLE DEFINITION

The research sample mainly focuses on the façade style of residential buildings, such as: building appearance, structure, doors, windows, roofs, decorative constructions, materials, construction modes, and building behaviors, etc. It does not include research on the level of village planning, spatial layout, or interior space;

The interview survey samples were mainly focused on human willingness to build and construction behavior: local residents, related designers or construction practitioners in Xishuangbanna region.(Figure 1.8)

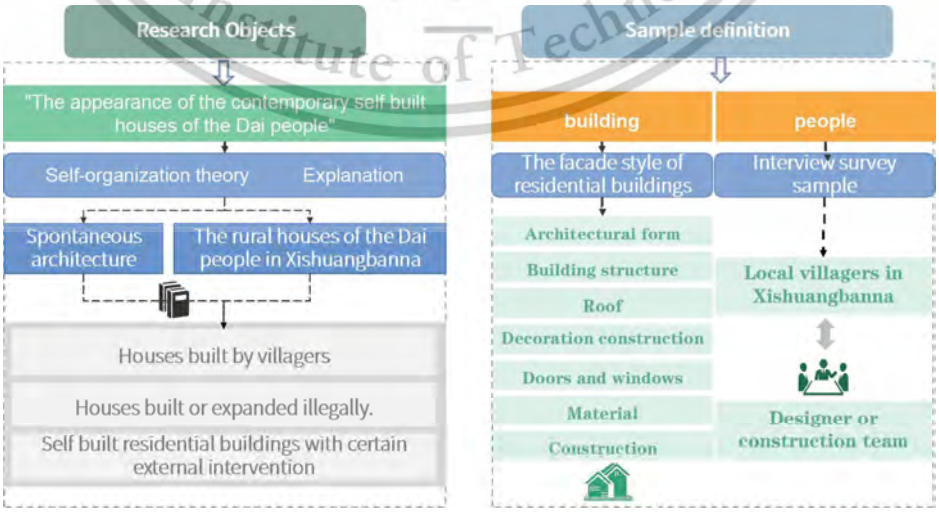


Figure 1.8 Research Object and Sample Definition

1.5 OPERATION DEFINITION AND SCOPING OF THEORETICAL RESEARCH

The research will introduce the general characteristics of self-organizing systems as a framework in the course of the discussion, involving the concepts of architectural regionalism, spontaneous construction and self-organization. The concepts of "architectural regionalism" and "spontaneous construction" are rich in meaning and will be explored in depth later in the research. Here, we will briefly review the origins of the concepts of architectural regionalism and self-organization, as well as the core principles involved in the study.

(1) REGIONALISM OF THE BUILDING

The regionalism of architecture is an open concept and there is no unified consensus to date. Regionalism is a major theory related to regionalism, consisting of two basic components: nativism and modern regionalism

People's understanding of architectural locality is itself full of confusion. Locality is confused with concepts such as local tradition, nationalism, postmodernism, and even deformed into a new cultural symbol, fashion concept, and consumption concept [8]. As one of the essential attributes of architecture, architectural locality is simplified as the association between architecture and natural elements, humanistic elements, and technological elements [9], and the subjective

[8] Alexander Tzonis also refers to "regionalism for commercial and promotional purposes" in "Introducing a Current Architectural Trend - Critical Regionalism and Design Ideas for Uniqueness". [Alexander Tzonis, Liane Lefaivre. Critical Regionalism - Architecture and Identity in a Globalized World. Critical Regionalism - Architecture and Identity in a Globalized World. Beijing: China Architecture Industry Press, 2007:8.

[9] At present, the understanding of architectural locality, the importance of natural elements is the basic consensus, the interpretation of humanistic elements is more common, and the technical aspects can be broadly divided into three categories: 1) concern and criticism of technological advances; 2) the inevitability of innovation in materials and technology, and the combination of new technology with nature and humanity; 3) research on appropriate technology.

factors of the builder and the random factors in life are ignored. The generating mechanism of architectural locality is just like the connotation of reductionism, which cannot clearly describe its diversified reality and explain the principle of its dynamic development; the two main aspects of architectural locality research, the study of residential houses and the contemporary theory of regional architecture also lack the necessary communication, so that the theory of architectural locality can't be well applied. Therefore, while the theory of architectural locality has received widespread attention, it is especially necessary to further understand the generating mechanism of architectural locality and explain its connotation.

(2) SELF-ORGANIZATION THEORY

Self-organization theory is the study of "self-organization phenomena" in complex systems, first proposed and developed in the late 1960s by Ilya Prigogine and Hermann Haken.) proposed and developed the theory. Its research object is mainly the formation and development mechanism of complex self-organized systems (living systems, social systems), that is, under certain conditions, how the system automatically moves from disorder to order, and from low-level order to high-level order. Wu Tong defines the "self-organization phenomenon" as "self-organization, self-creation, and self-evolution without specific instructions from the outside world, and the ability to autonomously move from disorder to order and form a structured system." According to Paul Cilliers, "Self-organization is the ability of complex systems to develop or change their internal structure spontaneously and adaptively to better cope with or deal with their environment." (Silias, 2006)

Self-organization theory consists of Dissipative Structure, Synergetics, Catastrophe Theory and Super circle, but the basic ideas and theoretical core can be completely given by Dissipative Structure Theory and Synergetics. Self-organization theory studies complex phenomena in nature and human society with new basic concepts and theoretical methods, and explores the basic laws of formation and evolution of complex phenomena. From how non-living physical and chemical processes in nature transition to living biological phenomena, to the continuous evolution of human society from the lower to the higher level, and so on, are all the subjects of self-organization theory research.

The main parts of the theory of self-organization it has three main components: the Dissipative Structure, Synergertios, and Calastrophe Theory, but the basic ideas and theoretical core can be given entirely by the Dissipative Structure Theory and Synergertios. [10]

It can be seen that the theory of self-organization is a relatively complex system, the research will mainly focus on the concepts closely related to residential architecture. The goal of the research is to define the reasonable generation mechanism and evolution mode of village residential architecture, to find the "core" of residential development, and to summarize the effective way of intervention in the design, so it is necessary to use the principle of "self-organization" to make a detailed interpretation of the logic of the generation and evolution of village architecture. Therefore, it is necessary to use the principle of "self-organization" to

[10] http://tc.wangchao.net.cn/baike/detail_2795662.html

make a detailed interpretation of the logic of generation and evolution of village architecture, to explore the universal law and summarize the common characteristics.

Firstly, the necessity of selecting the self-organization theory as the guiding research theory is explained, and secondly, the self-organization attributes of villages are further interpreted under the self-organization vision, and the basic principles of self-organization system generation and evolution are explained. The self-organization attributes of village architecture system include: openness, non-linearity, non-equilibrium; the generation and evolution model of village architecture includes: historical information processing, fluctuations factors, evolutionary core, competition and synergy of several self-organization principles. According to the evolutionary core, the rise and fall factors, and the competition and synergy effects on the generation mechanism of village architecture for further analysis, summarize the common principles. (Figure1.9)

Zeng Guoping mentioned: "As long as a macroscopic system is composed of a large number of subsystems or elements, there must exist a certain amount of fluctuations in it, because fluctuations are a kind of original driving force for the development of the system." (Zeng, 1996).In self-organization theory, the formation of a "law of self-organization" goes through the following processes: "Generation", "Formation of base core", "formation of order", "new stable state", and "rise and fall" throughout the whole process of change.

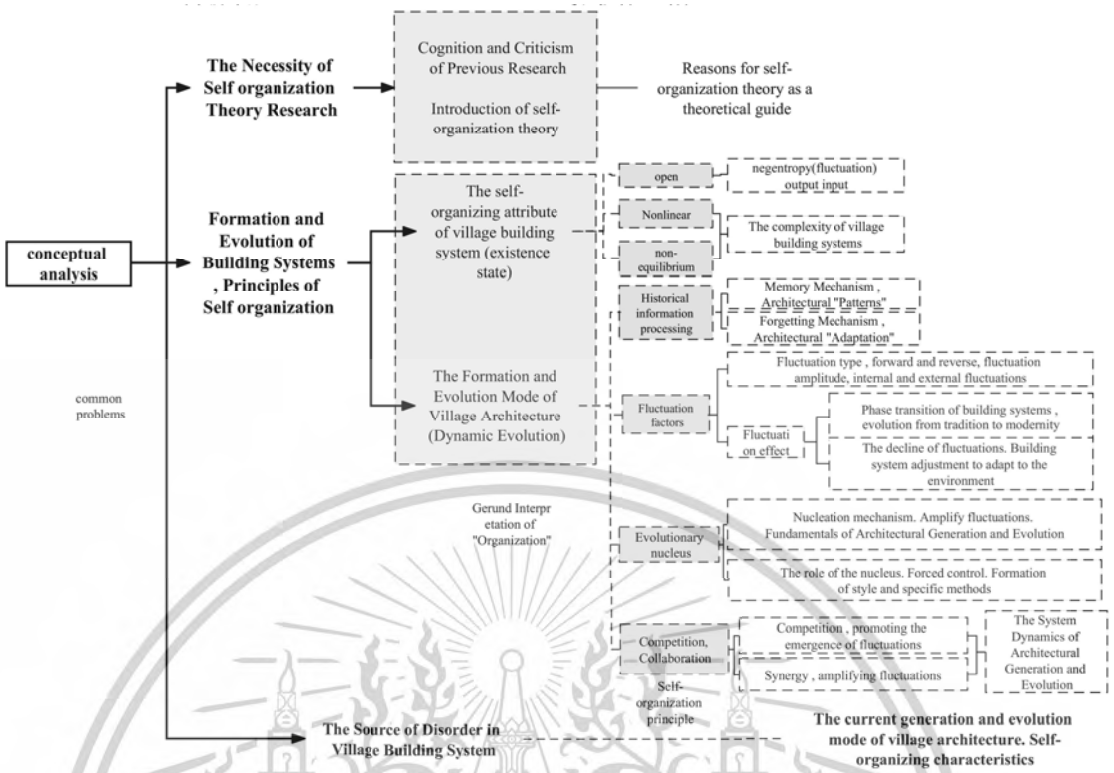


Figure 1.9 Research framework of self-organization theory

1.6 RESEARCH CONTRIBUTIONS

1.6.1 Expanding the theoretical system of the research field

Based on the self-organization theory, the village residential architecture of Xishuangbanna is systematically analyzed to find its generation and evolution law. It supplements the research gap of Xishuangbanna residential architecture under the self-organization theory, expands the related research content of self-organization theory in specific local villages, provides a new research idea for the construction of village residential buildings, looks for the road of cultural inheritance of village residential architecture, and finds a balance between practical functions and cultural characteristics.

1.6.2 Practical implications

The ultimate goal and significance of this research project is to explore the construction laws and important features of Dai ethnic residential buildings in Xishuangbanna, explore the possibilities for future development, and maintain the continuity of cultural characteristics. Based on the theory of self-organization, this study provides a new direction for the research of rural construction. Through interviews and in-depth research with residents, it establishes laws that meet the needs of villagers and promote the reasonable development of residential buildings. This provides a reference "basis" for the application of architecture in rural construction, making architecture a sustainable building that can be used for a long time in a dynamic society. It is hoped that this will provide guidance and reference for future interdisciplinary research and design practice ideas.

CHAPTER 2

LITERATURE REVIEW

2.1 CURRENT STATUS OF RESEARCH RELATED TO DAI FOLK RESIDENCE IN XISHUANGBANNA

2.1.1 About the Dai nationality

The Dai are a cross-border ethnic group with many clans, mainly distributed within the borders of China, Thailand and Laos. (Figure2.1) The Dai in China are mainly found in Xishuangbanna Dai Autonomous Prefecture, Dehong Dai Jingpo Autonomous Prefecture and Gengma Dai Wa Autonomous County and Menglian Dai Lahu Dai Autonomous County in Yunnan Province. The rest are scattered in more than 30 counties in Yunnan Province, including Xinping, Yuanjiang and Jinping. (Liu Wenbin, 2024)The Dai within China are basically composed of Dai clans located in these three regions. The research in this paper focuses on the Dai villages and residential architecture in Xishuangbanna region to carry out the research.

Figure 2.1 Geography of Xishuangbanna, China, in relation to Thailand, Laos, and Myanmar (map source: ArcGIS Online)

2.1.2 About Xishuangbanna

Xishuangbanna Dai Autonomous Prefecture is located in southwestern Yunnan, one of the eight autonomous prefectures in Yunnan Province, with Jinghong City, Menghai County, and Mengla County under its jurisdiction, and its capital in Jinghong (Figure2.2). Xishuangbanna is located at latitude 21°10′-22°40′ north and longitude 99°55′-101°50′ east, at the northern edge of the tropics south of the Tropic of Cancer. It has a land area of 19,096 square kilometers, bordering Pu'er City in the northeast and northwest, Laos in the southeast, and Myanmar in the southwest, with a national border of 966.3 kilometers. (Website of the People's Government of Xishuangbanna

Dai Autonomous Prefecture, 2022)

The places where the Dai people live are generally characterized by tropical and subtropical climate, which is warm and humid, with a great variety of flora and fauna and rich mineral resources. Xishuangbanna is located in the northern edge of the tropics, high temperature and rainy, dry and wet seasons distinct and four seasons is not obvious climate characteristics, so the climate of Xishuangbanna is warm and humid all the year round, there is no four seasons, only the difference between the wet and dry seasons. 2021 state counties and cities annual rainfall in the 1024.4 to 1,365.3. mm, and the same period of the year compared with the Jinghong and Mengla less than the Menghai normal; the annual average temperature of the counties and cities in the 18.9～23.5℃, compared with the same period of normal year, Jinghong is on the high side, Menghai and Mengla are normal; the main meteorological disasters during the year are wind and hailstorms and heavy rainfall and flooding. (Wang, 2021) It is well known that climatic causes can have an impact on local lifestyles, building forms and other aspects. The average monthly temperature of the coldest month in Xishuangbanna is 11.8-15.6℃. Equivalent to a cool fall in the middle and lower reaches of the Yangtze River Xishuangbanna is known as "the land without winter" because of its temperature. The temperature in Xishuangbanna varies greatly from one day to another, especially in winter and spring, with a difference of 20℃-25℃ between the morning and afternoon temperatures. It has abundant rainfall, with an average annual precipitation of 1200-1500 millimeters, with one day of precipitation throughout the year.

Therefore, according to the Banna is located in the karst landscape area, and rainfall, dry and hot climate and other characteristics of the formation of the main features of its Dai architecture: first, moisture-proof climate is hot, humid and rainy, elevated floor, conducive to ventilation and dissipation of moisture. Second, conducive to heat and ventilation: Xishuangbanna climate is hot, and set up a fire pit indoors for cooking, walls and floors with bamboo scorn or wood panels, there are large gaps, can be heat and smoke exhaust, well ventilated. Third, to avoid insects and animals: Xishuangbanna forests are rich, wild animals, insects are very many, endangering human beings. It is safer to live in the building. Fourth, to avoid floods: the Dai people live in the dam area, the annual rainfall is concentrated, often flooding, downstairs elevated, conducive to the passage of floodwaters, can reduce the danger.

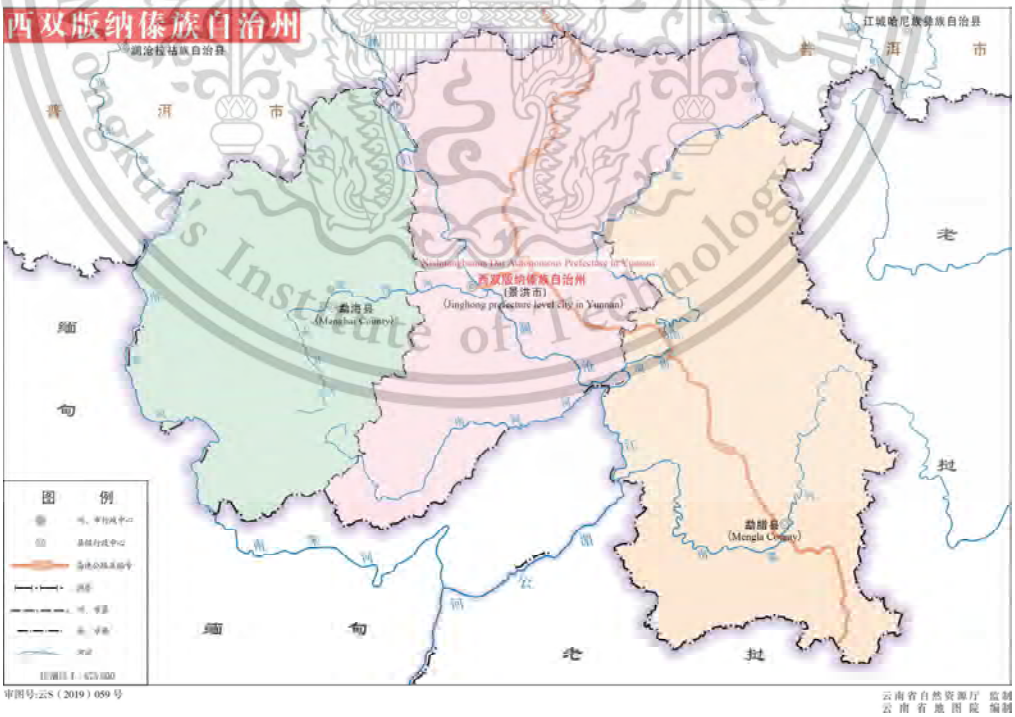


Figure 2.2 Jinghong City, Menghai County and Mengla County under Xishuangbanna (http://www.onegreen.net/)

At the end of 2021, the total resident population of the state was 1.360 million, of which 627,000 were urban residents, accounting for 48.0% of the total resident population. There are 13 ethnic groups, including Dai, Han, Hani, Yi, Lahu, Brown, Jinuo, Yao, Miao, Hui, Wa, Zhuang and Jingpo. The total household population is 1,018,100, of which 792,800 are ethnic minorities, accounting for 77.9% of the total household population. There are 334,700 Dai, accounting for 32.9% of the total household population; (Xishuangbanna Dai Autonomous Prefecture People's Government website, May 2022)

In the process of evolution and development of the long river of history, the ancestors of the Dai people have created a wonderful and unique Dai architectural culture, which has formed the distinctive Dai dry-rail type residential buildings due to the unique local climatic characteristics, regional culture, building materials and other complex reasons. As a type of architecture closely connected with people's daily life, residential houses carry rich cultural connotations. In Dai society, dwelling is not only a residential building, but also includes many deeper connotations, such as religion, faith, life style, livelihood, etc. For such a complex collection, many scholars from their respective fields of study, for the Dai folk dwellings to carry out a multi-faceted research, and has achieved fruitful research results. On the surface, it seems that a house is only a machine for users to live in, but after in-depth study, we can find that there is a wealth of information hidden behind a seemingly ordinary house. For this reason, many scholars in different research fields have carried out research activities on residential houses from their own research perspectives. At

present, the study of houses has entered into a multi-faceted and multi-disciplinary research from single-discipline research, and the scope of pure architectural research has been expanded to sociology, history, cultural geography, anthropology, archaeology, ethnology, folklore, climatology and other disciplines to conduct comprehensive research.

2.1.3 About Dai ethnic dwellings

As a form of architectural existence, scholars of architecture have firstly researched the residential houses of the Dai ethnic group, while the residential houses of the Dai ethnic group have originated from the rise of the research activities on the residential houses of the ethnic minorities in recent years.

Under the current situation of China's economic and social development, the Dai ethnic area has also ushered in an opportunity for development. The entry of people, logistics and information flow, and the rapid change of the external environment have brought great influence to the local residents, including the change of life style and livelihood, which are reflected in the pattern of the village and the appearance of the houses, and specifically manifested in the significant change or even the demise of the traditional houses and the traditional style, and the research of the protection of the traditional houses of the Dai ethnic group is the research activities carried out to address this issue. The study on the conservation of Dai traditional houses is a research activity to address this issue. [11]

[11] This part mainly explains the basic form of traditional residential architecture in Xishuangbanna, and can basically understand the basic situation of residential architecture in Xishuangbanna.

(1) EXTERNAL FORM OF DAI RESIDENTIAL BUILDINGS

"Overview of Dai Folk Houses Dry-structure is a structural form of ancient Chinese wooden architecture (Figure 1), mainly distributed in the region south of the Yangtze River Basin in China, and the Dai "Bamboo House" is a typical representative of the dry-structure." (P.Y. Feng, H.F. Wang & Zou Zhou, 2024) [1] The Dai "Bamboo Building" is one of the more spacious of the dry-rail type of architecture, with a lightweight form. The first floor is an elevated floor, with a series of pillars, mainly supporting the superstructure. The form of overhead floor is the creation of the wisdom of the Dai ancestors, which is excellent for flood prevention, beast prevention and ventilation. According to the arrangement and number of columns on the overhead floor, the size and plan form of the bamboo building can be known. The architectural form of Dai bamboo buildings is the forest of pillars, and then the shape of the roof. "The roof of the Dai bamboo building is also very distinctive, mostly using a Hip-and-Gable Roof , the ridge is short, steep slope, low eaves and out of the pick far, conducive to shade and rain, so the building as a whole is shaped like a pointed hat, so this kind of residence is also commonly known as the "Kongming Hat".(Miao Zekun, 2023) Its form is like a standing phoenix, and the roof is like the wings of the phoenix, with a beautiful appearance, and the whole bamboo building seems to be hidden in the bamboo jungle (Figure2.3).

Figure 2.3 Traditional Bamboo Buildings in Xishuangbanna

The Dai people in Xishuangbanna belong to high temperature and rainy climate conditions, so the Hip-and-Gable Roof of the bamboo building has a shorter ridge and a steeper slope, which is convenient for drainage and adapts to the rainy climate of Xishuangbanna, and a layer of Phi Roofing (biased mansion) will be set up under the eaves of the bamboo building, which is in the form of a heavy eave. The main function of the phi roof is to protect from the sun, shade and rain, and the phi roof is supported by an enlarged circle of gable columns around the main house, which almost completely covers the walls of the floors. (Wang, 2014)The walls of the floors consist of long wooden planks, and the front porch and lanai are basically wall-less, making the bamboo buildings appear more airy and light. As the bamboo buildings are no longer confined to square planes nowadays, there are more extensions, so the multi-roof combination form is rich in shape and contour. (Figure2.4)

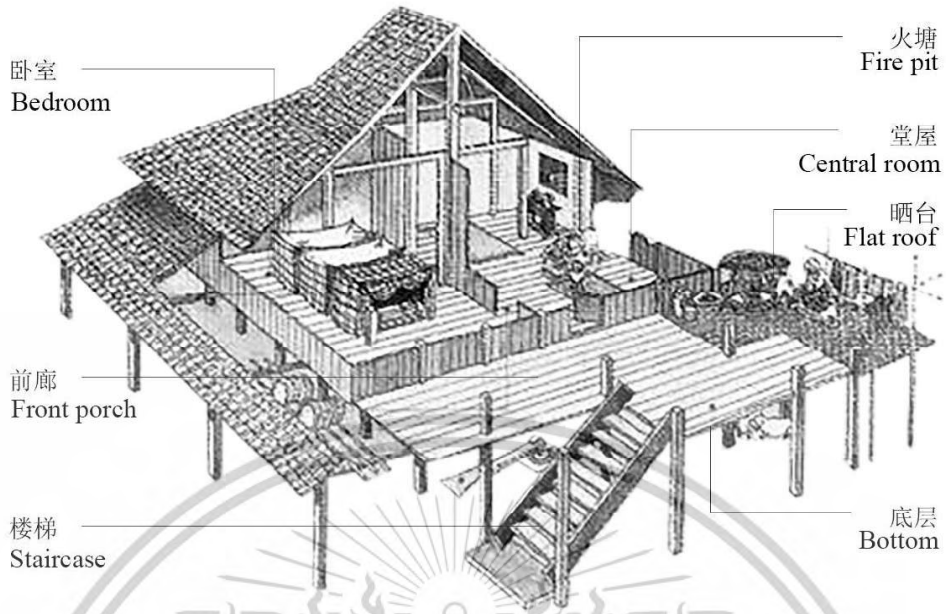


Figure 2.4 Spatial Structure of Traditional Houses in Xishuangbanna

(2) Basic form of plane function

Traditional Dai residential buildings are mainly composed of an elevated floor downstairs and a residential floor upstairs. The elevated layer is generally used to store miscellaneous items and large agricultural tools, as well as to raise livestock; The residential floor is mainly composed of a front porch, a main hall, bedrooms, and a sun terrace (Figure 2.5). The Residential floor can be divided into three levels from the outside to the inside: the first level is the wall-less space composed of the front porch and the sun terrace, which is the most open space of the Residential floor, and the "front porch" space is open and bright, with the natural wind blowing through the hall, which is the perfect place for daytime rest, meals and hospitality; the "sun terrace" is the place for washing and washing, and the "sun terrace" is the place for washing and washing, and the "sun terrace" is the place for washing and

washing. "The second level is the space of the hall, which is equivalent to the living room of the modern house, and is the center of the family's living, in which daily activities, reception of guests and household chores are carried out. Guests also stay in it. The third level is the bedroom space, which is also the most private space in the whole house. The bedroom space is generally inaccessible to non-family members, and is divided into beds and rooms, with the beds lined up according to the order of seniority and inferiority.

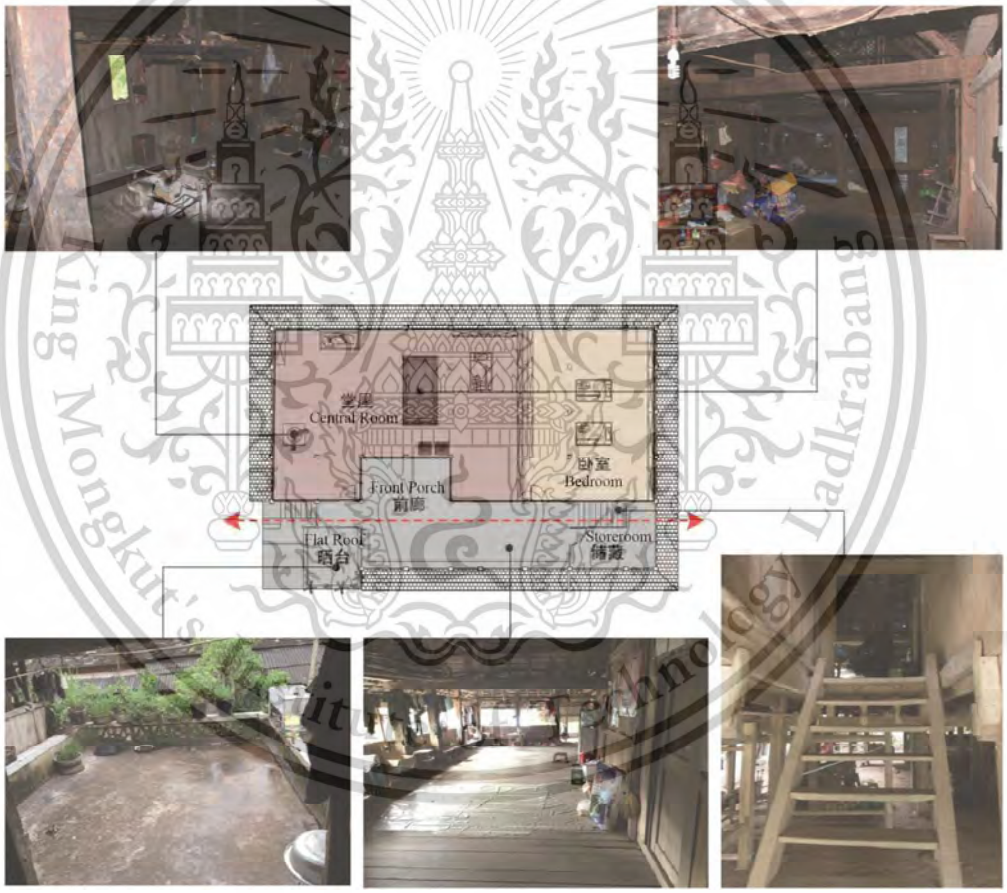


Figure 2.5 Layout of traditional Dai dwellings (variations in the form of different buildings)

(3) Characteristics of roof form

The roofs of Dai dwellings have strong national characteristics. From the myths and legends of the Dai people, we can learn that its origin was initially the Dai ancestors were inspired by the sitting posture of the dog and built the dog-sitting type of roof, which was able to shelter from the rain but difficult to protect from storms. Later, they were inspired by the "phoenix" spreading its wings and built the traditional Dai roof we see. The Dai roofs are of the hermetic style, with a large roof slope, usually 30°~40° (Gao Yun, 2003) [12]. With the expansion of residential space, the roof form of Dai dwellings began to appear in various forms. The traditional Dai roofs mainly have single gable and hip roof (Figure2.6), double gable and hip roof (Figure2.7) and multiple gable and hip roof combination patterns (Figure2.8).

The traditional Dai Lou roof expansion methods mainly include parallel expansion along the roof ridge and perpendicular expansion with the roof ridge. Due to its variable combination, the way of collocation cannot be exhaustive, and now we analyze the way of roof expansion with the example of double hermitage roof. When the expansion of the building plane occurs, the combination of the two roofs has a variety of relationships, there are parallel parallel, there are parallel extensions, there are vertical parallel and vertical intersection, one of the two is the "main body", there is a new roof.

[12] Gao Yun. Dai Folk Houses in Yunnan, China [M]. Beijing: Peking University Press,2003:61.

Figure 2.6 Single Pediment roof (photo by author, February 2023)

Figure 2.7 Double Pediment roof (photo by author, February 2023)

Figure 2.8 Multi-sheltered Hill Roof (photo by author, February 2023)

2.1.4 Traditional research on foreign vernacular residential architecture

Architecture is indispensable for human habitation, and attention to the culture of habitation is based on the study of vernacular architecture. The study of residential architecture originated in the West, and Geroge Gilbert Scott first used the

term "Vernacular Architecture" in 1858 (Scott, 1858). Another early study of vernacular architecture was the American anthropologist Louis Henry Morgan's Native American Houses and House Life, which dealt with the relationship between the structure of living spaces and their daily use. In this book, Morgan describes the organization of habitation in Indian longhouses and the primitive communist forms of habitation that accompanied this organization of habitation. (Morgan,L.H, 1881)Foreign research on vernacular residential architecture began in the 1960s.The publication of Bernard Rudofsdy's Architecture Without Architects in 1964 explored the history of architecture from a non-traditional and fresh perspective. Rudofsdy's book Architecture Without Architects (Architecture Without Architects) was published, exploring from a non-traditional and new perspective vernacular architecture that has not been noticed in the history of architecture, and emphasizing that what is lacking in the history of Western architecture is precisely the value and significance of vernacular architecture, and that his research ideas and methodology have had a positive impact on the later study of vernacular architecture. (Rudofsky, B, 1964) [2]Amos Rapopport's book House Form and Culture categorized the buildings, and put forward his own views on the process of construction and the way of construction of vernacular buildings, which made people's understanding of vernacular architecture more comprehensive. (Rapoport, A, 1969) [3] Rapopport categorized the interpretation of the house form into one thesis: that people with different attitudes and ideals survive in different physical environments, and Rapopport defined vernacular architecture and settlements as "the material forms in which people's needs, values,

aspirations, dreams, and sentiments are directly and unconsciously transformed into ". In addition to the discipline of architecture, there are many anthropologists in other fields who have done some research on dwellings.

The architectural style of a residential building is a multidimensional concept that reflects not only the cultural and historical characteristics of the building, but also the functional needs of the building, and J. Shaw's 2007 study analyzes the structural changes in the "corridor houses" of the EH II period to reveal the evolution of architectural elements such as corridors and axial rooms. In his 2007 study, Shaw reveals the evolution of architectural elements such as corridors and axial rooms by analyzing the structural changes of the "corridor houses" during the EH II period. (Shaw, J, 2007)Gayane Shalunts et al. in their 2011 study emphasized the importance of smart technology in classifying buildings by classifying the architectural styles of building façade windows through clustering and local feature learning methods. (Shalunts, G., Haxhimusa, Y, & Sablatnig, R, 2011)Montserrat Solano Rojo's 2013 study provides an in-depth analysis of the architectural system of the Le Mirail campus of the University of Toulouse, emphasizing its modern design in residential projects. (Solano Rojo, M, 2013)The study by Ju Hyun Lee et al. in 2015 proposes a methodology for analyzing and generating architectural configurations based on syntax and grammar, which is demonstrated by analyzing the residential design of Glenn Murcutt. (Lee, J, H, Ostwald, M.J,&Gu,N, 2015)Gendro Keling's study in 2017 identifies the typology and characteristics of Dutch colonial architecture in Singaraja, highlighting the uniqueness of Dutch colonial architecture in the region. (Keling,G,

2017)V. Sugár et al.'s 2019 study investigates the architectural values and characteristics of the building stock in the Old Jewish Quarter of Budapest, emphasizing the importance of preserving unique architectural elements while improving energy efficiency. (Sugár, V, Talamon, A, Horkai, A, Nagai, Y, & Kita, M, 2019) [4]Giuliana Scuderi's 2019 study assesses flexibility and adaptive design in the renovation of post-war residential buildings, focusing on integrated retrofit strategies. (Scuderi,G, 2019)Noor Zakiy Mubarrok et al.'s research in 2020 studied the façade changes of Jengki buildings in Yogyakarta, identifying the elements that have been retained, varied, or disappeared in the architectural style. (Mubarrok, N.Z, & Pramudito, S, 2020) E. Y. Astuti's study in 2020 explored the attitudes of the residents towards the preservation of large-scale heritage areas, emphasizing the importance of preserving the heritage in residential settlements, such as the Darmo heritage settlement in Surabaya, Indonesia. (Astuti, E.Y, 2020)

These studies show the diversity of architectural styles in residential buildings, from traditional elements to modern design principles, and the importance of preserving architectural heritage in residential areas.

Summary:

The architectural style of residential buildings is a multidimensional concept that reflects not only the cultural and historical characteristics of the building, but also its functional needs. From George Gilbert Scott's first proposal of the concept of "vernacular architecture", to Louis Henry Morgan's in-depth study of Native American living spaces, to Rudolfsky and Amos Rapoport's exploration of the value and

significance of vernacular architecture, these studies have provided a solid foundation for understanding vernacular architecture. In recent years, scholars have begun to pay attention to the relationship between architectural style and culture, as well as the combination of modern architectural design and traditional elements, such as J. Shaw's study of the "corridor house", and Gayane Shalunts and others' categorization of window styles on building facades. At the same time, the preservation of architectural heritage has also become a hot topic, with studies such as V. Sugár's emphasizing the importance of preserving unique architectural elements. Although existing studies cover many aspects of vernacular architecture, they still lack the depth of interdisciplinary research, especially the exploration of architectural detailing and material culture, as well as the practice of combining modern technology with traditional architecture. Future research could further deepen interdisciplinary collaboration to explore the cultural significance of architectural details and how modern technology can be utilized to preserve and preserve vernacular architecture, especially in terms of sustainable development and energy efficiency improvement.

In the west the research about the folk house in general is from the form of the house, the culture of living as well as multidisciplinary, multi-angle research, also constantly verify and promote the research history about the vernacular folk house architecture, but the foreign research about the Southeast Asian Dai people's folk house architecture is less. Many of the results in the Southeast Asian studies about folk dwellings have been made by anthropologists. In traditional societies, dwellings

and settlements were built to orient and enable people to define their place in the world. Houses and settlements in Southeast Asia follow a series of orientation rules, both geographically and ceremonially related. These rules of orientation have a pervasive role in influencing spatial layout and daily life, and traditional religions have a pervasive influence on Southeast Asian dwellings. From the above data, it shows that most of the research on residential buildings has a deep relationship with its specific cultural connotation, and foreign research on residential buildings, in addition to the degree of architectural angle, is also based on the angle of culture, life and form, which provides a lot of references for China's research on residential buildings.

2.1.5 Research Status of Dai Folk Houses in China

China's attention to the folk dwellings is relatively early is Professor Liu Dunzhen, he presided over the writing of the Southwest Ancient Architecture Survey Overview, in the book for the first time articulated that the folk dwelling architecture must have a place in the traditional Chinese architecture. In the 1990s, a number of results appeared in the study of Yunnan vernacular architecture (dwelling houses), among which the research works on Dai architecture include Architecture and Style of the Dai in Southern China (English Edition) (Zhu, 1992), Yunnan Ethnic House Culture (Jiang, 1997), Dai Dwelling Houses in Yunnan, China (Gao Yun, 2003), Yunnan Folk Dwelling Houses (Chinese Folk Dwelling Architecture Series) (Yang Dayu, Zhu Liangwen, 2009) and a number of other representative academic monographs, which have laid a solid foundation for the study of Dai folk dwellings.

There are a large number of research papers on Dai folk houses, and some representative ones are: "Ecological View of Dai Village Architecture" (Ma, 2002), "Analysis of Ecological Culture in Dai Villages" (Duan, 2007), "Explanation of the Meaning of Ethnic Culture Separation and Reconstruction--Taking the Cultural Changes of Dai Folk Houses Architecture in Xishuangbanna as an Example" (Shi, Chen, and Dong, 2010), etc. In recent years, there are also a lot of master's and doctoral dissertations on the subject of Dai folk houses. There are also many master's and doctoral dissertations on Dai dwellings, including master's dissertations of Kunming University of Science and Technology, such as Li Lei's "Research on the Regional Characteristics and Sustainable Development of Dai Dwellings in Yunnan" (Li 2006), Liu Yuxian's "Comparative Study on Dai and Other Ethnic Dry Bar Dwellings in Yunnan" (Liu, 2010), Liu Yi's "Study on the Evolution and Renewal of Dai Dwellings in Xishuangbanna" (Liu 2011) and "Study on the Cultural Changes and Reconstruction of Dai Dwellings in Xishuangbanna" (Liu, 2011). (Liu, 2011), as well as master's theses of Yunnan University, such as Bi Kai's "Philosophical Implications of Dai Folk Houses Architecture" (Bi, 2013), and Zhang Weina's "Solidified Virtue: Traditional Folk Houses of the Dai People in Banna in the Field of Ethics" (Zhang, 2015), which have carried out a certain amount of research on the Dai Folk Houses. The doctoral dissertations include Zhao Qun's Research on Ecological Architecture Experience of Traditional Folk Houses and Its Pattern Language (Zhao, 2005) from Xi'an University of Architecture and Technology, Bo Wenfeng's Renewal of Yunnan Folk Houses and Sustainable Utilization of Natural Building Materials (Bo, 2009) from Tsinghua

University, and Wang Lili's Spatial Analysis of Ethnic Settlements in Yunnan: Taking Three Typical Villages as an Example (Wang Lili, 2010) from Wuhan University, as well as other dissertations.

Summary:

Summarizing the above research results, most of the studies on the traditional houses of the Dai ethnic group start from the aspects of architecture, building structure, patriarchal culture, etc., focusing on their unique traditional customs and culture, and more on the integration of traditional house materials. The basic research on Banna houses in Xishuangbanna is relatively detailed, but there is a lack of innovative and in-depth research on Banna houses. There are few systematic researches on the spatial form of the modern Dai traditional houses with the starting point of the use and demand of "people". The systematic analysis of Dai folk houses supported by relevant theories is also relatively small. There are almost zero studies on the systematic analysis of Xishuangbanna residential architecture from the "self-organization theory".

2.1.6 Research on the Protection of Dai Ethnic Residential Buildings

Zhang Ruochen, in the article "Theory and Practice of Protection and Renewal of Traditional Residences in Jingmai, Yunnan Province--Taking the Protection and Renewal of Eight Villages in Mangjing Scenic Area of Jingmai, Yunnan Province as an Example", points out the problems in combining domestic and international protection of traditional residences and proposes a method on the protection of traditional residences (Zhang, 2014).

The author summarizes the current situation of Dai dwellings in the research site into three situations: alienation of dwelling forms, lagging of traditional dwelling functions and industrial structure. The author analyzes the reasons for these three situations: firstly, the lack of construction vocabulary, which stems from the shortage of construction materials; in addition, foreign craftsmen's ignorance of the local construction vocabulary also exacerbates this phenomenon to a certain extent; secondly, the lack of norms for spontaneous construction; and lastly, the lack of a reasonable understanding of the traditional dwellings among the local inhabitants, and their lack of self-confidence in their own traditional culture, which makes them regard their own traditional culture as backward and obsolete in the face of the impacts from the foreign construction culture. The last is due to the local residents' lack of reasonable understanding of traditional houses and their lack of confidence in local culture, which makes them regard their own traditional culture as a symbol of backwardness and obsolescence.

With regard to the conservation strategy of traditional residential buildings, the author proposes to carry out dynamic conservation by upgrading the internal functions of the existing residential buildings in an adaptive way, so that the traditional ethnic living space can keep pace with the times and realize the sustainable development of the residential buildings. Under the premise of maintaining the architectural theme of traditional houses, the author proposes to modernize the internal functions of traditional houses, so that the quality of life in the houses can be improved.

Liu Yuxian, in her research "A Comparative Study of the Dai and Other Ethnic Groups in Yunnan Province on Dry-structure Dwellings", elaborates in detail the significance of preserving dry-structure dwellings as well as the current situation of preserving this type of dwellings (Liu, 2010). In their research "Protection and Revitalization of Dai Residences", Bo Wenfeng and Lv Jue explore the subject of protection of Dai traditional residences from the perspectives of environmental ecology and building technology (Bo & Lv, 2007). According to Wang Song, the Dai "new dwellings" built after the traditional Dai dwellings are very different from the traditional dwellings in terms of materials and structural systems. Although these new dwellings have improved the living conditions of the Dai people to a certain extent, the ecological environment of the villages and the traditional style have suffered unprecedented damage, which is mainly manifested in the following:

1. The use of clay bricks leads to the consumption of land and forest resources and air pollution;

2. Waste building materials cannot be recycled and reused;

3. The unstable quality of homemade materials affects the quality of construction;

4. Traditional Dai construction techniques are lost due to the lack of opportunities for practice. In response to these damages, the authors propose the conservation strategy of "revitalizing bamboo buildings", which is to build new Dai bamboo buildings by improving the existing bamboo construction techniques, in order to change the simple image of traditional bamboo buildings in people's minds,

and to improve the indoor living environment of the bamboo buildings and the appearance of the whole village. (Wang, 2017)

The above are the relevant researches on the protection of Dai traditional architecture in recent years, from which it can be summarized that the concerns about the protection of Dai traditional houses are focused on the following aspects:

1. Protection of traditional buildings and village features.

2. Protection of traditional construction techniques. Through modern construction technology to make up for the traditional construction techniques in the environment, building physical properties and other aspects of the shortcomings of the traditional construction techniques to meet the needs of the people of today's housing, so as to win the survival of the space.

Renewal of residential buildings is a continuous process. The internal factor lies in the actual user's demand for use, the external factor lies in the social environment, changes in the natural environment, and the craftsmen are the most direct people to promote the renewal of residential houses, their experience accumulated in the process of long-term practice and their own creativity together to promote the renewal of residential houses. Since then, with the development of residential research, a large number of researchers and scholars have begun to pay attention to the issue of residential renewal, and have proposed renewal strategies from different perspectives.

Summary:

In general, the traditional research on vernacular architecture focuses mostly on the discussion of the past and is obsessed with the study of regional architectural characteristics, while the evaluation of the current situation of rural settlements and how to intervene in the construction of the countryside on the basis of the intrinsic evolution mechanism are far from being sufficiently researched. In the face of the impact of contemporary social transformation, a large number of rural settlements are declining or even disappearing, and how vernacular architecture can adapt to the new ecology and culture and realize the sustainable development and evolution of the countryside is an issue worth exploring and thinking about (Dong Zhouyi, 2018). [5]With the attention to the protection of traditional architecture, coupled with the actual living needs of the residents, the Dai residential houses, although possessing a characteristic architectural style, are no longer able to meet the needs of modern life, and how to protect the surviving Dai residential houses is also a problem we face.(Figure 2.9)

Figure 2.9 Summary of Relevant Literature Research on Residential Buildings

2.1.6 Renewal Practices of Dai Residences

The contradiction between the protection and development of dwellings has become more and more prominent in the process of urban construction. In recent years, there have been more and more researches and practices on the protection and renewal of traditional villages and towns, historical and traditional neighborhoods as well as dwellings, and Dai's dwellings have been renewed and evolved from generation to generation.

(1) Constructed update study

In his paper "Protection and Inheritance of Traditional Houses of Some Ethnic Minorities in Yunnan under the Perspective of Constructing" (2014), Zhuang Lei takes constructing theory as a perspective, and analyzes the connotation and extension of constructing theory, and comes up with the constructing hierarchical relationship of "material, structure, skill, and place". It proposes the principle of "originality" protection for traditional houses and the principle of "interpretive" renewal for new houses, which provides a new perspective for the inheritance and development of traditional houses.(Zhuang, 2014)

(2) Updated study of physical properties

Liang Junke explores the relationship between architectural function, spatial form and climate in his paper "On the Study of Climate Adaptation of Dai Folk Houses" (2014). It is concluded that the "triangular roof frame" is the main reason that restricts the utilization of local architectural space. Relevant design strategies were proposed to solve the key technical problems of integrating the upper space of the

roof frame into the use of the second floor space, as well as the problems related to composite walls, ventilated roofs, and the integrated design of solar energy and buildings (Liang, 2014).

Yang Hui studied three aspects of solar radiation protection, ventilation and heat dissipation and heat insulation in his research "Research on Appropriate Technology for Dai Residences in Hot and Humid Areas of Yunnan" (2009), and provided a quantitative basis for shading of buildings through relevant calculations. (Yang, 2008)

(3) Renewal Study of style and features Renovation

Chang Yanwei in the paper "Exploration of the road to the "rebirth" of the Dai community vernacular houses in Dazhai, Jingmai, Yunnan" (2014) mainly focuses on the transformation of the style and features, and analyzes the local villagers' living problems through the interviews of local residents and the investigation of the living situation. At the same time, the whole village dwellings were categorized, and according to their respective characteristics, corresponding transformation strategies were proposed (Chang, 2014).

Zhang Ruochen in his paper "Theory and Practice of the Protection and Renewal of Traditional Dai Residences in Jingmai, Yunnan--Taking the Protection and Renewal of the Eight Walled Villages in Mangjing Scenic Area of Jingmai, Yunnan Province as an Example" (Zhang, 2014), he researches on the evolution and development of the construction methods, building materials, and architectural forms of the Dai residences in Jingmai. Secondly, the current situation of traditional

folk dwellings in Jingmai is summarized, and the relevant problems existed are put forward. Once again, the value of the traditional folk houses is analyzed, and the protection strategy of dynamic updating is proposed. In view of the existing problems, reorganize the space within the dwellings and carry out thematic research to improve the residential quality of the dwellings, and illustrate them with specific cases. Then, the inheritance of traditional houses during the construction of new houses is discussed from the perspective of living culture and house style. By extracting the architectural vocabulary of traditional residential buildings and using modular design techniques, the possibilities of building new residential buildings are explored, and corresponding new residential design cases are proposed. Finally, we summarize the practice of the project and put forward the practical operation method of on-site participation in the preservation and renewal of traditional houses.

(4) Updated research on materials

Wang Yajing made a more systematic research on the renewal strategy and appropriate technology of the light roofs of Dai dwellings in Xishuangbanna in her master's thesis, "A Study on the Renewal of Light Roofs of Dai Dwellings in Xishuangbanna Using Raw Bamboo as the Main Material" (Wang, 2011) .

(5) Renewal studies of structures

In 2006, Mr. Zhu Liangwen, Mr. Bo Wenfeng and other teachers researched on the new Dai residential houses and explored the new structural system of Dai residential houses by applying the new technology of IMS system.

Liu Yi, in the research "Study on the Evolution and Renewal of the Dai Folk

Habitat in Xishuangbanna" (Liu, 2011), through comparative research to discover the characteristics and laws of the evolution and renewal of the traditional folk of the Dai people in Xishuangbanna, and to find a path of the evolution and renewal of the dwellings in conformity with the development of the times and the practicability of the regional characteristics. Inherit the tradition, innovate constantly, build the habitat environment with Dai characteristics, explore the regional characteristics to absorb the essence of tradition, combine the protection and renewal with the development, and build a tourist resort with Dai characteristics.

Summarize: From the current Dai residential renewal design in Xishuangbanna region, a series of exploratory research has been done on residential renewal in terms of building construction, physical properties, style, material and structure. The researchers have explored the use of bamboo as a substitute for roofing material in view of the scarcity of wood. As for the traditional Dai villages used for tourism and residential integration, it is a relatively complicated research proposition to adapt to the angle of tourism demand and also meet the living needs of the residents, and there are very few renewal designs for traditional Dai villages and Dai dwellings from this perspective. There are also fewer researches on the confusion and disorder of Dai village style and features, and there are basically zero research on the systematic analysis of the disorder of new Dai dwellings with self-organization theory. Some of the researchs put forward design strategies and concepts for guiding and controlling the style and features of new Dai dwellings, but they are not objective enough, and they are analyzed from the perspective of designers and planning, failing to achieve

the output of "affirmative action" and to find out the real "core" of development of the dwellings in the complex system.

2.2 REGIONALISM BUILDINGS

Openness of concepts

Despite this longstanding interest, there is still a lack of a unified understanding of what exactly is meant by architectural regionalism. The current widespread interest in regionalism is based on a variety of different interpretations of the term. "Regionalism is as plural as the region itself, corresponding to its location and historical context." Interpretations of territory vary from region to region and from era to era, and there is no definite concept of the regionalism of architecture. There is no definite concept of regionality in architecture.① "Natural and cultural regions are not static." ②. "The nature of 'territory' varies with the needs, the purposes, and the criteria for the use of this concept." ③. It is difficult to provide a clear definition of the concept of architectural locality, and the study of spontaneous construction framed by the concept of self-organization allows for the interpretation of the connotations of architectural locality in terms of organizational mechanisms, which is complementary to the established understanding.

Regionalism is the main theory associated with locality and includes two basic components, vernacularism as well as modern regionalism (Shan, 2001). Vernacularism first originated from the focus on vernacular architecture in the Arts and Crafts movement (Richardson, 2001), and modern regionalism generally harks back to the picturesque style of English gardens (Tzonis and Lefaivre, 2007). However,

as one of the fundamental attributes of architecture, the focus on architectural regionalism can be traced back to Vitruvius's discussion of the relationship between architectural features and climate, sorting out the main ideas about the perception of architectural regionalism before the Industrial Revolution. The main ideas and events of modern territorial theory are also reviewed: the Arts and Crafts movement of the late 19th century, when the mundane rural style and features began to enter the architect's field of vision, and the 1960s, when vernacular architecture came to the forefront as a "spontaneous" built environment; and Raimund Abraham's 1963 book Elementare Architecture Architectonic. Raimund Abraham, in his 1963 book Elementare Architecture Architectonic, highly praised the spontaneous construction of country mills and cattle pens without architectural design (Abraham.R, 1963). In 1964, Bernard Rudofsky, in his Architecture without Architects, was earlier to use the term "spontaneity" as a reference to the "spontaneity" of vernacular architecture. "spontaneity" as a characteristic of vernacular architecture. Spontaneity as a basic characteristic of vernacular architecture has been widely recognized by researchers, and in 2000, Arati Chari further explained the connotation of "spontaneity" of vernacular architecture: "Traditional architecture, and especially vernacular architecture, is a spontaneous response of its form to the constraints of the site's climate and topography, as well as to its relationship with its people. They are also a response to the complex (and often inscrutable) structure of their relationship with people, from which we can learn a great deal, rooted as they are in a 'shared feeling based on regionalism' and a deeper understanding of people's situations." (Arati Chari,

2000)

There has been a bias against urban spontaneous construction as opposed to traditional, vernacular spontaneous construction. The study of urban spontaneous construction has its roots in urban spontaneous communities, which began in the 1960s when anthropologist William Mangin and architectural scholar John Turner focused on the self-built homes of urban dwellers in Third World countries. John Turner and others, in their earliest studies, had already perceived the creativity of the impoverished in the application of resources and materials in the construction of unauthorized communities. However, subsequent studies of spontaneous urban neighborhoods have remained more social, economic, and urban planning perspectives and scales, and have lacked architectural attention. In 1984, Jerzy Wojtowicz, in his unpublished pamphlet Unauthorized Façades (Wojtowicz, J, 1984) , explored bottom-up façade generation, outside of governmental regulation, and the laws of spontaneous construction. In 2000, N.J. Habraken's Unusual Structures: The Laws of Formal Control in Built Environments (Habraken, N.J., 2000) explored the ways in which spontaneous construction exists in a modern city like Hong Kong in a state of "with and without architecture". Habraken, N.J, 1998) gives a more detailed study on both the phenomenon and the law of everyday life spatial construction. The author understands, observes, improves and enhances the built environment as if it were a self-organized entity.

China has been concerned about vernacular architecture for a long time.In 1926 the Institute of Social Research had already examined rural dwellings in the

outskirts of Beijing from the sociological point of view. (Li,1929)In the architectural world, Mr. Liang Sicheng made a reflection on locality in the 1940s in the study of Chinese traditional architecture (Liang,1991). Mr. Liu Dunzhen (Liu, 2004) and Mr. Liu Zhiping (Liu, 2000) researched more detailed and specific research on the residential houses of Li Zhuang and Zhoubian in Sichuan Province, etc. After the 1980s, with the rapid urbanization and economic development, scholars paid more and more attention to the residential houses, and set off a research craze, with rich results. 1999, Wang Shu, under the title of "amateur architecture", praised the "amateur architecture", and the "amateur architecture", which is the most important and important part of Chinese traditional architecture. In 1999, Wang Shu, under the title of "Architecture for Amateurs", praised the creativity of non-architects (Wang, 1999).

Through the review of the research history of architectural regionalism, vernacular architecture, and urban spontaneous communities, the following four aspects need further consideration.

(1) Although the commonalities between spontaneous communities and vernacular architecture have been recognized, they have not been summarized in terms of spontaneity as a basic characteristic, and architectural regionalism has not been investigated from a relatively complete viewpoint.

(2) Although spontaneous communities have been described in terms of vernacular architecture, they have not been supplemented by the study of architectural regionalism from the viewpoint of spontaneous communities. it does not complement the study of architectural regionalism from the perspective of

spontaneous communities. The value of spontaneous construction in expanding the understanding of architectural locality is a question that has yet to be considered.

(3) How can the locality embedded in vernacular architecture be applied in contemporary contexts.

(4) As a way of thinking, regionalism itself is critical; as an essential attribute of architecture, is locality necessarily critical? How to recognize the difference between them needs to be further studied in the contemporary context.

2.3 SELF-ORGANIZATION THEORY

2.3.1 Self-built Housing

The self-built houses studied in this paper refer specifically to rural self-built houses in non-traditional villages, which are generally built by the family as the main decision-making unit under the auspices of the construction, self-organized craftsmen or their own participation in coordinating the construction of craftsmen. Self-built housing is a product of spontaneous construction, the construction of rural housing is by the users themselves as the main decision-makers involved in the spontaneous behavior, rural housing in the process of self-built is almost not subject to the control of specific instructions from outside, in accordance with the collective will of the individual or the family to make decisions on the location of the house, the style of the house, and the economic inputs. The main motivation of this spontaneous behavior is to improve their own living environment and enhance the comfort of production and life.

With the development of rural economy and the improvement of rural living

standards, farmers have higher requirements for housing conditions, are full of aspirations for a new way of life, and hope that the conditions for satisfying the new way of life can be satisfied in their own newly-built residences, so the level of construction of self-built residences in the countryside is getting higher and higher and the styles are getting more and more varied.

2.3.2 Spontaneous construction

Spontaneous construction refers to the behavior or result of making autonomous decisions on the location, form, and investment of a house for the purpose of improving one's own living environment, with the family as the decision-making unit, without being controlled by specific instructions from outside (Lu & Jiang , 2012). Relying on the framework of self-organization related theories, "spontaneity" in vernacular architecture can be further recognized, and "spontaneity" can be regarded as the fundamental driving force for the formation of regionalism commonality, which becomes the key to exploring the mechanism of generating architectural locality (Lu, 2009) .

Social consciousness comes from social practice, and the social practice of individual self-builders will stimulate the spontaneous construction consciousness of other villagers in the same village, thus affecting the overall social consciousness of the whole village. Rural residents in the process of bottom-up participation in residential construction can show individual decision-makers consciousness, but also combined with the local geography and climate and public living habits, in the collective spontaneous construction consciousness naturally formed a stable and

local characteristics of the overall style of rural housing, so that the village has a certain degree of regionality.

2.3.3 Current status of self-organization theory research

In the 1930s and 1940s, the Austrian-American theoretical biologist L.V. Bertalanffy put forward the idea of system theory and the principle of general system theory, and laid the theoretical foundation for the monograph "General System Theory Basis, Development and Application" published in 1958, and the idea of self-organization theory was born in the late study of system theory. 1960s, the Belgian physicist I. Poupon, who was the first to study self-organization theory in the late 1960s, was the first to study self-organization theory. At the end of the 1960s, the Belgian physicist I. Ilya Prigogine in the face of the use of various thermodynamic methods to solve the irreversible problem of the phenomenon, put forward the "dissipative structure" theory of this new paradigm. Subsequently, in the early 1970s, the German physicist Hermann Haken created synergetics based on the competitive and synergistic properties of subsystems within phase transitions.

These studies have elaborated on the macroscopic ordering phenomenon of the system caused by the spontaneous movement and mutual influence of many subsystems within the system, and put forward the basic principle of self-organized orderly evolution. 1977 Belgian physicist Prigogine put forward the self-organization of the development of the open system in his book "Chaos to Order". The self-organization theory originated from natural disciplines has risen beyond the height of natural disciplines to the height of philosophy, and transformed into

thinking characteristics, making its application to other fields possible.

Domestic research on self-organization theory began later, in the 1980s, Wu Tong, Zeng Guoping, Shen Xiaofeng, Wu Yanfu and other domestic scholars began to carry out the basic research work of self-organization theory at the philosophical level, and their successive publication of "The Philosophy of Self-Organization-A New View of Nature and Science", "The Melody of Growth-The Science of Self-Organization Evolution", "The Philosophy of Self-Organization", "The Science of Self-Organization Evolution", "The Philosophy of Self-Organization", and "The Philosophy of Self-Organization". The Science of Self-Organization Evolution", "New Natural History-Self-Organization Theory and Natural System Evolution", "Research on Self-Organization Methodology" and a series of other works, of which "Research on Self-Organization Methodology" is the main source of this paper to understand and summarize the knowledge related to self-organization theory.

Since the relevant institutions in China have carried out research related to self-organization theory in other fields, it has also become a trend to use self-organization theory for research in the field of architecture, and the number of related papers has increased year by year. (Hou, 2003) "The Self-Organizing Mechanism of Urban Characteristic Crisis and Urban Architectural style and features" adopts the theory of self-organizing criticality to prove the existence of self-organizing action mechanism in it, and describes its macroscopic mechanism from the perspective of the interaction of business behavior, social psychology, and information media (Hou, 2003). Guo Rui's "Study on the Contemporary Renewal

Model of Traditional Villages Based on the Self-Organization Theory" proposes a "traditional village renewal model based on the law of self-organization" (Guo, 2013) from the aspects of the main body of the renewal, the renewal power mechanism, the renewal principle, the renewal strategy, and the adaptive scope of the renewal and the evaluator .

Self-organization theory describes the phenomenon that subsystems and elements in a system gradually move from disorder to order and remain stable for a certain period of time under the premise of continuous exchange of energy, material, and information with the external environment, and the process of shaping such a system is basically the same as the process of shaping the regionalism of the architecture in a certain area, which is comparable. Through the interpretation of the self-organization theory, it can expand the cognition of the connotation and generation mechanism of architectural regionality, which is of guiding significance in the guiding and controlling strategy of non-traditional rural self-built houses for maintaining regionalism characteristics.(Figure 2.10)

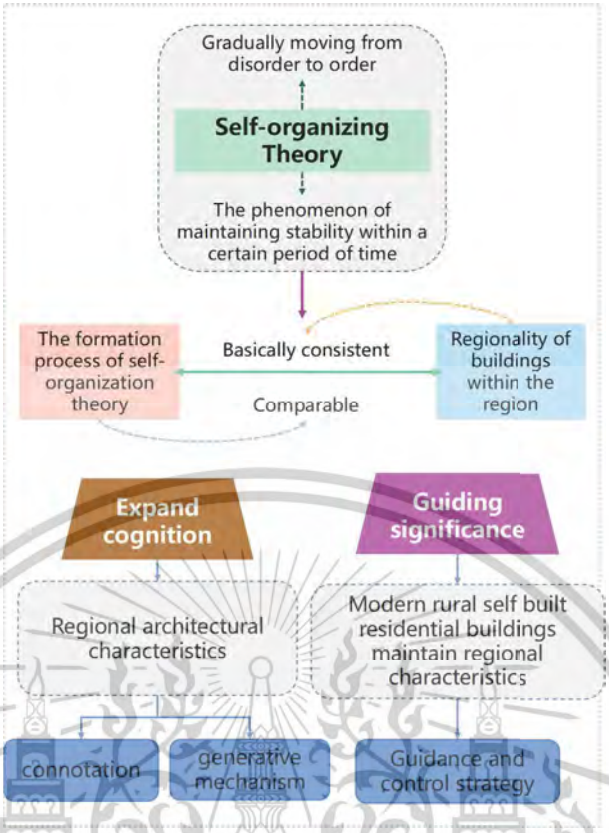


Figure 2.10 The Relationship between Self Organizing Theory and Regional Residential Buildings

2.4 SYNTHESIS OF RESEARCH METHODS

2.4.1 Grounded Theory

Grounded Theory is a social science research method that is applicable to qualitative research methods. It constructs theories by collecting and analyzing data. It has been widely used in the field of social science, especially in exploratory research and theory construction. Meanwhile, as an important part of cultural heritage, residential style not only reflects regionalism characteristics, but also carries rich historical and cultural information. In the study of architecture and residential style and features, which involves rich cultural connotations, social factors and other complexities, Grounded Theory can be well used to understand the relationship

between architectural forms and social culture.

Grounded Theory, proposed by Glaser and Strauss in the 1960s, is a method of constructing theories from data. It emphasizes that researchers should go deep into the actual situation and construct theories step by step by collecting and analyzing data, rather than setting a theoretical framework and then verifying it. (Yu & Li, 2024) The core of rooted theory lies in the collection, coding, analysis and theory construction of data, and the process is iterative, flexible and open.

Grounded Theory emphasizes the induction of theory from actual data, which in architectural research means extracting universal principles from specific cases of architectural practice and residential style and features (Kresl,2016). In the study of residential style and features, rooted theory has helped researchers gain a deeper understanding of the complex relationship between residential architecture and local culture, climate and geography (Rapoport,1969). Through the application of rootedness theory, researchers are able to reveal the social structure and cultural significance behind architectural forms (King, 2007). Studies have been conducted to analyze residential architecture in different cultural contexts, such as African indigenous architecture and traditional Asian villages, through rooting theory (Oliver, 2006). Roots theory has also been used to analyze the integration of traditional elements in modern architectural practice (Jacobs,1996). Roots theory research usually requires extensive field research and in-depth interviews, which may be limited in time and resources (Caniggia,2001). Because rooted theory relies on a specific data set, its findings may lack generalizability (Cuff,2010).

Rooted theory provides a way to distill theory from practice in the study of architecture and residential style and features. It helps to reveal the deep connections between architectural forms and socio-cultural factors, but suffers from resource constraints and lack of generalizability. Future research can explore how to combine rooted theory with other research methods to enhance the depth and breadth of the study.(Figure 2.11)

2.4.2 Analysis of Building Form under the Perspective of Typology

Building form analysis under typological perspective is an important research method that focuses on the basic types and forms of buildings and how these types influence and reflect the functional, cultural and historical context of buildings. In the field of architecture, typology is not only an analytical tool but also a basis for design and innovation (Jacoby, 2015).

Building typology plays a key role in building design and conservation. Yu Jiangguang et al. (Yu et al, 2011) emphasized the importance of architectural typology in the maintenance and integration of historic districts, aiming to promote the healthy development of historic districts through the study of spatial assemblage patterns. Similarly, Zhang Jingwei et al. (Zhang & Lu, 2016) applied a typological approach to the study of kindergarten outdoor space, highlighting the importance of outdoor space in the teaching and learning process. (Jacoby, 2015) delved into typology and typological reasoning in architecture, suggesting that architectural diagrams can be considered typological diagrams exclusive to architecture. This distinction is critical to understanding the evolution of architectural history and its

relationship to innovation, layout and style.Markus explored the adaptation of the Nigerian courtyard house in modern architectural design, emphasizing the influence of religious and cultural diversity on architectural form and character, and suggesting that courtyard design should be based on climatic adaptation and passive design strategies to achieve cultural heritage. (Markus, 2016)

In addition, Shi and Wei focus on the harmonious relationship between urban form and architecture through the architectural typology design approach, emphasizing the role of "type" as a conceptual factor rather than simple imitation. (Shi & Wei, 2017) Grover et al. discuss the recurrence of typology in architectural discourse, emphasizing the need for abstraction of typological analysis in the creation and resolution of buildings (Grover et al,2019).Fisher et al. emphasize the importance of architectural features and layouts in understanding the process of urbanization through a morphological study of the ancient architecture of Purépecha, Mexico (Fisher et al,2019).Lullulangi et al. present an architectural typology of traditional tombs in Mamasa, West Sulawesi, highlighting the cultural value of traditional architectural products (Lullulangi et al,2020).Siola, on the other hand, explores the architectural typology of the mosque of Sultan Amay in the Gorontalo region that highlights the role of the mosque as a symbol of Islamic culture and civilization, demonstrating the integration of local architecture with Islamic architectural elements (Siola,2020).Karahan et al. (2020) evaluated the ecological sustainability of traditional buildings in the Uzundere region, explaining the relationship between vernacular architecture and ecological sustainability, and emphasizing the importance

of architectural typology and architectural physical form in rural areas (Karahan & Davardoust, 2020).(Figure 2.11)

Overall, this literature suggests that architectural typology not only plays an important role in architectural preservation and cultural heritage, but is also significant in adaptation to the environment, cultural integration and sustainable development. The typological research method not only helps to understand the formation law of traditional architecture, but also provides a theoretical basis for innovation and diversification in modern architectural design.

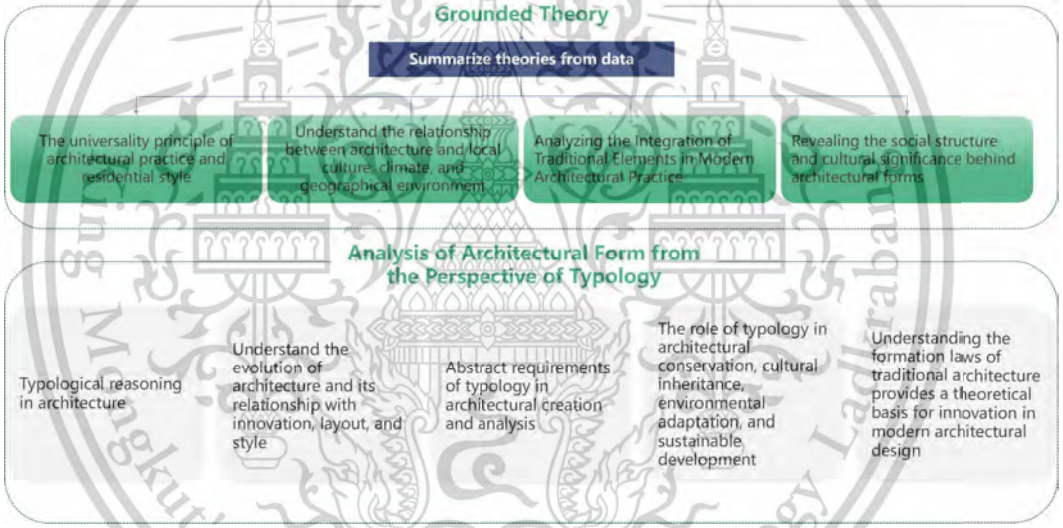


Figure 2.11 Grounded theory and typology

Summarization

The study shows that the study of Dai folk dwellings has expanded from the single field of architecture to the comprehensive study of many disciplines, such as sociology, history, and cultural regionalism, and this interdisciplinary research trend provides rich perspectives and methods for an in-depth understanding of the cultural connotations and architectural characteristics of Dai folk dwellings.

Through the study of literature, although the existing research has achieved

certain results, there still exists a research field in the gap. In terms of the application of self-organization theory to the study of Dai folk residence architecture, there are fewer research results. As a theoretical framework for explaining the formation of internal order in complex systems, self-organization theory can provide new perspectives to help us excavate the generative mechanism, evolutionary process, construction mode, and inheritance of characteristics of Dai folk dwellings in our research. With the acceleration of modernization, the Dai folk dwellings are facing the conflict between tradition and modernity, and how to protect the traditional architectural features while meeting the demands of modern life has become an urgent problem. Interdisciplinary cooperation is not yet sufficient, and future research can further strengthen the cooperation among disciplines such as architecture, history, and sociology in order to understand the multiple values of Dai folk dwellings more comprehensively. There are fewer studies on the evolution and renewal of Dai dwellings in modern society, especially on how to balance traditional preservation and modernization needs, which is an urgent problem. In addition, the research on the architectural details and material culture of the Dai dwellings is not deep enough. In the future, modern technological means, such as virtual reality and 3D scanning, can be used to accurately record and analyze the architectural details of the dwellings, in order to reveal the cultural significance and technological value behind them.

Future research should further deepen the application of self-organization theory in the study of Dai folk dwellings, exploring the spontaneous construction

mechanism of folk dwelling architecture and how to integrate traditional elements in modern architectural practice. At the same time, attention needs to be paid to the performance of Dai folk dwellings in terms of sustainable development, to find their future construction paths guided by appropriate spontaneous construction modes and habits. In addition, research on the conservation strategies and renewal modes of Dai dwellings should also be a future focus in order to realize the inheritance and innovation of Dai architectural culture.

CHAPTER 3

RSEARCH METHODOLOGY

Research methodology is the sum of a set of principles, strategies and procedures used to guide the research process, determine research methods, select research tools and analyze data in scientific research or academic inquiry. It forms the framework and foundation of research and ensures that research can be conducted in a systematic, orderly and scientific manner. In research methodology, quantitative research and qualitative research are the two main research methods, each with different application scenarios, purposes and approaches.

A.Quantitative research：

Quantitative research analyzes and interprets data through numerical and statistical methods. It applies to phenomena that can be expressed in numerical form, such as quantities, proportions, percentages, etc., and is usually used to test hypotheses, discover patterns, and make generalized conclusions. Advantages: It can provide objectivity and generalization of data. Suitable for statistical analysis of large samples and results are more generalizable. Disadvantages: Difficult to explore subjective and cultural factors in depth, more difficult to reveal the complex behaviors and feelings of individuals.

B.Qualitative research：

on the other hand, focuses more on understanding human behavior, cultural contexts and the reasons behind complex phenomena. It explores the subjective meaning and contextual cultural factors of phenomena through in-depth descriptions

and explanations, and is well suited to understanding the motivations and emotions behind human behavior.

Data types are mainly unstructured data (e.g., interview texts, observation records, video materials, etc.). Analysis methods are mainly coding, thematic analysis, rooted theory and other methods. The purpose is to explore and understand complex social and cultural phenomena and generate new theories or insights. Usually the sample size is small, but the data is in-depth and detailed.

Strengths: Suitable for revealing complex human behavior and cultural contexts. Ability to gain a deep understanding of the subject of study and help generate new theories. Disadvantages: Limited generalizability of results due to small sample size, often difficult to make statistical generalizations. Data is highly subjective, relies on the researcher's interpretation and understanding, and may be biased.

In this study, the choice of qualitative research method as the main way to explore the features of Dai folk houses and spontaneous construction laws in Xishuangbanna is based on the profound consideration of the characteristics of the research object. As a material carrier carrying profound cultural heritage and complex social phenomena, the architectural style and construction behavior of Dai dwellings not only contain rich cultural symbols and historical information, but also are deeply influenced by multiple factors such as local social structure, religious beliefs, and living habits. These factors are intertwined with each other, forming the uniqueness of the residential style and features and the spontaneity of the construction

behavior, and it is often difficult to fully capture and accurately express these deep-rooted contents through quantitative data.(Figure3.1)

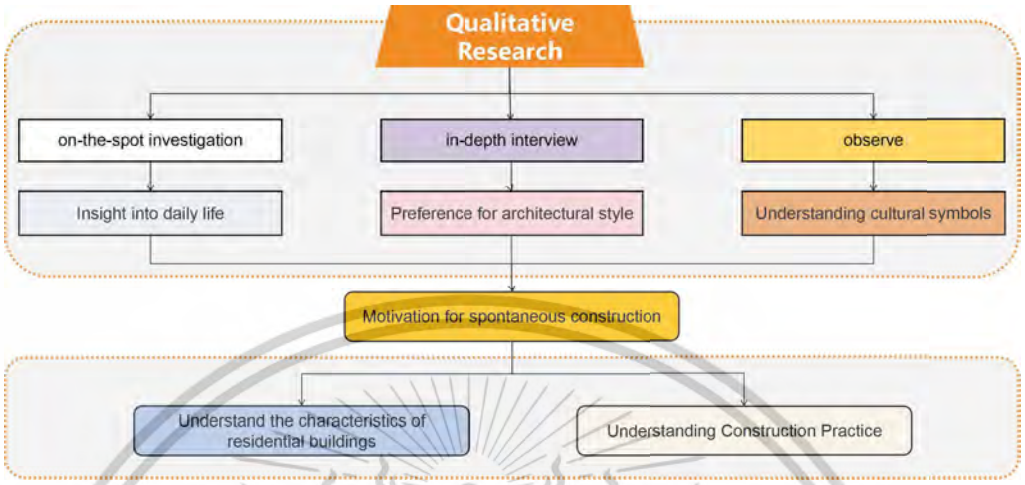


Figure 3.1 Qualitative research provides explanations for complex phenomena

Qualitative research methodology, because of its focus on in-depth understanding and explanation of the nature of social phenomena, has become an ideal choice for revealing the diversity of Dai residential style and featuress and the motives of villagers' construction behaviors. Through fieldwork, in-depth interviews and observation, the study can directly contact the villagers' daily life and construction practices, so as to gain a deeper understanding of their preferences for architectural features, their understanding of cultural symbols, as well as the motivations and attitudes of their spontaneous construction behaviors. This deep-seated information is difficult to reach by quantitative research, but it is an indispensable key to understand the characteristics of residential style and features and construction rules.

Further, the application of qualitative research methodology, such as the coding process of rooted theory, is able to distill key concepts from the rich data

collected and construct a theoretical framework that helps us systematically analyze the cultural connotations and social dynamics of the Dai residential style and features. This process not only reveals the deep-seated cultural logic hidden behind the architectural style and features, but also provides us with a new perspective to understand the construction behavior of the dwellings, enabling the study to more comprehensively grasp the style and features characteristics and spontaneous construction laws of the Dai dwellings, and to provide in-depth theoretical support and practical guidance for the inheritance and development of architectural culture. Therefore, the choice of qualitative research method is not only an accurate grasp of the characteristics of the research object, but also a profound reflection of the research objectives and research value.

3.1 RESEARCH PROCESS

This study aims to reveal the geomorphological characteristics and spontaneous construction patterns of Dai dwellings in Xishuangbanna, an objective that requires a systematic and scientific research process. The methodology provides a logical framework for each part of the research process and ensures that the various steps of the study, such as design, data collection, and data analysis, are carried out in an organized manner. Through the combination of methods such as qualitative research and rooted theory, this study was able to systematically explore complex socio-cultural phenomena, ensuring structured data analysis and interpretive results.

3.1.1 Defining the research problem and research objectives

Before starting the research work, it is important to define the problem and objectives of the research. This is the starting point of all research and the central axis that guides the entire study.

This study aims to explore the architectural features of Dai dwellings in Xishuangbanna, the law of their spontaneous construction and the analysis of the causes of disorder.

What are the distinctive features of the architectural style of the Dai dwellings in Xishuangbanna. What are the traditional and modern elements in terms of roofs, decorations, materials, etc.? In the absence of unified planning or external intervention, how does the spontaneous construction behavior of villagers affect the architectural style and features? What is the relationship between spontaneous construction and external intervention? Why do some of the Dai village dwellings look chaotic, and what could affect or constrain the architectural appearance of the villages.

Specific objectives for problem-based planning research:

Summarize the typical features of the architectural style of Dai dwellings in Xishuangbanna and its association with Dai culture. Analyze the villagers' decision-making process, preferences and choices in spontaneous construction, and explore the influence of external interventions (e.g, governmental guidance) on the residential style. Analyze to find the causes that lead to the disorder and order of the village style and features. Finally, a theoretical model is constructed to explain

the law of spontaneous construction of Dai dwellings in Xishuangbanna and the formation mechanism of their style and features.

3.1.2 Data acquisition

The data collection process utilized a variety of methods to ensure the richness and comprehensiveness of the data.

Semi-structured interviews: semi-structured interviews were used to conduct in-depth interviews with villagers or construction workers. The content of the interviews centered on villagers' preferences for architectural styles, their selection criteria in the house-building process, and their views on spontaneous construction and external intervention. The audio recordings of the interviews were transcribed to form textual data that provided the basis for subsequent coding and analysis.

Field Observation and Image Recording: Visited 12 villages in Xishuangbanna and recorded the architectural features from multiple perspectives by photographing the exterior of the buildings, the roof structure, and the decorative details. The image data provide visual support for the overall appearance of the villages as well as individual architectural styles.

Literature: Collect literature related to Dai culture, architectural style and rural construction, and supplement the understanding of the current situation by analyzing the historical and cultural background.

The combination of interviews, observations and video data ensured that the research data covered the diversity of Dai architectural styles and the richness of villagers' spontaneous construction behavior.

3.1.3 Data collation and coding analysis

After the data collection is completed, the text and image data are first organized to form a structured collection of information. The organized data are analyzed through the coding method of rooted theory, which mainly includes the following steps:

Open coding: line-by-line analysis of the interview texts and video recordings to extract features of the architectural style and features (e.g, roof styles, decorative motifs, etc.) as well as specific behaviors in the spontaneous construction process as initial concepts.

Axis coding: The concepts extracted from the open coding were categorized to form higher-level themes. For example, details about "roof decoration" were categorized under the overall character of the architectural style and features, and "construction decisions" were categorized under the theme of spontaneous construction behavior.

Core coding: Through the analysis of the spindle coding, the core categories, such as "the intersection of tradition and modernity" and "the influencing factors of spontaneous construction", were extracted to provide the theoretical basis for the subsequent model construction.

Through the coding analysis, the key factors and internal logic of the Dai architectural style and features characteristics and spontaneous construction laws were gradually constructed.

3.1.4 Observational analogical analysis

On the basis of coding, the image data were further analyzed by observation and analogy, focusing on the differences and commonalities of architectural features among different villages. The specific steps of observation and analysis include:

Hierarchical generalization: The image data are hierarchically generalized according to the roof style, decorative details, building materials and other characteristics of the building to form a classification of different building types.

Typological Comparison: Categorize similar architectural features into the same type and make horizontal comparisons across villages to observe the differences in the performance of the same type of building in different environments. For example, compare the slope and material of roofs in different villages and analyze their relationship with the environment and culture.

Summary of characteristics: Combined with the comparison of village types, summarize the typical characteristics of Dai residential architecture, such as "Double-eaved Roo", "Pediment decoration", etc., to further reveal the regionalism characteristics of architectural style.

Observational analogical analysis enables the accuracy of coding results to be verified at the visual and structural level, providing intuitive data support for model construction.

3.1.5 Reciprocal Evidence and Model Construction

Reciprocal evidence and model construction based on coding and observational analogical analyses:

Cross-validation: Interview data, imaging observations and literature were validated from multiple perspectives to form a triangular cross-validation mechanism. Through the cross-validation of different data sources, the reliability and credibility of the study results are ensured.

Model construction: Based on the results of coding and observation, a theoretical model of the spontaneous construction law of Dai dwellings in Xishuangbanna is constructed. The model covers the motivation of spontaneous construction behavior, the formation mechanism of architectural features and the influence of external intervention on architectural features, thus revealing the evolution law of Xishuangbanna residential features.

The model provides a theoretical framework for understanding the Dai architectural style and features and its transformation in the process of modernization, and provides guidance for policy making and cultural heritage.

3.1.6 Summary

The research design and process were developed to provide a clear operational framework for this study. Through the identification of research questions, systematic data collection, multi-level coding and analysis, observational analogical comparisons, and the final mutual evidence and model construction, the study gradually reveals the characteristics of the Dai residential style and features in Xishuangbanna and its laws of spontaneous construction. This process not only enhances the depth and scientificity of the study, but also provides a methodological foundation that can be drawn upon for subsequent studies. (Figure

3.2)

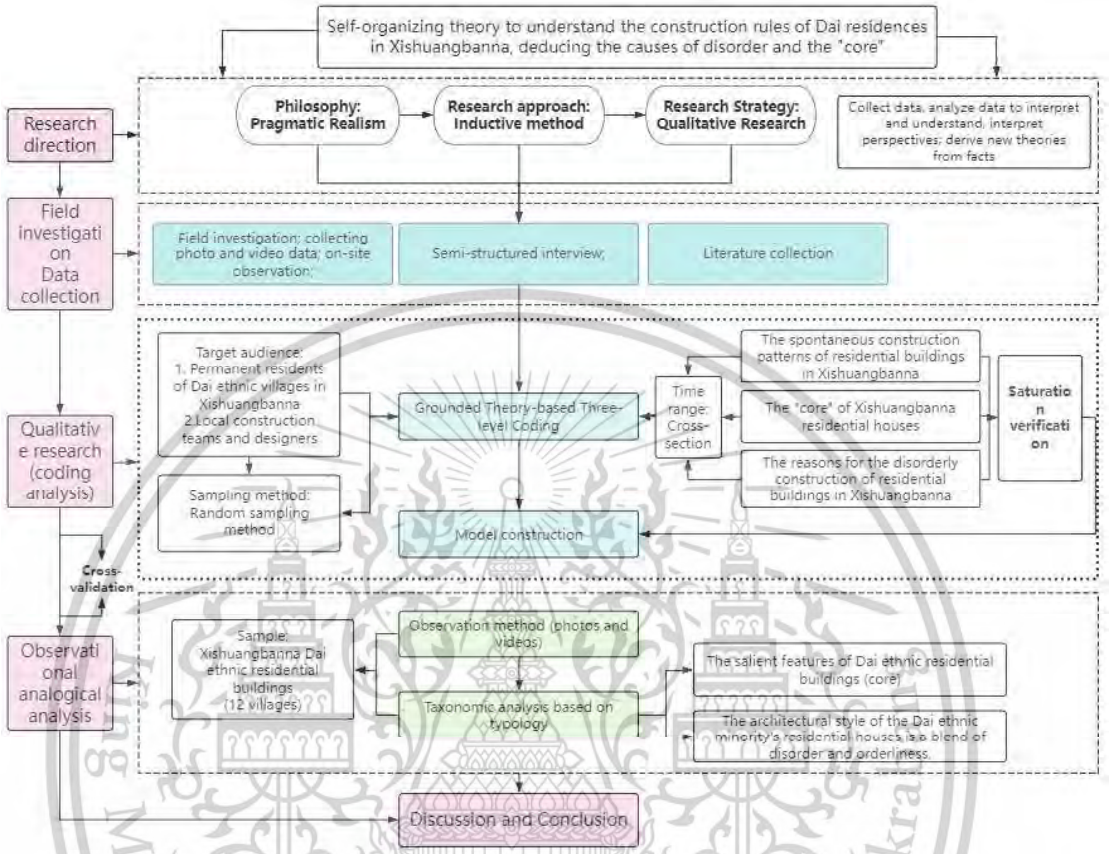


Figure 3.2 Research process (author's own, August 2023)

3.2 TIME FRAME

This study adopts a cross-sectional time period to carry out research [13], which involves researching several Dai villages in Xishuangbanna within a specific time period. The data were collected between 2022 and 2024, with the main purpose of recording and analyzing the architectural features and spontaneous construction behaviors at the current point in time. This is because the study did not plan to repeat observations or comparisons (as would be involved in a longitudinal study) at

[13] "Cross-sectional time horizon" usually refers to the use of a cross-sectional design in a study, where data are collected at a specific point in time to understand the state of one or more variables. This is in contrast to a longitudinal study design, which collects data at different points in time to track changes in variables over time.

multiple points in time. Therefore, the data in this study were collected at one point in time and represent the current architectural style and features and spontaneous construction of the villages, rather than changing trends or historical evolution. Adopting this cross-sectional design can help us capture the current situation of village dwellings within a specific time frame and reveal the style and features characteristics of Dai dwellings and their cultural connotations.

3.3 RESEARCH TOOL

3.3.1 Definitions

A research tool is a method, device or technique used to collect, record, analyze and interpret research data. In research, the selection of appropriate research tools is essential to ensure the validity and reliability of the study and can be used to collect both quantitative and qualitative data.

3.3.2 Research tools

(1) Interview method: Face-to-face or remote conversations with interviewees to obtain in-depth qualitative information. Interviews can be semi-structured or unstructured. The questionnaire setup is detailed at the end of the article (Exhibit 1).

(2) Field research method: collecting data through field visits and field trips. Data collection is mainly carried out through survey interviews, photo collection, video recording and so on. Field research method can help us better understand the actual situation of Dai architecture in Xishuangbanna, control the macro state, and also facilitate us to find the pain points and entry points with research faster.

(3) Coding and analysis tools: triple coding of rooted theory with the help of

MaxQDA software provides a structured analytical framework for the study and helps to systematically identify architectural features and patterns.

(4) Observation: Observe and record the architectural style, construction behavior, environment, and adaptability of living mode of the Dai villages in Xishuangbanna, in order to obtain in-depth qualitative data. For example, the self-built houses in the villages or the research photo data are subjectively analyzed, and the relevant information is extracted from the field observation as well as the photos to analyze the differences between different architectural styles and to extract the characteristics of the architectural style.

(5) Collection and comparison of photo data: The collection of photo data can be categorized as "observation" as a research tool. The photo data will be stratified and processed, and the typological analysis method will be used to summarize the different architectural features and compare the types, so as to show the characteristics of each village's residential style and features in the form of charts. The study will collect several photos for each typical village to observe the form, style, features, materials and current status of the buildings, and then summarize and analyze them to draw conclusions, so as to summarize their patterns and features.

(6) Case study: In the study, one or a few well-referenced cross-sectional cases may be discussed to obtain detailed qualitative data and to support the thesis point.

3.4 SAMPLE SAMPLING OR CASE STUDIES

3.4.1 Sampling area restrictions

Study scope constraints: (Figure3.2)

(1)The focus of the study is centered on Jinghong City in the Xishuangbanna region, and also the scope of the study excludes Menghai and Mengla counties in Xishuangbanna, and the study will focus primarily on village dwellings within Jinghong City;

(2) It must be a Dai characteristic village with distinctive regionalism features of its dwellings; villages selected by the government as traditional characteristic tourist villages, Chinese traditional village list, Chinese minority characteristic villages, etc. will be more representative and typical;

(3) The residential buildings in the village are self-built homes;

(4) Residential samples are prioritized for contemporary or newly constructed residences;

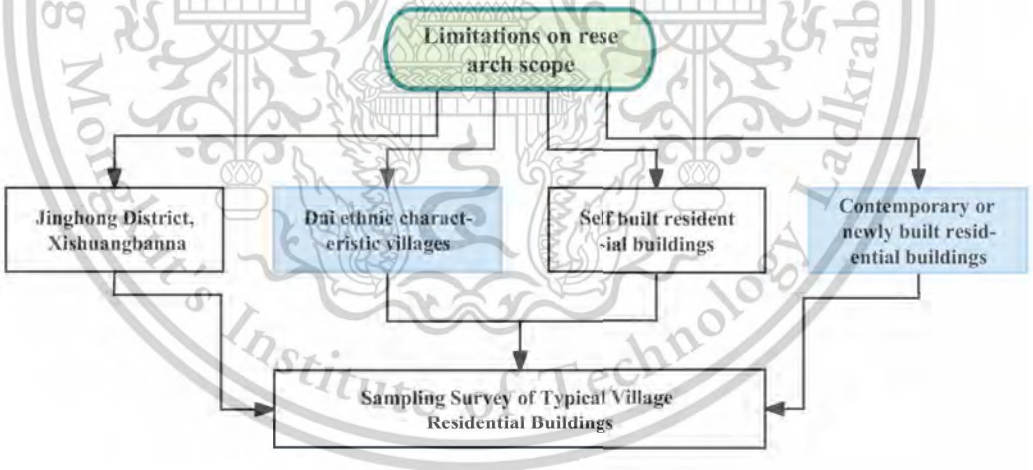


Figure 3.3 Limitations on the scope of the research (authors' own drawings)

Reason: the studied territories are all located within the Jinghong city limits, the villages are all Dai villages, and there is a better horizontal comparison effect of the dwelling patterns in the same area.

There is a high degree of consistency and comparability in the style of the

self-built dwellings in these villages, each with its own unique architectural features, as well as the same or different problems.

3.4.2 Study Population and Sample Definition

3.4.2.1 Research Sample I (residential buildings)

The research object of this paper is mainly defined as "Dai contemporary self-built residential buildings" in typical villages in Jinghong District, Xishuangbanna. The samples of residential buildings include villagers' self-built houses, unauthorized extensions and self-built residential buildings with certain interventions. The number of samples varies according to the specific conditions of each village, basically, the number of residential buildings in each village is within the range of 80-150, and the samples selected in the later stage of the study should have the coverage and reflect the basic conditions of the village.

3.4.2.2 Research sample II (local villagers)

(1) Permanent residents in typical villages in Xishuangbanna [14]

The main body of the research sample is the residents in the village, which must be the permanent population to conduct interviews to ensure the reliability and validity of the interview data. The village can include young people who go out to work or people who do not live in the village for a long time, and the interview data of such people will lose accuracy.

[14] The resident population is defined as those who live in the township street and have their household registration in the township street or have their household registration pending; those who live in the township street and have been away from the township street where their household registration is located for more than half a year; and those who have their household registration in the township street and have been away from home for less than half a year or who have been working and studying outside the country.

(2) Designers and construction teams

Designers and construction teams also belong to the group of people with high relevance to the research topic, and their knowledge and professionalism of residential architecture is also very high, and the interview data obtained for this group also has a certain reference value.

3.4.2.3 Ethical considerations

Ensure that the interview process follows ethical principles and protects the privacy and rights of the interviewees.

1. Prior to the start of the interview, clearly inform all participants of the purpose of the study, the process, and their role in the study. Detail the content of the study, the scope of the interview questions, and how the data will be used.

2. Privacy protection is an important ethical consideration in interview research. Participants may share sensitive information related to their personal lives, cultural traditions, etc. during the interviews, and the researcher should take steps to protect the privacy of this information. Participants' real names or other identifiable information are not used directly in interview transcription, coding analysis, and research findings.

3. Respecting participants' autonomy is key in the interview process. Participants had the right to withdraw from the interview at any time or to refuse to answer any questions that made them feel uncomfortable or unwilling to answer. Ensure that participants feel autonomous and secure throughout the research process.

4. The researcher should inform participants of the research purposes for which the interview data will be used and remain transparent about the use of the data in the research report or paper. It will not be used for commercial or other non-research related purposes.

3.5 DATA ANALYSIS

Depending on the nature of the research questions and data, the study may require a combination of analytical methods to fully analyze and interpret the questionnaire data. Also, depending on the circumstances, it may be necessary to consider whether to perform data preprocessing. The final choice should be based on the research questions, hypotheses and data characteristics.

3.5.1 Grounded Theory coding

Grounded Theory is a bottom-up approach to theory generation by coding and refining the raw data layer by layer to finally form a theoretical model [Glaser & Strauss, 1967]. In this study, the coding of Grounded Theory is divided into three steps, i.e., open coding, spindle coding, and core coding, and each stage of coding aims to reveal the inherent laws and structures of the architectural style and features and spontaneous construction of the Dai dwellings in Xishuangbanna.

3.5.1.1 Open coding

Open coding is the initial step in the rooted theory analysis and refers to the line-by-line analysis of the data to extract initial concepts from the interview transcripts and observation notes. The purpose of this process is to break down the raw data into actionable codes or labels that directly reflect key elements such as

architectural style, functional zoning, and decorative features. For example, by analyzing the descriptions in the interview data, labels such as "roof form," "decorative symbols," and "material use" can be extracted. Open coding enables the study to cover complex and diverse phenomena through detailed line-by-line analysis, and also lays the foundation for subsequent coding.

3.5.1.2 Spindle code

After open coding, the stage of spindle coding was entered. The purpose of spindle coding is to categorize the concepts extracted from open coding and to identify the relationships between the different categories. For example, the labels "roof finishes" and "building materials" may have been extracted from the open coding, which can be grouped into the higher level category "architectural features" by means of spindle coding. ". This phase focused on analyzing and integrating the logical relationships behind the phenomena in order to develop more explanatory categories. The principal axis coding helps to clarify the structural relationship between architectural features and spontaneous construction behavior, which supports the construction of theoretical models [Strauss & Corbin, 1998].

3.5.1.3 Core coding

Core coding is the final step in rooting a theory by further refining key categories to form the core theme or theoretical framework of the study. In this study, the results of core coding may include themes such as "architectural disorder", "spontaneous construction", "cultural core", etc. The goal of core coding is to summarize a set of core concepts that can comprehensively explain the research

phenomenon, and to construct a theoretical model. The goal of core coding is to summarize a set of core concepts that can comprehensively explain the research phenomenon and construct a theoretical model, which directly points to the core problem of the research. The core coding makes the study move from details to the whole, so as to reveal the deep cultural and social logic behind the architectural style and spontaneous construction law of Dai dwellings in Xishuangbanna.

3.5.2 Typological Observational Analysis

Typological observation analysis is a method of comparing the features of different building types, aiming to systematically analyze the architectural features of the residential houses in each village and identify the similarities and differences. The typological observation analysis in this study mainly focuses on the pictures of residential buildings, and displays the characteristics of various types of architectural features in a categorized manner through hierarchical summarization, in order to systematically summarize the patterns of Dai architectural features and their evolution patterns. The specific steps of the typological observation analysis include:

3.5.2.1 Layered generalization

First, the architectural images were grouped in layers according to specific characteristics (e.g, roof shape, decorative patterns, material application, etc.). For example, buildings with similar roof structures are grouped into one category, and then buildings with similar decorative details are grouped into another category. Such categorization enables the visualization of characteristic differences between different building types.

3.5.2.2 Comparative analysis

The categorized building types were compared and analyzed across villages to observe the differences and commonalities of residential architecture in different villages. This cross-sectional comparison enables the identification of major differences in ethos between villages, explains the reasons for these differences (e.g., autonomy of spontaneous construction, material availability, external interventions, etc.), and validates the results coded by the rootedness theory.

3.5.2.3 Summary of characteristics

Based on the comparison results, the main features and laws of each type of architecture are summarized, and a systematic understanding of the architectural features of the Dai folk houses is finally formed. For example, the prevalence and specificity of certain specific roof forms, decorative styles, etc. in different villages are summarized, so as to provide pictorial support for the construction of theoretical models.

The typological observational analysis not only enriches the coded findings through visual comparisons, but also provides a basis for validation of the coded results, allowing the concepts generated by the rooted theory to have greater visibility and explanatory power.

3.5.3 Theoretical saturation validation

Theory saturation is an important concept in rooted theory research, which refers to the fact that coding is saturated when no more new concepts or themes

emerge during the coding process, indicating that the data have been able to fully cover the research phenomenon [Charmaz, 2006]. In this study, theoretical saturation was validated through the following steps:

In the later stages of coding, the generated concepts were iteratively compared with the new data to ensure that no new concepts or themes emerged. For example, by coding the follow-up interview data, it was observed whether architectural features or construction behaviors that had not been mentioned emerged. If the coding results tended to be repetitive, the theory had reached saturation.

3.5.4 Multi-source cross validation

To ensure the comprehensiveness of the data, cross validation from multiple sources was used, i.e., the coded themes were confirmed through cross-analysis of interview content, photographic observations, and documentary sources. For example, the representativeness of these features was further verified by comparing interview results from different villages and observing whether similar architectural features emerged.

The degree of coverage of the core categories was assessed based on the results of iterative matching and multi-source validation. The study is considered to have reached theoretical saturation if all architectural features and spontaneous construction behaviors in all samples have been coded and included in the analysis, and no new themes emerge. The validation of theoretical saturation ensures the completeness and credibility of the research model, and ensures that the results of

the study are comprehensive and reliable in explaining the architectural features and construction laws of the Dai folk houses.

Summarize

The data analysis method provides a systematic path to reveal the characteristics of the architectural style and features of Dai dwellings and the cultural and social motives behind them through multi-level coding and typological observation analysis rooted in theory. Meanwhile, the adequacy of the data analysis and the integrity of the model are ensured through theoretical saturation validation, which further enhances the scientificity and credibility of the study. This methodological design makes the study both meticulous in its in-depth analysis and comprehensive in its theoretical modeling, and is able to provide solid academic support for understanding the spontaneous construction laws of Dai architecture and its cultural core.

CHAPTER 4

DATA ANALYSIS

This research involved interviews with villagers, construction workers, and design professionals conducted through visits and research in seven typical villages in Jinghong City, Xishuangbanna Autonomous Prefecture. Semi-structured interviews were focused on core topics including the reasons for the chaotic architectural style, house construction and implementation, the distinctive features of Dai architecture, building functionality, and local perspectives on Dai culture. Following the transcription and modification of interview content, the grounded theory approach was applied to systematically organize and analyze the data. Following extensive visits and investigations, the conditions and on-site photographs of several Dai villages in the Xishuangbanna region were also recorded and collected. The research further employed the observational method to systematically review the collected data, resulting in comprehensive research findings that were correlated with the interview outcomes to create corroborative evidence. This led to the derivation of analytical insights and theoretical models.

4.1 GROUNDED THEORY CODING ANALYSIS

Grounded theory is a systematic and scientific qualitative research method, through systematic collection and analysis of data, repeated reading of the corpus, coding step by step, gradually identifying the relevant laws and complex factors of the Dai residential style and spontaneous construction, so as to construct a

theoretical framework and answer the corresponding research questions. This process is complex and long, which can help us understand the construction phenomenon and the influence of complex factors on construction, and can also provide some basis for the construction mode and cultural inheritance of Dai residential architecture later.

The research is mainly based on the triple decoding embodiment of open coding, spindle coding, and core coding of rooted theory. First, open coding analyzes the collected textual materials line by line, and extracts and summarizes the important information in the materials and encodes them as labels; basic concepts and themes are extracted on the basis of continuous comparison of heterogeneity. Next, spindle coding is based on the initial coding categories that have been established, and similar or related concepts are categorized and summarized into higher level columns so that they can be organically related to the existing material. Finally, in the core encoding stage, on the basis of secondary encoding, the core categories are summarized, further abstracted and refined, systematically connected with other categories, and continuously focused on the logical relationship between the core categories and other categories, forming a systematic and orderly theoretical model.

In this study, the content of the village dwelling interviews in Xishuangbanna was coded and analyzed with the help of MaxQDA software for rooted theory, and the results of the analysis are presented hierarchically as follows.

4.1.1 One-level open coding

To conduct a Grounded Theory research on the interviews on the residential style and features of Xishuangbanna villages, the first step is to extract concepts from the relatively complex textual content and organize the primary codes. These initial concepts reflect the intrinsic complexities of local residents' construction, behavior, participation, preferences, and attitudes toward Dai architecture, as well as the extrinsic effects of governmental control over residential construction.

Since the Xishuangbanna Dai are an ethnic minority in Yunnan, interviews with local people will exist in the use of local dialects, and language expressions are characterized by colloquialism and decentralization. By transcribing the original content sentence-by-sentence intensive listening analysis, we understand the content of the interviewees' expressions, and carefully review all the original statements to delete semantically contradictory and incoherent content, supplement sentences with incomplete semantic expressions, and writtenize some spoken expressions in the initial samples. The initial concepts were then extracted from the original statements and coded.

Meanwhile, in the semi-structured interviews, there will be open-ended questions and answers based on the interview content, so the mentioned interview content may be related to the Dai residential style or may not have coding significance. Therefore, it will be screened and summarized in the open coding session to eliminate invalid content and categorize similar content. （Figure4.1）

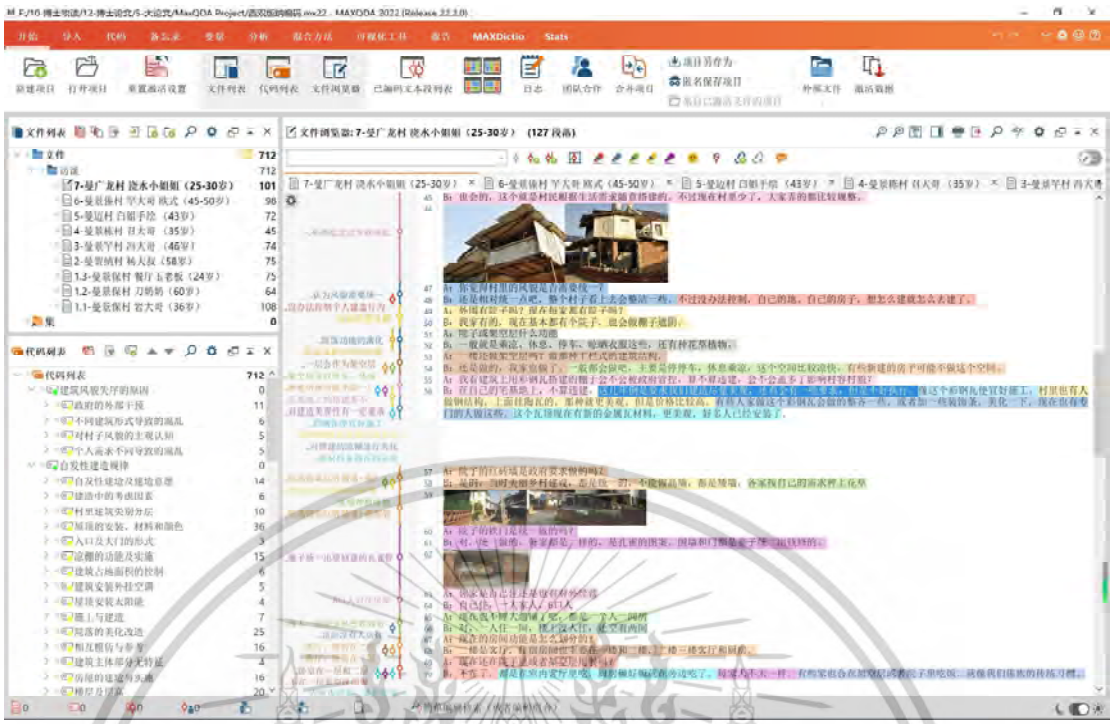


Figure 4.1 Encoding Process Diagram

In the initial coding process, in order to facilitate subsequent research and root coding traceability, sample comments were numbered and processed. The primary coding is numbered according to "category words+serial numbers". For example, regarding the chaotic style of residential buildings, the number for "Disorder" is "DR01"; Regarding the content of spontaneous construction, the "Construct" number is "CT02"; Regarding the content of residential core, the "Core" number is "CR01"; Regarding government control, the "Government" number is "GV"... and so on. According to statistics, a total of 701 encoding points were obtained after initially encoding the 27878 character Chinese interview data. Due to the limited length of the article, Table 4.1 is used to present some of the initial coding content and the original interview text. The open coding content is detailed in Table 4.1.

Table 4.1 Open coding table

serial number	Open Concept Extraction	Original interview text
DR01	Government does not intervene in the style and features is prone to chaos	A: Will the locals also be willing to do this Dai style? B: If the government doesn't require it, then the whole village will be in a mess, and they can build whatever they want. Unless the government requires, but the government does not give subsidies, everyone will do it according to their own preferences. We also want to be unified, the village will look a little tidier! A: Has the village ever thought of unifying the appearance of the village? B: There is no way to unify it, it is all according to their own wishes, unless it is a government project. Unless the government pays for it. .....
DR02	Financial support determines the effectiveness of control	Unless the government requires it, but the government doesn't give subsidies, so people just do what they like. We also want to be able to unify, the cottage will look a little more neat and tidy
DR03	Whether the style and features is chaotic or not is related to government control	A: If the government doesn't control it, will the walled village look chaotic B: That's for sure, each doing what they want to do .....
DR04	Strong building autonomy and weak government control	According to the main family's own wishes to build, the government also has control, but not good control, our village is not many tourists, so the government control is not too strict.
DR05	Weak government intervention	A: Individual preferences are different, and the government and village committees do not have specific unified requirements leading to chaotic style and features B: Yes, there are some requirements, but how to build is basically still up to their own family to decide
		.....
CT23	Indoor roof with enclosed ceiling	There used to be no suspended ceilings, but now they all have suspended ceilings and chandeliers.
CT24	Building a home with stormwater diversion and drainage in mind	A: Is there a lot of rain B: Rain hasn't been too much these past few years, but there are drainage issues to consider.
CT25	Roofing materials will be blue, gray and dark green.	A: Why did you choose blue for the roof shingles? B: Purchasing materials would be basically blue, gray mostly, and dark green
CT26	Roofs with drainage and insulation	A: Isn't it functional to make the roof pitched? B: Yes, it's convenient for drainage. There's a lot of rain here, so a pitched roof can drain quickly. A flat roof is prone to water accumulation and leakage. Moreover, the weather here in Xishuangbanna is hot, so adding a roof will make it cooler.
CT27	More uniform roof materials and colors	The roofs of our village buildings are still very uniform.

Table 4.1 Open coding table

CT28	Simplification and mutation of roofs	A: I see a few families house roof modeling are not quite like the Dai roof, just a sloping roof, Gable wall surface to do a little peacock decoration. Basically, the new buildings built in recent years seem to be this model. B: Yes, simplified, depending on their own preferences, now the construction team to do according to this model!
CT29	Poured or wood-built roofs	It also depends on the skill of the construction, whether it is poured or wood to build it.
CT30	Roof framed and tiled	It can be framed with lumber and hung with shingles.
CT31	Roof aesthetics, drainage	This top doesn't leak and drains well. And just for looks.
CT32	Cement poured roof	Some buildings also have direct poured roof slabs.
CT33	Roofing with steel structures	There are also some who will use steel
CT34	Using dismantled wood for construction	The wood is also very good, it's all old wood.A: Is the inner structure of the roof all wood? B: We use a lot of wood in our village, the old houses used to take down some of the old wood and use it directly to build the roof, and all this wood is very stable now.
	.....	
CT67	Wooden Dai Building is expensive and difficult to construct	But the cost is too high, and fewer people are making these wooden divans now.
CT68	Construction method of contracting labor and materials	A: What about the construction materials B: Generally the construction team is all-inclusive, package materials package construction.
CT69	Building construction excluding interior decoration	A: Doesn't the construction team do interior decorating? B: Yes, the renovation is done by a separate person
CT70	Building construction does not include sheds	A: What about the shelves that were built B: I got someone to do it myself in the back. Mainly the inside building
CT71	High architectural similarity	A: I see that a number of houses in the village are quite similar B: Yes, a number of them were done by one contractor. The more similar ones are made by a team. The style is similar.
CT72	You have to build a Dai roof to get past the trial.	A: not add the roof can not be seen is the Dai building B: Yes, must be covered with this Dai roof, otherwise no characteristics can not pass the audit.
CT73	The economic situation determines the effectiveness of the construction	Depends on your family's financial situation, if you have the money to do a little more beautiful, no money to just build a little, can shade on the line!
	.....	
CT170	Closed loop of supply and demand	The building materials market also has a lot of European style building materials.
CT171	The use of new materials metal tiles	This tile roof is now available in a new metal tile material that is much more aesthetically pleasing, and so many people have already installed it!
CT172	Materials for shed construction	A: What are the main materials used to build the shed B: The structures inside are built of steel frames, painted to prevent rust, and covered with metal tiles.

Table 4.1 Open coding table

CT173	Building a home takes into account the quality of materials	Other things like the quality of the material
CT174	Building materials will reuse wood removed from old houses	A: where to buy the materials B: the main material is the wood removed from the old house, the other materials are the building materials market
CT175	Influence of market building materials on architectural style	There are also so many European materials when you go shopping for them. Columns, doors, windows, handrails.
CT176	Building modes and materials	A: Is all construction now reinforced concrete? B: No, it's all reinforced concrete. It's very expensive to build with wood. If it's wood, it's very expensive in Olive Dam and Mongla.
CT177	Buying building materials locally	A: Are materials all purchased locally? Does the village have a regular supply? Or do you find them yourself B: Yes locally purchased. The materials are all found on your own
CT178	Old wood is stable, environmentally friendly, lightweight and easy to work with	A: I see that the shingle roofs of the additions are wood framed structures, why do you use wood materials to build the frames? B: It's all old wood, it's all screened, and the wood is more stable. The materials can also be recycled. And the wood structure is lighter and not too heavy on the roof. Wood is also easy to construct and erect.
CT179	The popularity of European elements and the influence of the building materials market	This European style is like a fad, right? Everyone gets it, and the building materials market has a lot of European-style building materials.
CT180	Purchase materials on your own	You can also get someone to do the work according to the design and buy all the materials yourself.
CT181	Labor cost and material supply for wood-frame dwellings	A: How much is a square foot of the old-style Dai wooden building house? B: Almost 150 a square, labor costs, materials need to provide their own. There are also packaged materials, buy their own case more. The package depends on whether the material is good or not.
CT182	Lace can be purchased directly for finished installation	But it was done by Han construction and there is a finished product that can be purchased and installed directly.
CT183	Selection of materials	Buy the materials yourself, get the Han to do the work, buy the steel, cement and bricks yourself, and the construction team to do the work, the Gasha side.
		.....
CR11	a peacock in his pride decoration on the Gable wall	Including our Dai decoration, peacock. Including peacocks or peacock open screen is also a decoration that the Dai like to use. A: Do peacocks on the Pediment count? B: Yes, peacocks are also counted, and peacocks are made on every hut face. In the past, some people didn't necessarily do this decoration, and many roofs in our village were empty or had other simple shapes. A: What are the decorative features of Dai architecture? B: The decoration on the roof hill wall, the peacock.
CR12	Dai Roof Decoration: Curly-tailed Phoenix	A: what is the curly decoration of the roof B: Dai four corners of the ridge will do the decoration, similar to a curly-tailed phoenix, Han called Zoomorphic ornaments.

Table 4.1 Open coding table

CR13	The curved corner decoration of the roof ridge	Peacock crown decoration on the roof. And the golden phoenix corners of the roof. A: I see that each roof corner is decorated with a phoenix, and there are open-screen peacocks on the roof's Gable wall surface B: Yes, the phoenix decoration, a feature of our Dai ethnic group. One will be made at the end of each roof ridge, and the roof line will look better.
CR14	Dai Characteristic House Corner Decoration: Elephant Trunk Phoenix	A: What are the red decorations on the roof of the village chief's house? B: The warped feet on the roof, which we in the Dai ethnic group call the elephant trunk phoenix.
CR15	The barbed eaves boards on the hill wall of the small roof are also characteristic of the Dai ethnic group.	Decorations like the barbs on that heavy gable, the picket fence side of the gable will be done in a circle.
CR16	The lace is a characteristic pattern of the Dai ethnic group	A: This Dai decorative lace has what to say B: Dai pattern, a traditional decoration that
CR17	Dai characteristic decoration: golden lace decorative strips	Gold colored lace trim boards. There are also Dai lace decorative strips that seal the eaves board. Including the decorative lace on the edge of the eaves, all of them are very common, and every Dai residence is basically decorated. A: What are the characteristics of the decoration? B: Dai drip lace, A: decorative? What are the decorative features of Dai architecture? B: is just said that lace; ....
CR18	Featured Decorations (Gold Sealed Cornice Boards and Peacocks on Pediment)	Peacocks on the roofs, and the sheds built will also be fitted with peacock lace. But residential houses with gold color is still less, and also a kind of avoidance, there is a kind of faith. However, there are people who install gold-colored decorations, the material factory can be bought. For example, the gold sealing eaves boards, gold peacocks on the roof surface.
CR19	Characteristic decorations (crested arches of the roof)	A: The roof has a barbed decoration at the end of each ridge, what is this? B: It is a characteristic decoration of the Dai people, like the shape of a peacock, which is more beautiful and has an auspicious meaning. A: Like this Dai roof of the foot and the treasure brake is there to pay attention to and say? B: It is the custom of the Dai people that every family and temple must have this decoration. Every family will have, must have. On the residential houses is that they will do the corners similar to the phoenix tail, all four corners of the eaves.
		.....
GV18	Certain requirements for aesthetics of construction	These days we are instead asked to build as aesthetically pleasing as possible, and there will be some requirements, but they are not well enforced.
GV19	Preserving traditional old villages and building new ones outside	A: In addition to this residential base, will the government grant land outside the village? B: Our village does not have, other villages have new villages, Manzangzai village have, the so-called new village, the government paid for the re-planning of a place.
GV20	Buildings with commercial behavior must do Dai roofs	The Dai must build a Dai Top, and if you don't, you won't be allowed to open a store for business.

Table 4.1 Open coding table

GV21	The government requires the roof to be a Dai-style pitched roof	A: Is there any requirement for the roof B: The roof has to be done in a Dai style
GV22	The government requires that no colorful steel tiles be used	A: Does the government intervene in your buildings B: There is intervention, you can't use colored steel tiles on the roof, you have to use tiles and glazed tiles.
GV23	Government control of roofs	The government does not allow asbestos tile materials to be used for roofing, so the sheds are replaced with colorful steel tiles, and the roofs are made of colorful cement tiles or ceramic tiles. In our village, the roofs have to be made like this, with Dai characteristics. There, the roof has to be a uniform glazed tile. A: What are the requirements for the roof B: The roof would have to be made like a Dai-style pitched roof.
GV24	The government has asked for relative uniformity in the new village's style renovation	A: Is it a government requirement B: Yes, it needs to be unified, and all of them have to be overhauled together. To be relatively uniform in style, do new village construction is basically this way.
GV25	Cannot use asbestos tile material, the construction should have Dai characteristics	A: Is this shed built by yourself B: Yes, this shed was built not long ago, last year it was a pitched roof with asbestos tiles, and the government requires Dai characteristics, so you can't use asbestos tiles.
		.....

Source: Organized by the author based on MaxQDA software.

4.1.2 Secondary spindle code

In the second level spindle coding stage, the code points in the open codes are grouped into broader categories or themes, the relationships between the concepts are identified, their cores and logical relationships with each other are understood, and the open codes are summarized, organized, and generalized to form certain category relationships.

For the 700 coding points in the first level code, classification and summarization are carried out, and 55 initial categories are summarized. The content covers the factors that confuse the style and features of Dai villages, the complexity of the details in spontaneous construction, including the behaviors and

responsibilities of villagers, construction teams, and design in construction, the government's control and intervention in the construction process, and people's perceptions and attitudes toward Dai culture and foreign cultures. Due to the small number of codes, the research labeled the secondary coding points in the form of "serial number + category", e.g., B01 Government's external intervention. For details of the main axis coding content, see Table 4.2.

Table 4.2 Spindle coding table

serial number	main category	conceptual
B01	External government intervention	DR01. Without government intervention the style and features is easily confused, DR02. Financial support determines the effect of control, DR03. Whether or not the style and features is confused is related to government control, DR04. Strong autonomy in building houses and weak government control, DR05. Weak government intervention
B02	Confusion caused by different building forms	DR12. thinks the village looks chaotic, DR13. thinks the village is chaotic, DR14. thinks the village looks a little chaotic, DR15. looks chaotic, DR16. thinks the village looks chaotic
B03	Subjective perception of the village style and features	DR12. thinks the village looks chaotic, DR13. thinks the village is chaotic, DR14. thinks the village looks a little chaotic, DR15. looks chaotic, DR16. thinks the village looks chaotic
B04	Confusion due to different individual needs	DR17. no way to control individual building behavior, DR18. differences in building forms lead to confusion, DR19. owner-occupied erection leads to confusion and variety, DR20. construction of new homes leads to confusion in the style and features
B05	Spontaneous construction and willingness to build	CT01. division of spatial functions is related to personal habits, CT02. willingness to build houses is related to personal preferences, CT03. high autonomy in construction, CT04. spontaneous construction without government requirements, CT05. different regions have different preferences for building appearance, CT06. building appearance depends on personal preferences, CT07. spontaneous reconstruction of commercial and residential houses, CT08. building houses according to their own wishes, CT09. Steel-concrete residential buildings are better to live in, CT10. Building is based on villagers' wishes, CT11. High autonomy in building
B06	Considerations in construction	CT12. cost, aesthetics, and functionality are considered together, CT13. building a home first considers cost, CT14. building budget is considered first, CT15. funding

Table 4.2 Spindle coding table

		affects architectural style
B07	Stratification of building categories in the village	CT16.There are second-generation Dai houses in the village, CT17.The houses are steel-concrete + brick-concrete structures, CT18.The houses in the village are basically newly built houses, CT19.The creation of tourist lodging villages, CT20.The village of Mangjingbao is dominated by steel-concrete houses, CT21.Demolition of the old and construction of the new, CT22.There are more newly built houses in the north side of the village
B08	Roof installation, materials and colors	CT23. roof interior all do ceiling, CT24. building houses considering rainwater evacuation and drainage, CT25. roofing materials will choose blue, gray and dark green, CT26. roof has the function of drainage and heat insulation, CT27. roofing materials and colors are more uniform, CT28. roofing simplification and variations, CT29. poured or wood-built roofs, CT30. roofs built with wooden frames and then hung with tiles, CT31. aesthetic and drainage features of roofs, CT32. poured roofs, CT33. roofs constructed of steel, CT34. roofs constructed of demolished wood, CT35. roofs mostly using blue or green terra cotta tiles, CT36. roofs constructed of both steel and wood, CT37. roofs with the addition of a small hermit's peak, CT38. roof shingle material and color, CT39. roof Structure and Materials, CT40.Form and Function of Upper and Lower Roofs, CT41.Functionality of Roofs, CT42.Pitched Roofs with the Addition of Flat Roofs, CT43.Historical Origins of Dai Roofs, CT44.Layers of Roofs and Their Functionality
B09	Form of entrance and gate	CT45. will install European-style aluminum doors or rolling doors, CT46. Dai-style entrance image, CT47. creation of Dai-style features for household doors
B10	Functions and implementation of the shed	CT48. steel structure hanging tiles are beautiful but costly, CT49. color steel tiles are cheap and good for construction, CT50. the roof of the building to do drying function of the balcony, CT51. to build the shed to beautify, CT52. the functionality of the shed, CT53. the side of the shed to do the water-guide sink drainage, CT54. shed is both aesthetically pleasing and functional, CT55. the shed can be heat-insulating, sunshade, rain, CT56. The roof can shade and drain water, CT57. government requirements for shed erection, CT58. open areas are covered with roofs
B11	Building footprint control	CT59. Building footprint cannot exceed 300 square feet, CT60. Building beyond the footprint cannot be issued a land license, CT61. Building footprint requirements, CT62. No building on the base is considered illegal, CT63.
B12	Building installation of external air conditioners	CT64. the heat necessitated the installation of air conditioning
B13	Roof Mounted Solar	CT65. roof-mounted solar, CT66. roof-mounted solar
B14	Construction and building	CT67.Wooden Dai buildings are expensive and difficult to construct, CT68.Building construction includes labor and materials, CT69.Building construction does not include interior decoration, CT70.Building construction does not include shed, CT71.The architectural style is similar to a high degree, CT72.Building a Dai roof in order to pass the audit, CT73.Economic situation determines the building effect

Table 4.2 Spindle coding table

B15	Beautification and renovation of courtyards	CT74.Masonry red brick wall + Dai pottery decoration, CT75.The fence will be made of low gate, CT76.Uniformly made red brick fence, peacock sculpture or Dai pottery, CT77.Peacock iron gate built by the village with unified funding, CT78.shed is built in the courtyard, CT79.Installation of gate according to your needs, CT80.Planting of flowers and grasses in the courtyard wall according to your preference, CT81.Height of the courtyard wall 60-80cm, CT82. the government clearly demarcates the area occupied by the courtyard wall, CT83. construction of the courtyard is not included in the building construction project, CT84. the whole village builds the courtyard wall in a unified way, CT85. the courtyard wall is not beautified according to the government's requirements, CT86. the courtyard wall cannot be fitted with a gate, CT87. planting greenery on the courtyard wall
B16	Mutual imitation and reference	CT88. similar architectural styles in the same period, CT89. mutual reference for independent building, CT90. other people in the village will refer to each other for building, CT91. respondents do not refer to each other for building, CT92. respondents do not refer to other dwellings for building, CT93. other villagers may be imitating each other for building, CT94. imitating each other for constructing European style buildings, CT95. Mutual imitation among village people,
B17	The main part of the building is featureless	CT96. the main part of the building is no different from modern buildings, CT97. the form of the main body of the building,
B18	Construction and implementation of housing	CT98. the house building mode of the old generation, CT99. beautification and upgrading of the built dwellings, CT100. wood is easy to be processed and installed, CT101. modern buildings are good to live in, good to be constructed, and low in cost, CT102. modern buildings do not get wet, CT103. the role of pillar and stone piers, CT104. wood-frame dwellings are built according to experience, CT105. the inside of the picket gables do storage space, CT106. can find Dai carpenters, CT107. the form of building a house refers to the old folk houses, CT108. modern building is weatherproof and easy to construct, CT109. erecting is mainly steel structure, CT110. people in the village help to build a house, CT111. the setup of staircase, CT112. the process of building a house,
B19	Building Floor & Height	CT113. The height of the building cannot be too high, CT114. Sufficient funds can build three-storey buildings, CT115. Route affects the floors cannot be too high, CT116. The height of the floors is between 3.5m-3.8, CT117. The government requires that the floors of the building be 2-3 storeys, CT118. The government requires that the floors of the building cannot be too high, CT119. The government has no requirements for the height of the floors, CT120. Only three-storey buildings can be built, CT121.Application is needed for building more than five storeys, CT122.High-rise residential buildings are good to live in and are cooler, CT123.Different storey heights are required for different locations of residential buildings, CT124.Newly built timber-framed houses have higher storey heights, CT125.The storey heights have been raised compared to that of the old residential houses, CT126.The government controls the storey heights to be no more than two storeys, CT127.The Government has enough funds to build high-rise buildings,

Table 4.2 Spindle coding table

		CT128.The Government requires that houses should be built at 2-3 storeys, CT119.The Government has no requirements for building storey heights, CT129.The Government requires that houses should be built at 2-3 storeys, CT119. Build high-rise buildings, CT128. basic floors are 2-3 floors, CT129. building heights and floors, CT130. building floors are generally within 3 floors, CT131. floor heights are generally 3.5m high,
B20	Treatment of building facades	CT132.Painting the exterior wall, CT133.The fence must be masonry as a short red brick wall, CT134.Inconsistency in the color and material of the building's exterior wall, CT135.Tiling the exterior wall or painting the exterior wall, CT136.Laying tiles on the exterior wall, CT137.Treating the building's exterior wall according to one's own preference, CT138.Treatment of the building's exterior wall, CT139.Choosing the exterior wall of the building to be tiled or painting, CT140. choosing materials and colors for exterior walls according to preferences
B21	Security considerations for installing security windows	CT141. security windows are installed on the first and second floors, CT142. installing security windows is safer, CT143. new houses are less likely to install security windows, CT144. adding security cages to windows
B22	Windows & Lighting	CT145.Solve the problem of poor lighting in the old Dai building, CT146.Windows are made of aluminum alloy, CT147.Modern windows have good lighting and are easy to install, CT148.Featured imitation wood grain window frames, CT149.Window materials, CT150.Installation of modern windows
B23	Use of stained glass	CT151. new homes start using white glass, CT152. stained glass attenuates sunlight, CT153. villagers are installing stained glass, CT154. stained glass looks good and blocks the sun, CT155. reasons for using stained glass
B24	Participation and involvement of the construction team	CT156. the construction team builds the house according to the drawings, CT157. the design is completed and the construction team is approached to build it, CT158. wooden Dai buildings must be built by Dai construction teams, CT159. steel-concrete buildings are constructed by Han construction teams, CT160. the construction team builds the house with a package of labor and materials and a package of design, CT161. the construction team designs the spatial layout, CT162. the same construction team builds in a relatively similar style, CT163. ...construction teams have design drawings to offer choices, CT164...multiple construction teams work at the same time, CT165...find construction teams based on preferences, CT166...will find construction teams in the village or outside, CT167...complex building processes are done by the construction team, CT168...duties of the construction team, CT169...construction team's leadership and participation
B25	Selection and domination of building materials	CT170. the closed loop of supply and demand, CT171. the use of new materials metal tiles, CT172. materials for shed construction, CT173. the quality of materials will be taken into account in building a house, CT174. building materials will be reused to reuse timber removed from old houses, CT175. the influence of the market for building materials on the architectural style of the building, CT176. building modes and materials, CT177. buying building materials locally, CT178. ...old wood is stable, environmentally friendly, lightweight, and easy to work with, CT179.

Table 4.2 Spindle coding table

		the popularity of European elements and the influence of the building materials market, CT180. you can also buy your own materials, CT181. the labor cost and material supply of wood-framed dwellings, CT182. lace can be installed by directly buying the finished product, CT183.
B26	Design leadership and participation	CT184. the style of building a house is mainly communicated with the designer, CT185. the designer designs according to the villagers' needs, CT186. the designer designs the architectural drawings, CT187. there are design drawings and construction drawings for a house, CT188. design and construction are one and the same, CT189. modern architecture requires design, CT190. new wooden dai buildings do not need to find a designer, CT191. . villagers lead the design of building appearance, CT192. building houses before would not look for designers, CT193. hiring a design or sketching your own house, CT194. designing your own house, CT195. design intervention
B27	construction period	CT196. building cycle is about half a year, CT197. building process requires downtime for maintenance, CT198. building cycle is about 8 months
B28	Time of construction	CT199. house built 10 years ago, CT200. house built 12 years ago, house built 12 years ago, CT201. house built 08 years ago, house built 16 years ago, CT202. house built 10 years ago, CT203. house built 5-6 years ago, CT204. house built early (20 years ago)
B29	Characteristics of Dai Architectural Decoration	CR01. symbolism of peacock, CR02. open-screen peacock and Suspended Fish decorations on the face of the Gable wall, CR03. folk dwellings cannot use Buddhist temple decorations, CR04. extensions must be Dai, CR05. folk dwellings can use different gold decorations than temples, CR06. no Dai decorations in the interior, CR07. folk dwellings will not use a lot of gold decorations, CR08. lace decorations are used for the sake of aesthetics and to Protecting the main beams, CR09. Folk houses do not use religious beasts decoration, CR10. Suspended Fish and decorative cornice boards, CR11. Open-screen peacock decoration on the Gable wall surface, CR12. Dai ridge decoration: curly-tailed phoenix, CR13. Ridge's warped corner decoration, CR14. Dai characteristic corner decoration: elephant trunk phoenix, CR15. Barbs sealing the cornice boards on the Gable wall surface of small roofs are also Dai characteristics, CR16. Lace is a characteristic Dai pattern, CR17. characteristic Dai decorations: golden lace decorative strips, CR18. characteristic decorations (golden sealing eaves boards and peacocks on the Gable wall), CR19. characteristic decorations (phoenix-tailed cocked horns on the roof ridge)
B30	Characteristics of Dai building materials	CR20. wood materials are more Dai, CR21. wood-framed houses are more Dai, CR22. timber facades are considered more Dai

Table 4.2 Spindle coding table

B31	Characteristics of Dai architectural forms	CR23. roofs are the core of Dai architectural base, CR24. residential houses must make Dai roofs, CR25. new wooden Dai buildings are considered to be very distinctive, CR26. Hip-and-Gable Roofs are an important feature of Dai, CR27. the Dai features of villages are obvious, CR28. Dai architectural features need to be preserved, CR29. constructing roofs to preserve Dai features, CR30. the preservation of Dai features and the modern construction mode of construction, CR31. will make Dai feature portal at the entrance of the building, CR32. gray roof tiles are more Dai features, CR33. the dry-fence residential features of cement construction are not obvious, CR34. dry-fence structure is also a Dai architectural feature, CR35. build a shed with Dai features, CR36. weakening of Dai features of the roofs, CR37. the appearance of the building should have Dai features, CR38. the village has Dai characteristics in order to attract tourists, CR39. the government requires buildings to have Dai characteristics, CR40. sheds also need to be made with Dai characteristics, CR41. the Double-eaved Roof of the building are Dai characteristics, CR42. the shed also needs Dai characteristics, CR43. existing lodging houses have distinctive architectural characteristics, CR44. commercial and residential lodgings will be constructed with more distinctive characteristics, CR45. the constructed Houses need to be remodeled with characteristics, CR46.Characteristic old villages can only build new wood-frame dwellings, CR47.Local people also like characteristic and unified village appearance, CR48.Outsiders like buildings with Dai characteristics, CR49.Old villages where houses have been built before are all steel mixed + Dai characteristics, CR50.Dai characteristics are distinctive and unified villages are easy to fire, CR51.Most of the dwellings are with Dai characteristics, CR52. new villages will build wood+brick mixed Banna characteristic residential houses, CR53. residential houses along the street will be built with wooden structure characteristic Dai residence for the sake of aesthetics, CR54. believe that wooden structure buildings have characteristics, CR55. respondents like wooden structure characteristic Dai residential houses, CR56. Dai roofs are the characteristics of Dai architecture, CR57. characteristics of Dai dry-rail style buildings
B32	Higher government control over tourist villages	CT01. division of spatial functions is related to personal habits, CT02. willingness to build houses is related to personal preferences, CT03. high autonomy in construction, CT04. spontaneous construction without government requirements, CT05. different regions have different preferences for the appearance of the building, CT06. the style of the building depends on personal preferences, CT07. spontaneous reconstruction of commercial and residential houses, CT08. building houses according to one's own will, CT09. steel-concrete dwellings are better to live in, CT10. building is based on villagers' will, CT11. high autonomy in building,
B33	The government exercises a considerable degree of control over tourist villages	GV04. Government intervention is the only way to harmonize the style and features
B34	Building approval requirements	GV05. contents of building approvals, GV06. drawings and approvals required for new houses, GV07. construction drawings required for building approvals in recent

Table 4.2 Spindle coding table

		years
B35	Government non-intervention component	GV08. no government requirements for building facades, GV09. little government intervention in the past, GV10. no government requirements for roofs, GV11. no government control of roof color
B36	Government financial support for construction	GV12. the government and villagers together funded the renovation of the wall, GV13. the government funded half of the renovation of the style and features, GV14. the government subsidized the guide and control of the style and features, GV15. the government has no financial compensation for the renovation of the building, GV16. the need for financial support to be able to cooperate with the renovation of the building's style and features, GV17,
B37	Relevant government requirements for construction and renovation	GV18. There are certain requirements on the aesthetics of the construction, GV19. Protect the traditional old villages and build new villages in the outside world, GV20. Buildings with commercial activities must be made of Dai roofs, GV21. The government requires that the roofs be Dai-style pitched roofs, GV22. The government requires that colorful steel tiles can not be used, GV23. The government's control over the roofs, GV24. The government requires that the new villages be transformed into a relatively uniform style, GV25. No asbestos tile material can be used, and the building should have Dai characteristics, GV26. the requirements for building floors and storey heights, GV27. the government's control over the style, GV28. the government's unified planning of courtyard walls, GV29. the government's requirement to build Dai-style structures to enhance the aesthetics,
B38	Functional evolution of the elevated floor	FU01. basically do not keep livestock, FU02. livestock are no longer kept in the residential houses, FU03. open or closed building one floor, FU04. use the building one floor as a closed indoor space, FU05. some villagers will have meals on the elevated floor and in the yard, FU06. do not have meals in the elevated area of the first floor, FU07. newly built houses may not do one floor of the elevated, FU08. the elevated floors can be used for parking and recreation , FU09. residents will not dine in yards or overhead, FU10. first floor will not be an overhead, FU11. first floor will be used as an overhead, FU12. small yard area for building overhead, FU13. large yards will not be an overhead, FU14. function of yards and overhead, and FU15. evolution of dry barred overheads,
B39	Functional relationship between commercial and residential	FU16.The building contains dining and owner-occupied functions, FU17.The Manmai Village Residence caters to both owner-occupied and commercial needs,
B40	Sources of income for villagers	FU18. villagers' source of income, FU19. occupation as rubber plantation,
B41	Corridor construction and function	FU20. corridor needs roof shading, FU21. picket corridor linking various rooms, FU22. corridor to have a Dai shade roof, FU23. extension of Dai porch,

Table 4.2 Spindle coding table

B42	Basic functional division of living room and bedroom	FU24. spatial layout is connected to each other, FU25. guest dining room is connected, FU26. room separation focuses on privacy, FU27. the top floor is not inhabited, FU28. interior functions are no different from modern living spaces, FU29. bedrooms are on the first and second floors, FU30. each person has a bedroom with better privacy, FU31. living area is on the second floor, FU32. living room is on both the first and second floors, FU33. living on the first and second floors, FU34. living room, storage and kitchen on the first floor, FU35. living on the second and third floors
B43	Double Eaves Setup and Function	FU36. the Double-eaved Roof of the building are Dai characteristics, FU37. new European-style houses do not do Dai Double-eaved Roof , FU38. Double-eaved Roof have the effect of drainage and shade,
B44	Diversified layout of dining areas	FU39. the setting of the dining area is related to the living habits of each family, FU40. dining indoors, next to the kitchen, FU41. the erected divan structure serves as the dining area, FU42. the dining room is on the second floor, and FU43. the building contains the functions of both dining and owner-occupation,
B45	Installation and function of small balconies	FU44. small balcony on the second floor is also a continuation of Dai architecture, FU45. balcony for drying clothes, planting flowers and plants and viewing, FU46. second floor balcony used for drying clothes, FU47. function of small balcony on the second floor, FU48. small balcony set on the second floor,
B46	Layout and setting of the bathroom	FU49. toilets and kitchens are built independently on the second floor balcony, FU50. nowadays the kitchen and bathrooms will also be built inside the house, FU51. kitchens and bathrooms built of reinforced concrete, FU52. 10 years ago the toilets were not built inside the main building, FU53. toilets are easy to use, FU54. toilets are constructed inside the building, FU55. toilets and kitchens are constructed outside the building for the same reason, FU56. toilets, Kitchen not built inside the main building, FU57. relative separation of restrooms from the main body of the building, FU58. toilets are cleaner and more hygienic when not indoors, FU59. new buildings now build toilets indoors, FU60. toilets were built outdoors 7 or 8 years ago, FU61. toilet additions are built next to the building,
B47	Functional evolution of the kitchen	FU62. bathroom and kitchen independently built on the second floor balcony, FU63. second floor is kitchen and dining room applies very little, FU64. bathroom, kitchen built outside the house for the reason, FU65. bathroom, kitchen is not built inside the main building, FU66. living room, kitchen on the second floor, FU67. kitchen is also inside the subject building, FU68. kitchen and bathroom built by reinforced concrete, FU69. now kitchen and bathroom will also be built inside the house, FU70. living room, storage, kitchen on the first floor, FU71. kitchen built outside to avoid fumes,
B48	Functions of the courtyard	FU72. yard replaces function of dry space, FU73. livestock kept in yard, FU74. function of yard and shed area, FU75. dining in yard, FU76. laundry in yard for easy drying, FU77. evolution of yard function, FU78. yard home site,
B49	lifestyle	FU79. Modern buildings are fully functional and meet the needs, FU80. Life pattern retains some Dai customs, FU81. Life pattern is similar to that of Han Chinese, FU82.

Table 4.2 Spindle coding table

		Integration and change of Dai life pattern, FU83. Balance between Dai aesthetics and modern life pattern
B50	Dai residential houses have a large population	FU84.6 population of owner-occupied houses, FU85. high population of residential dwellings,
B51	Building Orientation & Lighting	FU86. building orientation, FU87. with direct sunlight, FU88. to ensure sufficient light, FU89. living room light harvesting obstruction, FU90. light orientation south to north,
B52	Attitude towards architectural style	AT01. locals and outsiders want the village to be more distinctive, AT02. believe that the style needs to be unified, AT03. it is difficult to unify the style without external intervention, AT04. it is difficult to unify the style of the residential buildings, AT05. unifying the style of the village is beneficial for the development of the village, AT06. hope that the architectural style is united and the village is clean, and AT07. hope that the style is united and financial support is given,
B53	Views on new wood-frame dwellings	AT08. think wooden houses are not as good to live in as steel-hybrid houses, AT09. wood-framed dwellings are expensive to build and not convenient enough, AT10. villagers like wooden Dai buildings but will not choose to build them, AT11. no one in the village builds wood-framed houses, AT12. a few people will build new wooden Dai dwellings, AT13. the preservation and maintenance of wood-framed dwellings, AT14. wood-framed dwellings are good to live in and cooler, AT15. like wooden structures but will build steel mixed structures, AT16. make soundproof membrane inside wooden walls, AT17. difference between old and new wooden dwellings, AT18. new wooden structures are more applicable, AT19. wooden structures are ventilated and cool, AT20. newly built wooden dwellings, AT21. Jingmai Mountain will build wooden dwellings, AT22. wooden Dai buildings are rented to the outside world and for self-occupation, AT23. think that Wooden buildings look good and are not good to live in, AT24. the high cost of wooden houses, AT25. the loss of the traditional wooden house building process, AT26. wooden houses will be built in the tourist development area, AT27. the reasons for not building wooden houses,
B54	national identity	AT28. voluntary construction into Dai-style roofs, AT29. spontaneous construction will affect cultural inheritance, AT30. high religious beliefs, AT31. personal preference for modern Dai style, AT32. Han Chinese and tourists like distinctive Dai architecture, AT33. construction of Dai roofs is the self-will of the villagers, AT34. locals aesthetically prefer wood-framed Dai architecture, AT35. recognition of the identification with Dai culture,
B55	Absorption and tolerance of foreign cultures	AT36. the foreign acceptance of Dai is high, AT37. do not exclude foreign cultures, but have Dai architectural features, AT38. the tolerance of foreign architectural cultures is high, AT39. imitate each other to build European style buildings, AT40. respondents like the fusion of European and Dai styles, AT41. respondents like the fusion of European styles, AT42. newly built houses are biased towards European style and Dai style, AT43. respondents think European style is beautiful and foreign, AT44. local people like European style very much, AT45. villagers now like to build European style residential houses, AT46. think European build is beautiful and easy

Table 4.2 Spindle coding table

	to buy, AT47. think European columns are good-looking and practical, AT48. young people don't particularly like European style, AT49. older groups prefer European style fusion, AT50. will choose to build modern buildings with European and Dai confluence, AT51. think that European style is good looking and good to live in, AT52. accepts and likes European style, AT53. are all villages with European architectural style, AT54. nowadays, residential houses will be a fusion of European and Thai architectural forms,

Source: Organized by the author based on MaxQDA software.

4.1.3 Three levels of core coding

Core coding is the final coding stage in rooted theory. In the core coding stage, it is necessary to logically generalize and compare the main categories of the previous level, and to excavate and derive a core category with the characteristics of generalization and centrality, which forms interrelationships among the core categories and can correspond to the research questions and research objectives. Around the core category will be associated with a variety of concepts gradually into a concise and clear theoretical model. At the stage of three-level core coding, the correlation between the categories and the categories has been gradually revealed. Through repeated comparison and deliberation of the main categories, and combining with the formation of the research theoretical model of the features and construction laws of the Dai residential buildings in Xishuangbanna, the core categories can be extracted as "Features and Construction Laws of Dai Residential Buildings in Xishuangbanna", and the core categories of the main categories can be extracted as "Features and Construction Laws of Dai Residential Buildings in Xishuangbanna". "The 55 core categories formed by the spindle coding were

repeatedly compared and deliberated, and finally 6 core categories were refined. The six core categories are sorted according to the number of coding points, which are: the reason for the disorganization of the style and features, the spontaneous construction law, the Dai architectural "core", the government's external intervention, the use of functions and adaptability to life, attitudes and emotions, and the details of the core categories and the main categories covered by them are shown in Table 4.3.

Table 4.3 Core coding table

serial number	Core scope	main category
A01	Causes of architectural disorder	B01. External government intervention B02. Confusion due to different building forms B03. subjective perceptions of the village style and features B04. Confusion due to differing individual needs
A02	The Law of Spontaneous Construction	B05. Spontaneous construction and willingness to build B06. Considerations in construction B07. Stratification of building categories in the village B08. Roof Installation, Materials and Colors B09. Form of entrance and gates B10. Function and implementation of sheds B11. Building footprint control B12. Building installation of external air conditioners B13. Roof-mounted solar B14. Construction and building B15. Beautification and renovation of courtyards B16. Mutual imitation and reference B17. main part of the building is featureless B18. Construction and implementation of houses B19. Building Floor & Height B20. Treatment of building facades B21. Security considerations for installing security windows B22. Windows and lighting B23. Use of stained glass B24. Participation and involvement of the construction team B25. Selection and domination of building materials

Table 4.3 Core coding table

		B26. Design leadership and participation
		B27. Construction period
		B28. Time of construction
A03	The "core" of Dai architecture	B29. Characteristics of Dai Architectural Decoration
		B30. Characteristics of Dai building materials
		B31. Characteristics of Dai architectural forms
A04	External government intervention	B32. Higher government control over tourist villages
		B33. Government intervention contributes to the unity of the architectural style and features
		B34. Building approval requirements
		B35. Government non-intervention component
		B36. Government financial support for construction
		B37. Relevant government requirements for construction and renovation
A05	Functionality and adaptability to life	B38. Functional evolution of the elevated floors
		B39. Functional Relationships between Commercial and Residential
		B40. Sources of income for villagers
		B41. Corridor Construction and Functions
		B42. Basic functional division of living room and bedroom
		B43. Double Eaves Setup and Function
		B44. Diversified layout of dining areas
		B45. Installation and function of small balconies
		B46. Layout and setting of the bathroom
		B47. Functional evolution of the kitchen
		B48. Functions of the compound
		B49. Lifestyle
		B50. Dai residential houses have a large population
		B51. Building Orientation & Lighting
A06	Attitudes and feelings	B52. Attitude towards architectural style
		B53. Views on new wood-frame dwellings
		B54. National identity
		B55. Absorption and tolerance of foreign cultures

Source: Organized by the author based on MaxQDA software.

4.1.4 Saturation validation

In grounded theory research, Saturation degree verification of theories is a critical step that can help us confirm that data collection and analysis have been adequate and ensure that no new concepts or categories emerge.

The saturation test was used to ensure the completeness of the data and the

reliability of the analyzed results. Interviews with different residents and builders of seven Dai villages in Xishuangbanna region on the patterns and laws of dwelling construction were collected through semi-structured interviews and field observations as well as observations of research photos. Data were coded and analyzed using MaxQDA software, and the theoretical framework of selective coding was constructed on the basis of open coding and spindle coding. Through repeated validation and comparison of the consistency and completeness of the data, it was confirmed that the data had reached saturation and no new concepts were generated, ensuring that each main category and sub-category accurately reflected the actual situation of Dai residential construction and style and features, and that the research results were reliable.

4.1.5 Model construction

The results of the coding analysis of the Grounded Theory have resulted in the proportion of core categories among the 701 coded points (Figure 4.2). Among them, "The Law of Spontaneous Construction" has the highest number of coding points, with a total of 294 coding points, accounting for 41.9% of the total; followed by "Functionality and adaptability to life", with a total of 131 coding points, accounting for 18.6% of the total; and then "The "core" of Dai architecture" with 116 code points, accounting for 16.5%; "Attitudes and feelings" with 77 code points, accounting for 10%; and "External government intervention" with56 coding points, accounting for 7.9%; and lastly, "Causes of architectural disorder", with 27 coding points, accounting for 3.8%. Through the comparison of the number of coding points,

it can be learned that the analysis of the characteristics of the Dai residential style and features and construction rules in Xishuangbanna mainly centers on the spontaneous construction of residential houses, the function and adaptability of the building, and the base core of Dai architecture, while the rest of the parts present fewer coding points, but they are also the necessary links that affect the style and features and construction process of Dai residential houses.

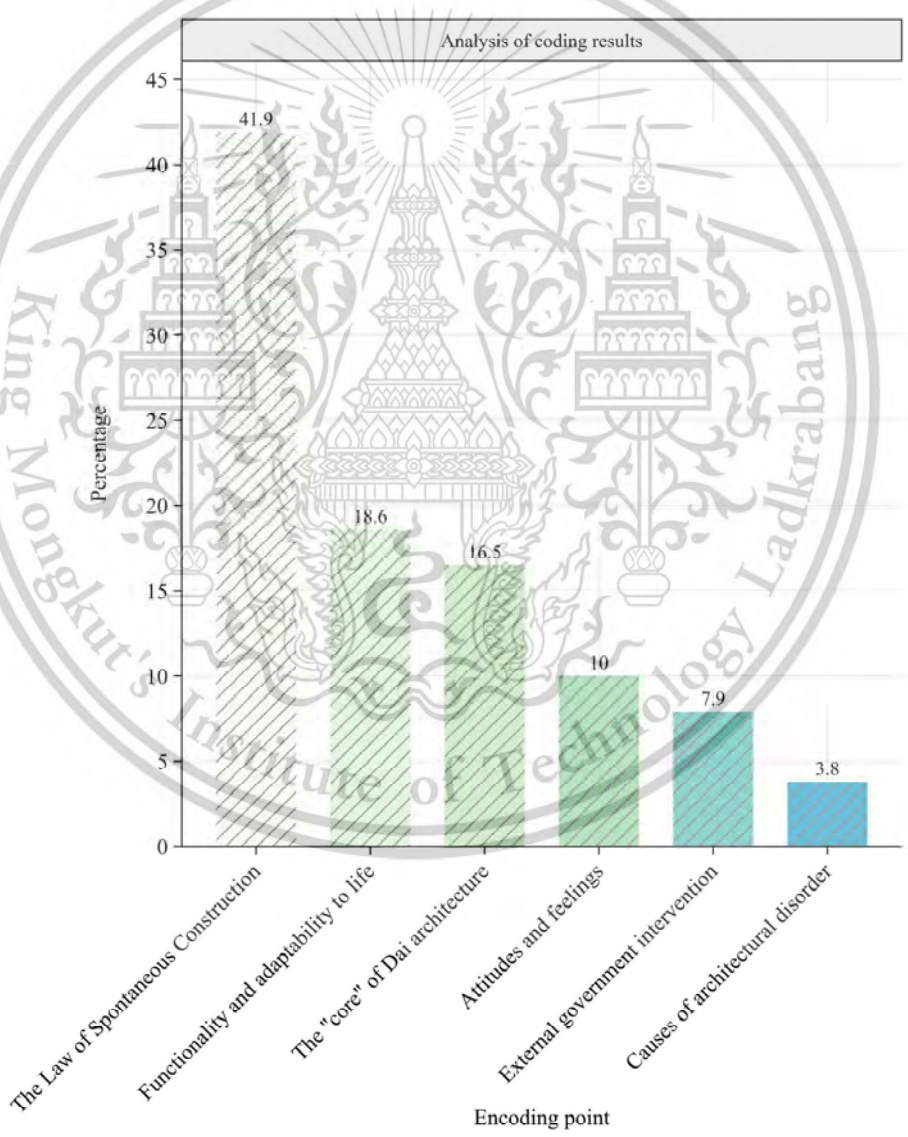


Figure 4.2 Proportion of coding points

4.1.6 Suggestions and Comments

4.1.6.1. Appearance suggestions

(a) Preservation of the architectural "core”

-The construction of the roof must follow the design of Dai gable and hip roof as the core feature of the building. In order to enhance the iconicity of the Dai architecture, the main body of the building can be appropriately added with Double-eaved Roof structure. The specific shape of the main body of the building can be decided by the residents according to their personal preferences.

-Whether it is a wooden or reinforced concrete structure of the residence, the traditional structure of dry-fence type should be retained as much as possible, especially reserving the elevated floors on the first floor of the building, so as to reflect the unique flavor of the Dai architecture.

-Exterior wall materials are recommended to moderately use wood or wood veneer to add a strong Dai flavor.

(b) Preservation of decorative cores

-When constructing Dai buildings, the Pediment of the roof with decorative sealing eaves boards is an indispensable element.

-At the end of each ridge, "Zoomorphic ornaments" should be installed, which are presented in the form of peacocks, elephant trunks, phoenixes and other forms that are rich in Dai cultural characteristics.

The eaves should be inlaid with Dai-style lace, which is not only decorative but also prevents wind and rain from eroding the building structure.

Reasons for support: Through in-depth interviews and careful observation and comparison, we have deeply revealed the nuclei of Dai architecture. These nuclei are the essence and soul of Dai architecture culture, which must be firmly preserved and inherited no matter how the architecture evolves. They are not only the cornerstone of the unique style of Dai architecture, but also the cultural bond connecting the past and the future, inheritance and innovation. Only in this way can we let the cultural light of Dai architecture continue to shine in the wave of modernization.

(c) Reducing excessive integration of foreign cultures

In order to preserve the purity of Dai architectural features, it is not recommended to excessively integrate European or overly modern design elements in the process of building houses.

Reasons for support: Unreasonable fusion of styles or spontaneous construction without professional guidance may lead to confusion in architectural forms, as well as the disappearance and differentiation of Dai architectural culture. This will weaken the uniqueness and inheritance of Dai architectural culture.

4.1.6.2. Construction rules

(a) FLOORS AND STOREY HEIGHTS

It is recommended that the building floors should not exceed three layers in order to maintain the harmony and unity with the traditional Dai architecture. At the same time, the floor height can be increased appropriately to enhance the comfort of living.

Reasons for support: Too high a floor will weaken the original characteristics of Dai architecture; from the viewpoint of the overall style and features of the village, it will also produce a kind of disharmony and instability, which will lead to the chaos and disorder of the style and features.

The appropriately increased floor height can optimize the spatial layout and enhance the living experience. It makes the space more permeability and comfortable, which is also the inevitable evolution of Dai architecture in the process of development.

(b) UNIFICATION OF MATERIALS AND COLORS

In order to make the architectural style of Dai villages relatively uniform and orderly. The architectural forms, building materials and colors are kept as consistent as possible;

Reasons for support: Through interviews and observations, we have discovered the inconsistency brought about by spontaneous construction, which can lead to the emergence of diverse architectural styles and make the villages look chaotic. Uniformity will help maintain the overall aesthetics of the village.

(c) PROMOTION OF REINFORCED CONCRETE STRUCTURES

Except for special tourist villages, reinforced concrete structures are recommended for construction. At the same time, wood finish material can be utilized as exterior wall veneer to enhance the Dai cultural characteristics.

Reasons for support: Through interviews, it is learned that reinforced concrete structure has the advantages of low cost, fast construction and easy availability of

materials. It is also more in line with the needs of modern life.

And the local people think that the wooden dwellings are more characteristic of the Dai ethnic group. So it can be appropriate to increase the wooden materials in the building, skillfully integrating the traditional and modern, so that the building has more Dai ethnic flavor.

(d) AVOIDING UNAUTHORIZED CONSTRUCTION

Villagers will spontaneously and privately build some architectural components on the basis of the original building according to their own needs of use. The government or village committee should control this behavior and intervene in the construction behavior of villagers from the perspective of wholeness and professionalism.

Reasons for support: The research found that there are many unauthorized construction behaviors in some villages. Such temporary structures may, firstly, have certain safety hazards in use; secondly, the random construction will lead to a more chaotic style and features in the village.

(e) MATCHING OF LIVING PATTERN

-The construction of houses should meet and conform to the living habits and patterns of Dai residents. The building should keep the first floor overhead or increase the functional space of the courtyard pergola;

-At the same time, a terrace should be set up on the second floor of the building to meet the needs of drying and leisure. In addition, all open activity areas should be equipped with pergolas for sun and rain.

Supporting Rationale:

-The elevated floors and courtyards are indispensable use areas for Dai life, and many of the residents' living behaviors will be carried out in this area.

-For the terrace, it is a functional area that has already existed in traditional Dai dwellings and has been extended to the present day. Due to the hot climate and strong ultraviolet rays in Xishuangbanna, local people will build pergolas in all outdoor activity areas.

(f) UNIFIED COURTYARD FORM

The courtyard wall is a uniform low red-brick masonry wall, decorated with peacocks or Dai pottery, and planted with plants for beautification;

Reasons for support: Through interviews, it was found that the government requires all residents' courtyards to be built in the pattern of low red-brick walls with Dai pottery or plant decorations. It is also a factor that reflects the style and unity of the Dai villages.

(g) IMPROVEMENT OF LIFE ADAPTABILITY

The windows are recommended to use large glass windows of broken-bridge aluminum to ensure sufficient lighting. Meanwhile, the building should be equipped with solar energy and air-conditioning facilities to meet hot water supply and cooling needs.

4.1.6.3. Intervention by external organization

(a) COMPLIANCE WITH GOVERNMENT CONTROL

Through interviews and observations, the reasonable control of the

government helps to improve the quality and unity of style of residential buildings. Therefore, in the process of building houses, under the full consideration of the government's control and constraints, the autonomy of the villagers or designers is brought into play.

Reasons for support: Through interviews and research, it is found that the reasonable control of the government can help to improve the quality and unity of the residential buildings. However, the control needs to be moderate, not only to avoid excessive intervention leading to the restriction of villagers' autonomy in building houses, but also to prevent the lack of control leading to the disorder of the style and features.

(b) PARTICIPATION OF DESIGNERS

The house building process is guided by both designers and residents. During the interviews, it was learned that many villagers will choose to hire designers to design their houses nowadays, and the residents will put forward their own needs for house building and functional needs, and this cooperation mode is more favorable for the development of the Dai ethnic minority houses. The quality of architectural style can also be improved. （Figure4.3）

Reasons for support: designers can provide professional design and planning for villagers to build houses from a professional point of view, and at the same time, they may also combine the opinions and needs of villagers, no matter in the point of view of aesthetics, safety and use are all good choices.

Figure 4.3 Suggestions and comments

4.1.6 logical explanation

Through the multi-level summarization and improvement of the code. The exploration of the architectural characteristics and spontaneous construction laws of Dai dwellings in Xishuangbanna has gradually formed a systematic framework system. By exploring the mutual laws between the core categories of code formation. Gradually form the theoretical model system.

The research mainly focuses on four major objectives to explore:

(1). the evolutionary characteristics of the Dai residential style and features in Xishuangbanna;

(2). exploring the law of spontaneous construction;

(3). deducing the reasons for the disorder of the architectural style and features;

(4). searching for the core of the Dai architecture. The four objectives construct the initial intention of the whole research theory and correspond to the six core

categories in the core code.

Among them, emotions and attitudes will determine the evolution of the core of Dai architecture. The more the local residents recognize Dai culture, the more obvious the core and characteristics of Dai architecture will be. The more local residents absorb and recognize foreign cultures, the weaker the core of Dai architecture will be, and the Dai characteristics will weaken or disappear. These complex cultural cognitive systems influence the law of spontaneous construction.

The core of Dai architecture also contains and influences the spontaneous construction law and the use function and life adaptability of architecture. The spontaneous construction law and the use function and life adaptability are the main body of the theoretical structure. The law of spontaneous construction and the function of use reflect the order and orderliness of the architectural style and features. The disorder and order of the architectural style and features can in turn be deduced from the laws of spontaneous construction as well as from the functions of use and adaptations to life.

The external intervention of the government controls and influences the spontaneous construction patterns and the use of functions and adaptations to life. External government intervention also affects the overall architectural appearance of the village.

The stronger the external intervention of the government, the weaker the spontaneous construction of the village becomes. The architectural style will then become orderly. In other words, the weaker the external intervention of the

government, the stronger the spontaneous construction of the villagers will become, and the excessive spontaneous construction will lead to the disorder of the architectural style and features.

Among them attitudes and emotions and external government intervention contain and classify as external factors. Disorder or order in the architectural style and features are internal factors. All external and internal factors are centered around the laws of spontaneous construction and the adaptability of use and life. In a word, the six core categories harmonize and interrelate with each other. A set of complex evolutionary laws about the Dai residential style and features characteristics and spontaneous construction is constructed. A relatively complete model of spontaneous construction theoretical system is formed. The construction of the theoretical model helps us to deduce the characteristics of the Dai residential style and features in Xishuangbanna and the law of spontaneous construction of buildings. According to the summarized model theoretical system. It can be targeted to put forward guidance and control strategies and solutions. Use the means of design intervention to solve the chaotic factors of residential style and features. And ensure the continuation of the inheritance and development of Dai architectural features. （Figure4.4）

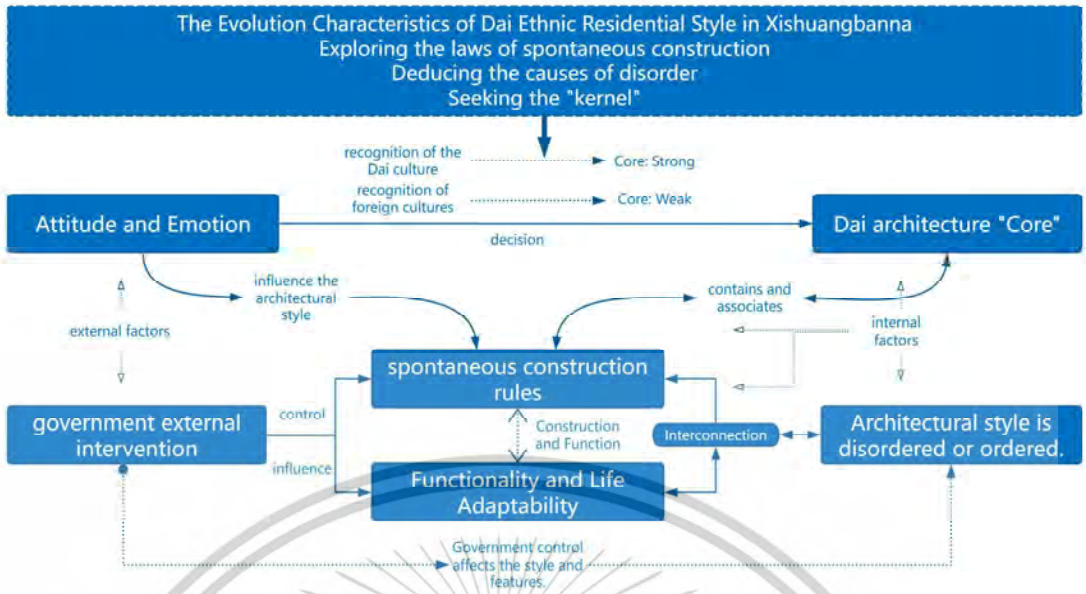


Figure 4.4 Theoretical Model Framework Diagram

4.1.7 Encoding Results

(1)THE 'CORE' OF DAI ARCHITECTURE

A. Formal features

·The traditional architecture of the Dai nationality is marked by the Hip-and-Gable Roof, double eaves and dry railing structure.

·Roof design (such as slopes and overlapping eaves) not only reflects aesthetics, but also has functions such as drainage and insulation.

B. Decorative features

·Traditional decorations such as peacocks, elephant trunks, phoenixes, and golden eaves panels reflect the symbolic significance of Dai culture.

·Decorative styles are often concentrated on roofs, Pediment, and other places, but in modern architecture, decorative functions are simplified and more practical.

C. Material characteristics

·Local villagers and designers believe that wood, as a traditional material, better reflects the characteristics of the Dai ethnic group. However, due to high construction costs and complex technology, and the fact that only Dai workers have such construction techniques. So it is gradually being replaced by the construction method of reinforced concrete.

·The supply of building materials in the market restricts the application of traditional materials, and some villagers turn to materials with higher cost-effectiveness.

(2) INTERPRETATION OF THE LAW OF SPONTANEOUS CONSTRUCTION

A. Construction intention and leadership:

·Build a house according to your own preferences. Divide the space and functions according to one's own needs.

·Meanwhile, different regions may have varying construction intentions, styles, and modes. Due to limited government intervention, villagers have strong autonomy in construction. This also leads to significant differences in architectural styles, materials, and color choices.

B. Factors considered during construction:Through interviews, it was found that villagers mainly consider the cost and budget of building houses, followed by other considerations such as aesthetics and functionality. The excessively high cost will make them make choices during the construction process, which will also affect the construction effect.

C. Installation, Materials, and Colors of Dai Roofs:

·There are generally two forms of gable roofs: one is built on a flat top, and the other is directly poured into shape.

·The majority of roof construction methods are framework based, and the internal structure of Dai roofs is constructed using wood or steel structures. After completing the basic framework construction, proceed with tile hanging or cover installation.

·In order to enrich the roof hierarchy, multiple Pediment roofs will be installed to increase the beauty and sense of hierarchy.

·The design of roofs is generally simplified for construction purposes; The main colors for the roof are blue, gray, and green ceramic tiles, and functionality (such as drainage and insulation) is also an important factor to consider.

·The functional enhancement of pergolas and balconies has gradually become an important part as shading, leisure, and drying spaces.

D. Construction process:

·The choice of building materials often relies on market supply, and the architectural style is significantly influenced by the supply of building materials (such as European elements).

·The construction team plays a crucial role in the construction process, with some teams providing design solutions, but the overall design quality varies.

E. Imitation and innovation coexist: The architectural form of villages presents a certain consistency due to mutual reference, but the absorption of foreign

cultures such as European and Thai makes the style more complex.

F. Climate adaptability:

· The Hip-and-Gable Roof has the functions of shading, insulation, and drainage, suitable for the hot and rainy climate characteristics of Xishuangbanna.

·The Dai people will build shade and canopy in all outdoor activity areas. The pergola has the function of covering and blocking rain. Easy for people to move around in outdoor areas. The construction of canopy should also have certain Dai ethnic characteristics, while meeting the needs of simple construction and cost-effectiveness. In addition to ensuring a certain slope, villagers also make water channels at the edge of the eaves of the pergola to adapt to extreme weather conditions with heavy rainfall.

·Through interviews, it was found that some Dai ethnic dwellings still retain the elevated first floor during construction. Ensure ventilation and coolness. Indoors, air conditioning systems are usually installed to cool down. The main source of hot water supply is to install solar water heaters on the balconies of buildings.

G. Space layout under modern demand

·The function of traditional elevated floors is weakened, and courtyards and balconies have become important spaces for drying, storing, and resting.

·The layout of bathrooms and kitchens is more in line with modern living needs, often transitioning from independent spaces to functional areas within buildings.

H. Residential needs

·The functions of lighting, ventilation, and insulation have become the focus of

design, and practical renovations such as adding drainage functions to roofs and reducing moisture on walls are widely used.

·The application of colored glass and sound insulation materials has improved living comfort.

I. Changes in lifestyle

·The integration of traditional Dai lifestyle habits with modern living patterns presents a simplification of traditional forms and an improvement in functionality.

(3)Reasons for disorderly architectural style

A.Insufficient external government intervention

·Although the government has proposed the goal of unified appearance, the implementation process lacks specific measures and supervision.

·Insufficient financial support has led to villagers being more inclined to independently choose economic solutions during the construction process, neglecting the coordination of the landscape.

·The government's projects are mostly focused on tourist villages, and the efforts to improve the appearance of ordinary villages are relatively weak.

B.Individual construction needs are diverse

·Villagers prioritize the functional needs of houses over the unified appearance, such as increasing storage space, considering practical needs such as lighting and drainage.

·Personalized decoration and style expression (such as European or mixed styles) lead to diversity and inconsistency in architectural forms.

C.Diversity of architectural forms

·The coexistence of traditional Dai architecture and modern reinforced concrete architecture has not formed a comprehensive plan, which has damaged the overall appearance of the village.

·The phenomenon of chaotic residential style is particularly concentrated in newly built housing areas, where villagers rely entirely on personal or construction team preferences due to the lack of guiding design plans.

D.Subjective cognitive differences in village style

·Some villagers believe that a unified style will enhance the attractiveness of the village, but lack specific implementation measures.

·Some villagers also believe that spontaneous construction meets personalized needs and does not require consistent appearance.

(4) External government intervention

A. Promote the unity of appearance and style

·The promotion of Dai style building standards in tourist villages, including uniform roof styles and material selection, has had a relatively weak effect in promoting policies in ordinary villages.

·Some regions require commercial buildings to adopt Dai style roof design, but regulatory efforts are limited and enforcement effects vary.

B.Insufficient financial support

·The policy of landscape renovation relies on the economic ability of villagers,

and lacks sufficient financial subsidies or incentive measures, leading to difficulties in implementing the policy.

C.Differences in regulation

·Tourism development zones are subject to stricter building controls, while residential buildings within villages are mostly freely constructed.

·The lax review of non-traditional architectural styles has led to the widespread presence of foreign architectural elements (such as European style) in the village.

(5)Attitude and Emotion

A.Cultural identity

·Most villagers recognize the significance of Dai ethnic characteristics for the development of the village, but in actual construction, they tend to focus more on economy, practicality, and modernization.

·Although wooden structures have prominent cultural significance, they are gradually decreasing due to high costs and complex maintenance.

·Villagers have a high sense of identification with Dai culture and are willing to incorporate Dai characteristics in their design and construction.

B.Absorbing foreign cultures

·Villagers have a high acceptance of European and Thai styles, and foreign architectural elements are gradually integrated into village architecture.

·There are differences in style preferences between young and old people, but overall there is a trend towards diversity.

4.2 RESEARCH ON THE FORMATION AND DEVELOPMENT OF DAI LOCAL HOUSES IN XISHUANGBANNA REGION UNDER THE PERSPECTIVE OF TYPOLOGY

During the research process, we visited 12 villages in Jinghong area of Xishuangbanna many times and recorded the wind appearance of the village buildings. In the past two years, more than 2,800 photos of the current situation of the village buildings were taken and several video clips of the current situation were recorded. "Typology holds that, whether subconsciously or unconsciously, types are not imitated but created, because architectural types are strongly characterized by their roots." (Li et al., 2024) The research will utilize the observation analysis method and the theory of typology by comparing and analyzing the site conditions of the research at that time and a large number of photographs. Elements such as dwelling forms, characteristics and construction patterns in different villages will be hierarchically summarized.

"Recording diversified dwelling types through typological methods, and refining and summarizing various types of dwelling prototypes, mining the evolutionary sequence of type features based on time clues, etc., is a classic and effective method for studying vernacular architecture of dwelling types"(Lin et al., 2023) For the dwelling architectural style in different villages with similarity, through analysis, observation, comparing and contrasting the research images, classifying and summarizing. At the same time, combined with the theoretical system and categories formed by coding, such as: architectural style characteristics, construction laws and

causes of chaos and other factors to summarize and summarize the typology, forming an analysis report. And form a mutual evidence relationship with the results of the coding of the rooted theory to improve the credibility and validity of the thesis.

The study has completed the collection and organization of data, recording observations of architectural features, building materials, architectural styles, construction and functional needs. A large number of architectural photographs were collected to ensure a variety of shooting angles and contents to fully demonstrate the architectural features. When choosing the photographs to be collected during the visits, it was ensured that the collected villages and residences were representative, covering and comparable. If there are fewer research villages, it will not be possible to form a scientific and reliable data form, resulting in a single form of data, a weak contrast of architectural forms, and the research results will lack representativeness. It should be noted that the research mainly focuses on the analysis of the current and contemporary Dai dwellings, but it will also visit some typical Dai villages with better preservation of old buildings to facilitate the analysis of the development and evolution of Dai architecture law, so in the data analysis stage, we will see a lot of analogies of the architectural forms of the traditional old buildings.

The next step is to complete the classification and organization of the data. At the end of the research, the photographs and field records have been classified according to the villages, and further hierarchically summarized according to the

architectural style, building materials, and building age. "The choice of type - meta design ", where type refers to" element ", is a method in the field of architectural design that guides people to classify and generalize the form and construction elements of the design object in the design process. It deconstructs and extracts complex forms to restore them to their original state. At the same time, people combine urban context or regionalism characteristics to interpret and change them, and design works with different forms but the same internal structure. (Gai, 2021)Number each photograph and record with a brief description, including location, time, architectural features, etc. (Figure 4.5)

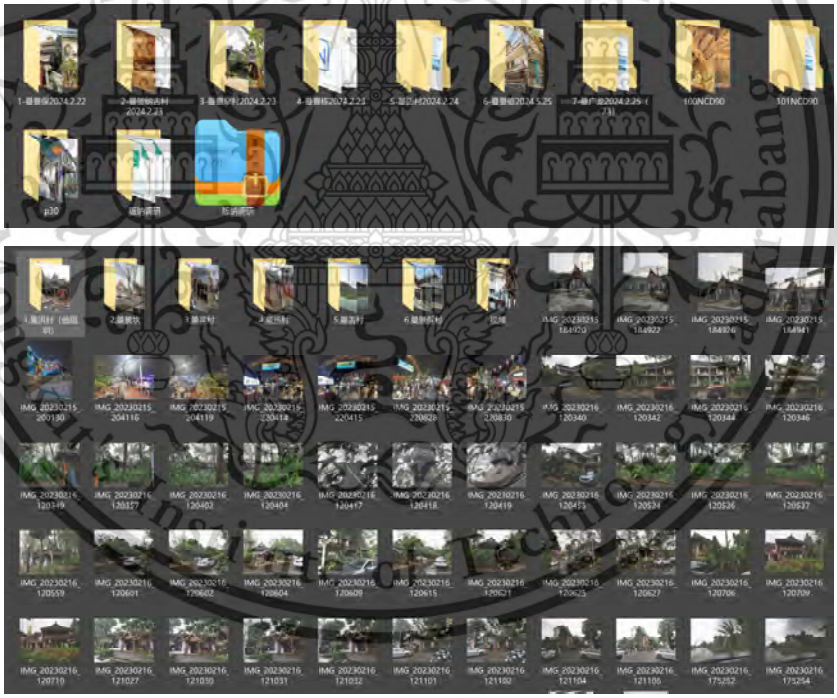


Figure 4.5 Classification and organization of collected photos

Although several researches and visits have been conducted, it is still necessary to observe and analyze the collected images in detail and analyze the architectural details in each photo one by one, such as roof form, wall structure, material, color,

decorative elements, cause of disorder, construction mode, functional adaptability and other elements. From this, we can further deduce the rules and details of spontaneous construction and find to excavate more research details.

4.2.1 Observational analysis of the "core" of Dai residential architecture

Through visiting and researching, it can be found intuitively that the local residential buildings in Xishuangbanna have high visual recognition characteristics, which is the visual symbol of "Dai" in the form of long-term development and evolution of local architectural culture. Observation and analysis method is used to observe and record the living and construction behavior, village environment, architectural style and features situation in Xishuangbanna villages to obtain in-depth qualitative data. For example, the self-built houses in the villages or the research photo data are subjectively analyzed, and relevant information is extracted from the photos to analyze the differences between different architectural styles and to extract the characteristics of the architectural style and features. The architectural features that appear in the architecture with "universality" will be defined as the "core" of Dai architecture (Chen Kang, 2022), and the process of definition and conclusion is based on a certain number of comparisons, and a small number of feature plans will not summarize the scientific and credible results. scientifically credible results. Of course this is only one of the paths to verify the research objectives and results. The observational analysis method will help to supplement and validate the results of the rooted theoretical coding through the actual building

forms and style and features features. The features will then be summarized and analogized through typological classification methods to find common and characteristic details and present them graphically.

4.2.1.1 Key Exterior Feature: Dai Hip-and-Gable Roofs

Through repeated observations and comparisons of the research and collected photos, the architectural features that are significant and in use today are extracted. The results of the comparison will be shown in the following chart. The comparison table covers the most intuitive and recognizable core features of the architecture, which can immediately convey the style and culture of the building. Dai architecture can be categorized into: the roof, the body of the building, the elevated area including the courtyard space connecting the buildings. Among them, the roof is more visually recognizable than the body of the building. Therefore, the summarized photographs of different villages were screened and compared to find the pattern and deduce the "core". In this study, 12 Dai villages were observed and researched, and some single buildings were randomly selected from the three categories of reinforced concrete buildings, newly built wooden buildings and traditional old buildings for arranging and analogizing, so as to facilitate the intuitive search for the distinctive features of Dai architecture.

(1) ROOFS OF MODERN DAI HOUSES

The study listed Manjingbao and Mangana villages,Manjingbao, Manhena Village, Manjinghan Village and other 10 villages with modern Dai architecture. The roof patterns of reinforced concrete modern Dai buildings were analyzed and

compared. It can be intuitively found that no matter how the main body of the building changes and how the height of the storey changes, the roof will be constructed as a Hip-and-Gable Roof with Dai characteristics. (Hong, & Li, 2003) Hip-and-Gable Roof is one of the types of traditional Chinese roofs. The Hip-and-Gable Roof has one principal ridge, four The vertical ridge and four Diagonal ridge, so it is called the Nine-ridge Roof (Chu, 2022). The principal ridge of the Hip-and-Gable Roof is shorter than the opening of the house, and it is typically characterized by a triangular vertical wall between the two The vertical ridge on both sides of the principal ridge, an area called the "Pediment". "Xishuangbanna Dai" Bamboo Building "resting on the top of the Pediment is also particularly concerned about different materials reflecting the effect of different tips at the same time, some of the ridge eaves in the shape of peacock in the flower parts of the wood carving decorations to the appearance of the bamboo building a lot of color, in addition, some of the tip of the parts of the gable end also exerted a variety of color styles of the wind-battling boards with decorations such as Suspended Fish." (Dan, 2011) (Figure 4.6)

The roofs are beautifully shaped and harmonized in proportion, and at the same time functional and applicable, adapting to local climatic characteristics while being aesthetically pleasing. It also reflects the strong Dai cultural heritage. It can be seen that although it has gone through a long period of evolution and development, accompanied by the spontaneous construction of the residents, the morphology of the roof has developed very maturely and formed a highly recognizable "Dai" style.

Figure 4.6 Introduction to the Form of Hip-and-Gable Roof

Form and shape: The roofs of modern Dai buildings are all single-eaved or Double-eaved roof hermetically shaped roofs (Zhang, 2014), and it can be seen through the comparison of the table that, except for Manjing Dai Village, the roofs of the other villages have a high degree of similarity and distinctive Dai-style features, which fully reflect the connotation of the Dai roofs in terms of the slope, proportion, decoration and color. The form of the roof is also very much related to the layout of the house and the occupation pattern of the building, and the plane pattern will determine the form and direction of the roof.

The ridge of the roof retains the structure of the traditional ridge, The vertical ridge and Diagonal ridge, and the Diagonal ridge is smooth and does not buckle. The form of the roof is more complicated than that of the traditional Dai dwellings, and the decoration and craftsmanship are more delicate. The number of small roofs with

Pediments is more and the visual impact is stronger, and the three-dimensional sense of small roofs is stronger. The direction of the Pediment is generally towards the front of the house, but the analysis of the pictures shows that the direction of the Pediment is somewhat random and more according to the preference of the folk houses. The roofs of stacked structures are less used. However, the roofs of the new houses in Manjing Dai Village have been oversimplified and alienated, and although it can still be seen that they belong to double-slope roofs and retain Dai decorations, the Dai characteristics are very weak and the degree of recognition is greatly reduced.

Function and Adaptability: Adapt to the local rainy climate, favorable to drainage and sunshade. The local climate in Xishuangbanna is hot and rainy. The roof can effectively block the heat, and the inclined slope also facilitates the drainage of rainwater.

Building and Construction: The construction of the roof of a reinforced concrete house is different from that of a wooden house. Reinforced concrete buildings are usually constructed after the body of the house is completed and the flat roof is poured, and then the Dai specialty roof is added. The structural skeleton of the roof is mainly built with wood or steel. The roof is then covered with tiles. This is a convenient and easy to build construction method, which is not overly expensive and is also lighter and safer and does not cause excessive loading on the roof. (Table 4.4)

Cultural significance: Representing and reflecting the connotation of Dai housing culture, after a long period of evolution and development, its roof form is still

characterized by distinctive features. This can also reflect the local people's identification with the Dai culture. It symbolizes the reverence of the Dai people for nature and their desire for a better life.

Summary: Through comparing the icons, it can be intuitively found that all the modern Dai buildings have to retain the Dai-style Hip-and-Gable Roof shape, which is also an important and visible feature in Dai architecture.

Table 4.4 Roof Analogies of Modern Dai Houses

Roof Comparison of Modern Dai Houses			
Building type		Roof Characteristics	Photo Comparison
Reinforced concrete modern building	1	Village roof forms are more uniform, with more harmonized massing and roof proportions. The number of small roofs with Pediments is high. Randomness of Pediment orientation. Roof materials and colors are relatively uniform.	 Manjingbao Village
	2	The architectural style of this village favors traditional wooden Dai architecture. The roof features are distinctive, and the style, material and color are very uniform.	 Manhena Village

Roof Comparison of Modern Dai Houses

3	The government intervenes in the architectural style. The building roofs are very uniform in form, color and material. Local people will build more small hipped roofs.	 Manjinghan Village
4	The village's architectural style is chaotic. The roof shape still retains Dai characteristics, but the form is more random, with weak unity of proportional relationship and scale.	 Manjingdong
5	The roofs of buildings in the whole village have high Dai characteristics. Newly-built houses must also have Dai-style roofs.	 Manmai Village
6	The architectural style of Manhong Village has been subjected to government intervention and is very uniform in style, with roof shapes, colors and proportional relationships.	 Man Hong Village
7	The village has seen more alienation of roof forms in recent years, with roofs still retaining their Dai characteristics but leaking more modern and European styles in their forms.	 Manjing Dai Village

Roof Comparison of Modern Dai Houses

8	The roofs of the buildings in this village have distinctive Dai characteristics and relatively uniform forms, but the colors, proportional relationships and construction forms are slightly different.	
		Man Guang Long
9	There are fewer newly built residential houses in this village with different forms. The roofs have distinctive Dai features, which are somewhat different from the main body of European or modern buildings. The face of the Gable wall opens towards the front and back of the house. The roofs have a high degree of uniformity in shape, materials and decorations.	
		Manjingkan Village

(2) ROOFS OF NEWLY BUILT WOOD-FRAMED DAI DWELLINGS

The study summarizes the architectural characteristics of the newly-built wood-frame dwellings in seven villages in Xishuangbanna by observing and comparing their architectural features and patterns.

The study summarizes the architectural features and rules of the newly built wood-structured Dai houses. It is found that the Dai characteristics of the newly-built wood-framed Dai dwellings are more intense, which can meet the functions of the modern people and at the same time have high cultural characteristics, and can

highly restore the shape of the traditional Dai architecture. The roof of the Dai ethnic group and the wooden structure of the roof body are more coordinated, and the visual effect is natural, with a high degree of unity.

Form and shape: The roof form of the newly built wood-framed houses is basically the same as the roof of reinforced concrete buildings. The roofs are equipped with a number of small Pediment roofs or principal ridge roofs. The form is flexible and changeable, and the construction will be based on the direction, architectural form, main entrance location and the residents' own needs. However, the roofs of wood-framed houses are more complex, and there are more cascading roofs. The layers of the roofs are rich, with a stronger sense of visual impact, presenting a staggered and intertwined architectural form. In the main entrance and exit area, the entrance roof image with Dai Pediments roof characteristics is built and forms a semi-connected state with the main roof or Double-eaved Roof .

Functionality and Climate Adaptability: The gable and hip roof is still climate-adaptable, which is conducive to the drainage of rainwater and the shading of sunlight. The roofs of wood-framed houses are interconnected with the overall frame structure to stabilize the structure.

Building and construction: Wooden houses must be completed by local Dai people who have experience in building, while local Han people do not have the ability to build wooden houses. The whole house and the roof have wooden structures mortise and tenon jointed and fixed with each other, forming a solid internal frame structure, hanging tiles on the outside of the wooden structures, and

adding decorations such as sealing eaves boards as well as lace. Modern wood-frame dwellings. The form, material, and craftsmanship of the roofs of new wood-frame dwellings have been improved and changed compared to traditional dwellings, and the construction process uses modern tools and supplies. The materials are also more resistant, and the building itself has been improved to be more in line with modern living patterns. (Table 4.5)

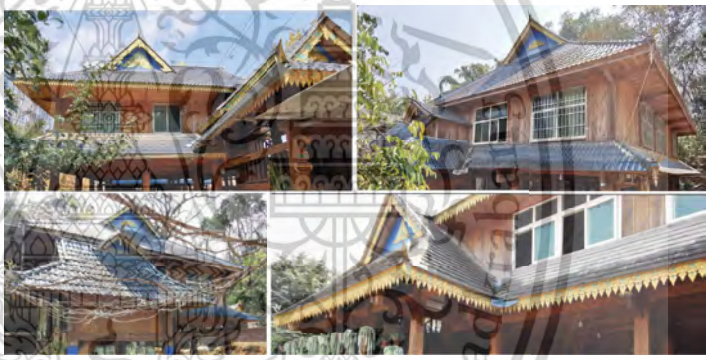
Cultural significance: the new wood-frame dwellings can highly present and reflect the essence of Dai architecture. Through interviews with local people, the cost of building wood-frame dwellings is very high. The construction difficulty and the purchase of materials are also higher than that of reinforced concrete buildings. So this is the reason why fewer and fewer people choose to build wooden houses. There are generally two kinds of cases for building wood-frame houses. One is that the government has specific requirements for the overall architectural style. The other is that the residents themselves have a special feeling for the Dai traditional architecture, and they recognize and love the culture, so they go to choose to build new wood-frame dwellings.

Summary: Through comparing the icons, it can be found intuitively that all the newly built wood-framed Dai dwellings retain the Dai-style Hip-and-Gable Roof shape, which is also an important and visible feature of Dai architecture.

Table 4.5 Comparison of Roof Forms of New Wooden Structure Dai Houses

Comparison of Roof Forms of New Wooden Dai Houses			
Building type		Roof Characteristics	Photo Comparison
Comparison of Roofs of New Wooden Dai Buildings	1	There are fewer newly built wood-frame dwellings in this village, and the roofs retain traditional features, with a stronger sense of hierarchy in the interlocking double-break structure.	 Manjingbao Village
	2	This village has more wooden buildings with distinctive features. The roof form retains the beauty of traditional Dai architecture and has been adjusted in terms of use, storey height and lighting.	 Manhena Village
	3	This village has fewer newly built wood-framed dwellings with distinctive roof features, and the roof forms and decorations show traces of spontaneous construction.	 Manjinghan Village
	4	The village has very few new timber buildings, with distinctive roof features and beautifully proportioned forms.	

Comparison of Roof Forms of New Wooden Dai Houses

		Man Guang Long
5	The architectural style of Manjungham Village has been intervened by the government, and the roof form, color, and proportionality are very uniform, regardless of the steel-concrete or wood-frame buildings.	
		Man Hong Village
6	The architectural style of Manjung Village retains the ancient flavor of traditional wooden Dai buildings. The roof form and color characteristics are obvious and can keep unity with the traditional old building style.	
		Manjang Village
7	The village's new wooden houses are distinctive, with high uniformity in roof shapes and similar forms, colors and construction patterns.	
		Mandou Village

(3) TRADITIONAL DAI OLD BUILDING ROOFS

This study summarizes the architectural characteristics and patterns of newly built wooden houses in five villages in Xishuangbanna by observing and comparing them. The main object of the study is the newly-built Dai dwellings in modern times. The first two parts of the research have already analogized and analyzed the newly built reinforced concrete Dai dwellings and the newly built wooden structure Dai dwellings, and this part mainly focuses on analyzing and comparing the architectural

features of the traditional preserved old Dai dwellings. By observing the morphology of the old dwellings, it is possible to verify whether the capture of the core in the new dwellings deduced in the previous two parts is accurate. The morphology of the old folk dwellings shows the most primitive and purest architectural form and architectural style of the Dai folk dwellings. By analyzing the old dwellings and comparing the new dwellings, we can also find out what subtle changes have occurred in the evolution and development of Dai architectural features, and what are those characteristic memories that have survived from the traditional dwellings through the change of times.

Morphology: the roof forms of traditional Dai dwellings are distinctive and recognizable, and have formed a stable "sequence" (Chang, & Luo, 2024) . "Synergistic theory, on the other hand, holds that the synergistic effect of interconnection among subsystems within the composite system will make it move from disorder to order, from low-level order to high-level order, and form an optimized evolutionary situation, which is specifically manifested in internal self-organization and external self-adaptation." (Chen & Gao, 2024) It can be observed that its roof morphology is not much different from that of the present contemporary dwellings. Influenced by the architectural structure and construction method, the roofs of traditional dwellings are mostly centered on the

principal ridge and expanded in a decentralized manner to both sides. The principal ridge of the roof spreads out to the vertical ridge and the Diagonal ridge. The number of small Pediment roofs is smaller and more streamlined than that of

modern houses. From the observation, it can be seen that the corners of the Diagonal ridge of some of the old traditional houses are slightly upturned. In contrast, the Diagonal ridges in the modern houses are smoother. The slope of the roof is gentler, the the Diagonal ridges of the bumpers is larger, and the opening is bigger.

Function and Climate Adaptability: Hip-and-Gable Roofs are still climate-adaptable, favoring rainwater drainage and sunlight shading. The roofs of wooden houses are interconnected with the overall frame structure, which has the function of stabilizing the structure.

Building and Construction: In the construction process, traditional houses are mainly built with wooden structures for the structural framework of the house roof. After construction, bamboo strips are used to hang the tiles. The tiles are traditional cotton tiles, which are slightly less practical and durable than Myanmar tiles. Since the second floor of a traditional house does not have windows, the distance between the roof and the eaves is very narrow. It is precisely this form which is the traditional Chinese roof shape with Double-eaved Roof and hermetically shaped roofs. (Table 4.6)

Cultural significance: The traditional houses represent the cultural form of traditional Dai architecture, which is a very historical heritage with historical value and inheritance value. However, these traditional buildings are unable to match the living pattern of the present people due to the long period of time, and they are also very difficult in preservation and maintenance. Therefore, this is a challenge that we have to face and one of the necessary factors why the cultural heritage of Dai architecture

should be carried out.

Summary: By comparing the charts, it can be intuitively found that the roofs of the Dai traditional houses have a high degree of visual recognition, and the Dai roofs are the more significant Dai architectural features, which can intuitively reflect the Dai cultural form. And this visual image or roof-making form has been continued from the traditional form to the present day, and is presented in the roof form of modern buildings. In terms of the historical changes of Dai architecture, the traditional roof form of Dai architecture has a high degree of recognition, and this "feature" has been continuing and evolving until now, and is used in modern Dai architecture in the form of another "variant". This can also reflect that the roof, as the most distinctive feature of Dai architecture, is not an empty claim, but rather, there are traces of it.

Table 4.6 Comparison of Roofs of Old Traditional Dai Buildings

Comparison of Roofs of Old Traditional Dai Buildings			
Building type		Roof Characteristics	Photo Comparison
Comparison of roofs of old traditional Dai buildings	1	Some of the buildings in the village are second-generation old houses. The roofs are "human"-shaped. The slope of the roof is large, with a slope of about 30°. There are only one or two principal ridges, so the four side ridges have a long span, resulting in a very open roof. All are double-layered, Double-eaved Roof roofs with a short pitch between the upper and lower roofs, resulting in poor lighting. The tiles are traditional Burmese tiles with a wooden frame inside.	 Manjingkan Village
	2	The village has preserved a large number of old Dai buildings. Roofs with multiple small roofs with Gable wall surfaces. The roofs are oriented in a staggered way. The slopes are more angular, and the tops are higher and three-dimensional. The roofs are also double-break Double-eaved Roof roofs, with the pitch of the double roofs widened appropriately in the course of evolution, and the presence of light windows can also be seen. The tiles are traditional Burmese tiles, and the interior is framed in wood.	 Manjang Village

Comparison of Roofs of Old Traditional Dai Buildings

3	The old traditional Dai buildings in this village are well preserved. The roofs have Double-eaved Roof with hermetically shaped roofs, and there are also single hermetically shaped roofs. The roof form is very traditional, with a slope of about 30-45°. There are several small roofs with Pediments on the top. The aesthetic sense is stronger. The single Hip-and-Gable Roof has an extended roof surface on both sides, which can shelter from rain and drainage and also form a space for activities under the porch. The tiles are traditional Burmese tiles with a wooden frame inside.	 Man Yuen Village
4	There are a certain number of old Dai buildings in Manthou Village. The roof form is basically Double-eaved Roof with double-break Hip-and-Gable Roofs. The angle of the roof is large. A number of small ridges are set on the roof. With the evolution of the double-break pitch, there are various forms. The tiles are traditional Burmese tiles, and the interior is made of wooden frames.	 Mandu Village
5	There are a few old traditional Dai buildings in this village. The roofs have large slopes. There are two forms of single-slope Hip-and-Gable Roofs and double-break roofs with Double-eaved Roof . Part of the main roof of the building, the two sides will make an extension of the roof, forming a space under the porch for sheltering from rain and drainage. The tiles are traditional Burmese tiles with wooden frames inside.	 Manghana Village

(4) Feasibility case study - analysis of building form with roof as a core

The study was conducted to confirm whether the distinctive features of the building could be reflected by retaining only the characteristic roof of the building during the construction process. In this regard, domestic and international case studies were conducted to prove the feasibility of this construction method. It is a common practice in modern architectural design to enlarge the characteristic architectural structure and design or graft it into the new building as a whole, while still retaining or reflecting the original characteristics of the building itself.

Case Study 1: Mahila University Auditorium

Prince Mahidol Hall is the landmark building of Mahidol University in Thailand, which combines the characteristics of traditional Thai architecture with modern construction techniques, especially in the design of the roof. Designed by Architects 49, the roof design of the hall is inspired by the traditional Thai "pitched roof" and features a massive steel skeleton with a copper roof. The design not only emphasizes the scale of the auditorium, but also symbolizes the Kanpai Mahidol, the symbolic plant of Mahidol University, and the integration of nature and architecture.

The long-span steel ribbed structure of the roof, covered with copper, is designed to reflect the sloping roof form of traditional Thai architecture, while at the same time providing a visual effect of simplicity and grandeur through the use of modern materials and techniques. In addition, the appearance of the roof and the building structure echo the surrounding natural environment and campus buildings, realizing the reproduction of regionalism architectural forms. The interior of the

auditorium, on the other hand, ensures acoustics through its double-story structure and advanced acoustic design, and is capable of hosting a wide range of performances, including concerts and operas. (Figure 4.7)

This design not only incorporates the traditional elements of Thai culture, but also, through modern architectural techniques and technology, turns the Mahidol University auditorium into an iconic modern building that is a highlight of the university campus.

It proves that if the "core" of traditional architecture is preserved in modern architecture, the characteristics of regionalism architecture can be clearly reflected.

It provides ideas for the inheritance and innovation of regionalism characteristics in modern architecture.

Figure 4.7 Mahidol University Auditorium

Case Study 2: Xishuangbanna Ethnic Museum Office Building

The office building of Xishuangbamban Prefecture Ethnic Museum is a typical case that integrates traditional Dai architectural symbols and modern architectural elements. Designed by Zou Mingsheng of the Xishuangbanna Architectural Planning and Design Institute, the project was completed in 2008. The core of the design is to

use the sloping roof as the main component symbol, emphasizing the "core" in the traditional Dai architectural style, and at the same time, combining modern materials and techniques for innovation.

First of all, the building adopts a layered sloping roof form. The frame above the main roof is presented with half-void and half-solid hollow wooden horizontal strips, and the triangular roof structure is connected with the indoor space, which serves the function of ventilation and cooling, which is borrowed from the open ventilation design of the traditional Dai bamboo buildings. In order to cope with the rainy climate of Xishuangbanna region, the designer has added a glass layer in the sloping roof to protect the building from wind and rain, and this combination of glass and hollowed-out treatment ensures the practical function and enriches the visual effect of the building's façade at the same time.

The slanting roof is decorated with hollowing and glass, forming a sparse and dense effect, which eliminates the heavy feeling of the traditional Dai architecture with its hush-hill roof. It is worth noting that the glass finish on the roof echoes the large glass curtain wall on the second floor, making the overall façade of the building more transparent.

The overall white tone of the building and the dark red tiles covering the roof create a color contrast between traditional and modern. The combination of modern glass material and traditional red tile roof not only conveys the regionalism cultural characteristics of Dai architecture, but also gives the building a modern artistic style. Through this combination of reality and material contrast, the building creates a

multi-layered light and shadow effect between the solid and void interfaces, increasing the dynamism and rhythm of the building. (Figure 4.7)

Figure 4.8 Ethnic Museum Office Building

Overall, the case proves that the Dai architecture with the slope roof as the "core" can not only maintain the cultural symbolism of traditional Dai architecture, but also integrate the modern building materials and construction technology, showing the inheritance and innovation of modern architecture to the regionalism characteristics through the flexible use of the slope roof symbol.

Case 3: Xishuangbanna International Airport

In 2012, the terminal building of Xishuangbanna International Airport designed by China Aviation Planning and Construction Development Company Limited was officially completed. The design skillfully combines traditional elements with modern materials and technologies, demonstrating the integration of Dai architectural

features with modern architectural styles in terms of modeling and cultural symbols. The whole main body of the building is inspired by the image of a peacock, presenting the image of a peacock flying with its wings spread out, symbolizing elegance and spirituality. (Xiao, 2020)

Roof modeling is the core highlight of the architectural design. The main entrance adopts a soaring and upturned triangular curved roof, which is actually a deformation treatment of the Dai traditional sloping roof. Compared with straight lines, the curve appears softer and more beautiful. The large angle of the overhanging structure imitates the image of the peacock's high head, which highlights the building's sense of strength and graceful posture. The eaves of the two wings are raised, symbolizing the full feathers of the peacock in the form of double eaves, showing the dynamic sense of the peacock spreading its wings and wanting to fly. The horizontal line between the head and the wings of the building suggests the energy stored inside the body, which complements the sense of stability and heaviness required by the building structure, making the overall image of the building both dynamic and solid. (Figure 4.9)

The design also adopts modern architectural techniques to create a space with ethnic characteristics. The combination of large glass curtain wall with simple and pure steel structure and concrete technology gives the building a strong sense of the times. The roof is made of steel mesh frame structure, the eaves are supported by overhanging steel beams, and the facade of the glass curtain wall is only divided into simple horizontal and vertical, avoiding complicated decorative elements. The

huge golden roof echoes the simple glass curtain wall, reflecting the regionalism character and expressing the fashionable sense of modern design.

The architectural form of the peacock spreading its wings complements the idea of aviation flight, symbolizing the functional character of the airport as a flight hub. This design combines the peacock's upward flight with the traditional Dai spire to create a unique architectural language. By bending and deforming the traditional large roof and double eaves, it proves that the Dai architectural form with the sloping roof as the "core" not only evokes people's emotional memories of the traditional Dai bamboo buildings, but also reflects the integration of modern architecture and Dai culture. (Figure 4.10)

The overall design not only meets the functional needs of modern architecture, but also reinterprets the regionalism characteristics of traditional Dai architecture through the skillful use of structure and materials. Eventually, the building assumes the role of the city's facade well with a simple but grand image, so that every visitor to the airport can feel the deep heritage of the Dai culture and the imposing beauty of modern architecture.

Figure 4.9 Roof of Xishuangbanna International Airport

Figure 4.10 Double-eaved Roof of Xishuangbanna International Airport

Conclusion: Through careful observation and analysis of the three actual cases, namely, Mahidol University Auditorium, Xishuangbanna Ethnic Museum Office Building and Xishuangbanna International Airport, it is not difficult to find out that the characteristic enlargement of the roof, which is the core element of the traditional Dai architecture, or its skillful fusion into the modern architectural design, is a kind of design approach that respects the tradition but also is rich in innovation. This strategy not only successfully preserves the "core" of the building - that is, the elements that best reflect the spirit and cultural qualities of Dai architecture, but also reinterprets these traditional features in the context of the new era through the modern design language, giving new life to these traditional features and realizing the "vitality" of the Dai traditional architecture. Moreover, through the reinterpretation of modern design language, these traditional features are given a new vitality in the new era, realizing the harmonious integration of "characteristics" and "modernity".

The key lies in the fact that the original architectural features must be accurately captured, which requires the designer to deeply understand the essence of Dai architecture, including its unique roof form, proportion, material use and the harmonious symbiosis with the environment. At the same time, when integrating

these features into modern architectural design, the volume and proportion of the new building need to be carefully considered to ensure that the unique charm of Dai architecture can be emphasized in the dialogue between tradition and modernity, while not appearing to be abrupt due to excessive exaggeration or disproportionate proportions.

The successful practice of this design idea not only opens up a new path for the inheritance and development of Dai architectural culture, but also provides us with an important revelation: in the process of promoting the modernization of traditional architectural culture, it is crucial to deeply excavate and accurately grasp its "core". Through this design method, we can not only preserve and promote the essence of traditional architectural culture, but also make it revitalized in the modern society, which points out the direction for the construction of Dai architecture in the future.

Therefore, it is foreseeable that in the future creation of Dai architecture, this design concept based on the preservation and enlargement of the "core" will be more widely used, and become an important bridge connecting tradition and modernity, and promoting cultural inheritance and innovation. This will not only help to enhance the cultural self-confidence of Dai architecture, but also contribute unique Dai wisdom and strength to the diversity and prosperity of global architectural culture.

4.2.1.2 Key Exterior Feature: Double-eaved Roof

Through observation and analogical analysis of modern residential houses in

12 villages in Xishuangbanna, representative architectural forms were screened in order to study their Double-eaved Roof features. (Liu, 2021) Through the analysis of a large number of pictures, we summarize the characteristics of the Double-eaved Roof of modern Dai dwellings by analogy, and summarize its three main types: short eaves, long eaves, and Pediment eaves. These three types of eaves show the evolution trajectory of Dai architecture, and at the same time reflect the dialog and integration between traditional and modern houses.

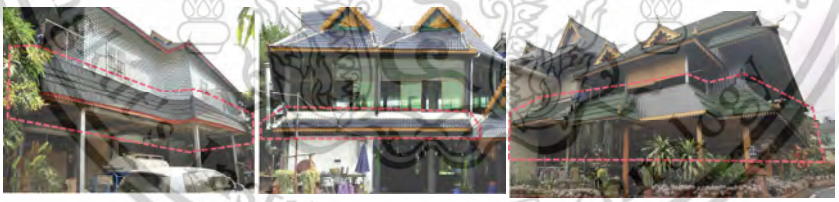
(1) SHORT EAVES TYPE DOUBLE-EAVED ROOF

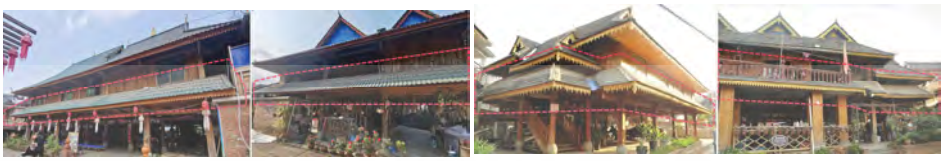
The short eaves are characterized by short eaves, and their design originates from the Double-eaved Roof of traditional Hip-and-Gable Roof buildings. In traditional Dai dwellings, the distance between the main eaves and the Double-eaved Roof is relatively close, but in the improvement of modern dwellings, this distance is increased. This adjustment is mainly to adapt to the modern architectural needs, such as increasing the light and ventilation functions, so the floor height is increased accordingly, lengthening the distance between the Double-eaved Roof . By comparing the modern-type Dai dwellings with the traditional wood-framed Dai dwellings, we find that the modern buildings are more coordinated and beautiful in form, preserving the traditional architectural style. (Table 4.7)

The design of modern wooden structure houses also continues this form of Double-eaved Roof , which makes the whole building more harmonious and shows the unique style of traditional Dai architecture. Through picture comparison and observation, it can be clearly seen that this short eaves type of Double-eaved Roof

has been well inherited and developed in both traditional and modern houses.

Table 4.7 Characteristic analysis of Double-eaved Roof of modern houses in Xishuangbanna

Double-eaved Roof of short eaves	
Modern Dai Residence	 Manjingbao Village
	 Manjingbao Village
	 Manjingbao Village
	 Manjinghan Village Manhong Village
Newly Built Wooden Dai Residence	 Manjingbao Village
	 Manjingbao Village Manjinghan Village

Double-eaved Roof of short eaves	
Traditional Old Buildings	 Manhong Village Manpang Village  Manjang Village Mangana Village  Manjingkan Village

(2) LONG EAVES TYPE DOUBLE-EAVED ROOF

The second form of Double-eaved Roof is the long eaves type Double-eaved Roof . Unlike the short eaves, the eaves of the long eaves are significantly extended and the original design of the short eaves is eliminated. This type of eave usually creates a wide porch space underneath, providing shade and drainage as well as creating a versatile activity area. Visually, these eaves create a double-gable effect.

Although long eaves are more common in modern homes, this design has actually been used in traditional architecture for a long time, especially in terms of drainage and the creation of functional spaces. By looking at both traditional and modern architecture, we can see that the persistence of this form suggests that it not

only has aesthetic value, but also a significant practical function. (Table 4.8)

Table 4.8 Double-eaved Roof of long eaves style

Double-eaved Roof of Long Eaves Type		
Modern type of building		
	Manjingbao Village	Manjinghan Village
Traditional old buildings		
		
		

(3) DOUBLE-EAVED ROOF WITH PEDIMENT STYLE

The third form of Double-eaved Roof is the Pediments-style Double-eaved Roof with complex Pediments decorations. By extracting the Pediment elements from traditional architecture and arranging them in a repetitive manner, the Pediment Double-eaved Roof form a multi-layered gallery space. This type of Double-eaved Roof structure tends to have a large volume and is usually used at the entrance of a building to enhance the visual effect and symbolism.

In modern and new wood-framed buildings, the design of the mountain-flower style Double-eaved Roof is widely used, especially in the entrance and doorway

sections. By reducing and applying the traditional Pediment elements to the Double-eaved Roof , the functionality of the Double-eaved Roof is retained and the image of the entrance is strengthened, making the building more visually appealing. In this process, the Pediments-style Double-eaved Roof are not only decorative elements, but also symbols of traditional architectural culture, which are continued and innovated in the new building form. (Table 4.9)

Table 4.9 Double-eaved Roof with Pediment Style

Double-eaved Roof with Pediment style	
New Dai Architecture	
Newly-built wood-framed Dai dwellings	

By comparing and analyzing these three forms of Double-eaved Roof of modern houses in Xishuangbanna, we can clearly see the evolution trajectory of Dai houses in form. Whether it is short eaves, long eaves, or Pediment type Double-eaved Roof , they have inherited the essence of traditional Dai architecture in different ways, and have been updated and developed in modern architecture. This form of evolution not only shows the transition and adaptation of Dai dwellings between history and modernity, but also reflects the continuation and innovation of traditional architectural elements in modern design.

4.2.1.3 Distinctive "decorative features" of Dai dwellings (decorative core)

The unique decorative totems and cultural symbols in Dai dwellings have formed a distinctive Dai decorative system. These unique decorative symbols contain the history, culture, legends, totem worship and symbols of the Dai people. The earliest Dai traditional buildings were simple bamboo and wooden fence-type buildings. However, with the continuous evolution and development of Dai architecture. The characteristics of its decoration are gradually revealed, and systematic decorative patterns and decorative symbols are formed. The formation of these decorative patterns and decorative symbols was also influenced by local and foreign cultures. Behind these cultural totems, the decorative features of many religious buildings can also be found. The architectural decoration of the Dai ethnic group has gradually evolved into representative decorative features in the course of history. These decorative patterns and decorative forms are mainly reflected in the

roofs, ridges and eaves of Dai dwellings.

(1) PEDIMENTS

The Pediment in the roof of Dai architecture is one of the most characteristic Dai decorations. The Pediment is the iconic feature of the Hip-and-Gable Roof. The Pediment in Dai architecture has a unique Southeast Asian characteristic style. By comparing the forms of Pediments in the newly built houses and the traditional old houses, we can find that the basic forms of Pediments do not change much. More changes are in the decorative details, colors and materials of the Pediments. The complexity of the Pediments decoration will also be built according to the background of the era, the preference of the house owner and the financial strength of the house.

The Pediment resembles a triangular roof perpendicular to the body of the house. Its outwardly picking structure is similar to the eaves part of the overhanging roof. The eaves will be decorated with sealing boards, which are of different shapes, mainly formed by peacocks and some decorative symbols of the local Dai ethnic group. The decorated walls are mainly carved or hand-painted. The traditional architecture of the Pediment eaves boards are mostly presented in the form of internal hooks. In modern architecture, the form is richer, with internal and external grooves. Above the eaves boards, there is a fish hanging in the air. Inside the Pediment, the wall surface is usually made symmetrical pattern in the form of peacock. The corner of the roof of the Pediment will do the Zoomorphic ornaments warping.

It can be observed through the pictures that the traditional traditional Dai dwellings of the Pediment is more ancient and practical, and its decorative nature is also relatively weak, the sealing eaves board is mainly formed by flat wooden boards, the Pediment at the simple pattern will be outlined pattern, and the rest of the details of the decorative treatment is not trivial, is the mapping of the Dai people's aesthetic sense of simplicity. (Xiao, 2020) (Table 4.10)

The modern Pediment surface process is more delicate and beautiful, in the color and shape of the top is also more bold and rich, its exotic style is more prominent. However, with the process of modernization and the influence of foreign cultures, Han-style architecture has also greatly influenced the form of Dai Pediment. Some of the newly built Dai dwellings are more oriented towards European and modernized styles, and the characteristics of their Pediments have been greatly weakened. (Table 4.11)

Table 4.10 Analysis of Traditional Dai Architecture Pediments Forms

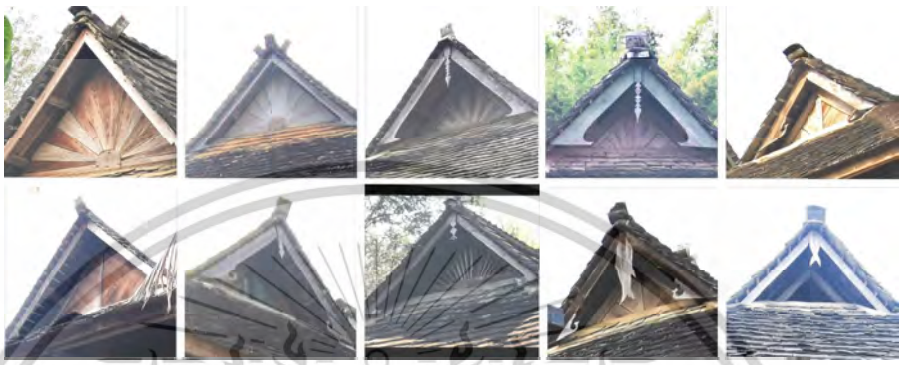
Traditional Dai Architecture Pediment Form	
Category and name	**Legends and forms**
(a) Wooden boards with spliced Pediments	 **Craftsmanship:** made of wooden boards spliced together, play a role in closing the wall of the Pediment, the gable do barbed sealing cornice boards, part of the Pediment will be done above the Suspended Fish modeling decorative; **Form:** the forms are mostly reflective sun or symmetrical diagonal patchwork; there are also skeletonized wooden strips;
(b) Openwork carved Pediment	 **Craftsmanship:** on the basis of spliced boards, carving or hollowing, forming a simple pattern, the eaves will also do barbed sealing cornice, part of the Pediment above will do Suspended Fish modeling decorations; **Forms:** Most of the forms are reflective suns or peacock shapes or peacock feathers; and other local characteristics of the pattern pattern;
(c) Hollow carved Pediment	 **Craftsmanship:** On the basis of the planks made of splicing, painted decoration, to enhance the aesthetic details at the same time, but also play a role in anti-corrosion; **Forms:** Forms are mostly decorated with suns, peacocks or other animals;

Table 4.11 Pediments forms in modern Dai dwellings

Forms of Pediments in Modern Dai Houses	
Category and name	**specificities**
a. Gorgeous gold-coloreddecorative Pediments 	1. Gorgeous decorations, the form comes from the gorgeous golden decorations in the Dai temples. 2. The Dai decorative pattern with peacock as the main theme; 3. Featuring Suspended Fish and warping corners;
 b. Eaves board External expansion type Pediment	Hillflower's capped cornice boards are installed outside the face of the hillwall. Both the interior and exterior of the gable end are covered.
 c. Wooden panels of Pediments	The form is similar to the traditional architecture of the Pediment, the plate is made of paint and preserved. Peacock decorations are made on the face of the Gable wall.
 d. White decorative Pediments	The color of the Gable wall decoration is white, which is visually clearer and simpler to look at.
 e. Simplified forms of Pediments	Installed with a simple sheet metal cut-out shape. Retain the form of Dai Pediments, looks more simple. The cost of construction is lower.

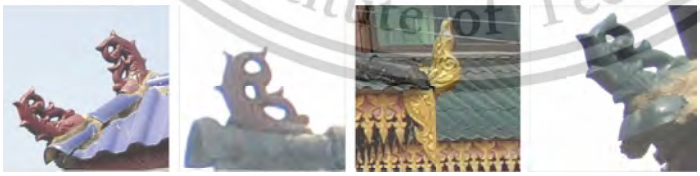
Forms of Pediments in Modern Dai Houses	
 f.Modern Minimalist Pediment	A very modern look at the Dai Pediment. The form and construction are very modern. In the simplified triangular roof, the wall do peacock or sun decoration. The disadvantage is that it is too modern and the Dai character is weak.

(2) CORNER OF THE HOUSE DECORATION: ZOOMORPHIC ORNAMENTS

A common decoration on the roofs of Dai buildings, known as the "Zoomorphic ornaments" (Liu, 2023), is shown in the Table. This kind of decoration is located at the end of the roof and usually presents the shape of a peacock or a sacred animal. The Zoomorphic ornaments not only has aesthetic value, but also symbolizes the protection of the building and its occupants from disasters and evils. It is an important element in the architectural style of the Dai, reflecting the characteristics of the national culture and the uniqueness of the architectural art. (Table 4.12)

The forms are categorized into more concise forms and relatively realistic forms. Divine animals are categorized as: peacocks, elephant trunk phoenixes (Zou & Zhang, Chun, 2015), phoenixes, elephant trunks, and unicorns.

Table 4.12 The decorative form of zoomorphic ornaments at the end of the roof ridge

Form	Forms and legends	Morphological analysis
Half body form		The "Zoomorphic ornaments" in the form of a phoenix, peacock or phoenix with an elephant's nose implies good luck and harmony; it is more common in Dai architecture, and its form is that of a bust. The use of gold and red add dignity and vibrancy to the décor. The elephant trunk and phoenix decoration, which skillfully combines the images of elephant and phoenix to imply strength and good fortune, has become the iconic element of Dai architectural art, highlighting the deep heritage of Dai culture.
Complete form		Full-length portrait forms, with both the body and tail of the Zoomorphic ornaments fully visible. The subject matter is mostly a fused form of an elephantine phoenix, peacock, or naga beast's head and bird's body; the form is more complex and complete;
Simplified form		The most common Zoomorphic ornaments decoration on the roof of the Dai people in Xishuangbanna is presented in the image of the uplifted head and curled tail of the peacock or phoenix, and the form is very simplified; the corners are curved upward and installed at the end of the roof ridge as an extension of the roof corners, which makes the visual lines more fluent. Enhanced aesthetics; also symbolizes good luck, protection and exorcism, showing the unique charm of Dai architecture.
Tail morphology		Xishuangbanna Dai architectural roof decoration for the "Zoomorphic ornaments" or "Zoomorphic ornaments", in the form of a dragon's head or animal tail: the color of gold, blue, red, green and gray. Not only beautiful, but also a symbol of evil spirits and disasters, blessing peace.

(3) DECORATION OF THE PRINCIPAL RIDGE: PAGODA OF A TEMPLE

The roof ridge of Xishuangbanna vernacular architecture is decorated in the center of the ridge in addition to the Zoomorphic ornaments at both

ends.(Figure4.10) Due to the differences in people's aesthetics and ideas, the decoration in the center of the ridge not only has various shapes and different metaphors, but also has richness in the materials used compared with other decorative parts. (Table 4.13)

Figure 4.11 Pagoda of a temple Installed in the Middle of Principal ridge

Table 4.13 Analysis of Pagoda of a temple Forms

Decorative molding		Material (that sth is made of)	An Analogy
Lotus Flower Modeling		lumber	Early Banna people believe in Hinayana Buddhism, the lotus flower in Buddhism is considered to be the symbol of the Western Pure Land, is the breeding place of the soul. Later influenced by the Han culture, the lotus flower is not only the Buddhist meaning, but also integrated into Confucianism, the lotus flower metaphor for the gentleman, the middle passes through the outside straight, giving the image of holiness. Among all flowers it is the only one that can flower, fruit (lotus root) and seed (lotus seed) coexist. The lotus flower mainly symbolizes beauty, love, longevity and holiness.
		tile	
Stupa Modeling		Metal with gold lacquer	Stupa-shaped decorations are mostly used in temple buildings, and the stupa has the supreme symbol in the hearts of Dai people. It not only represents the spread of Buddhism, but also witnesses the emergence and development of Dai culture.
Other Styles		Glass bottles with water, tiles	The Dai people have a deep water culture, so people worship water very much, and putting water into bottles symbolizes good luck and happiness, as well as praying for good weather year after year.

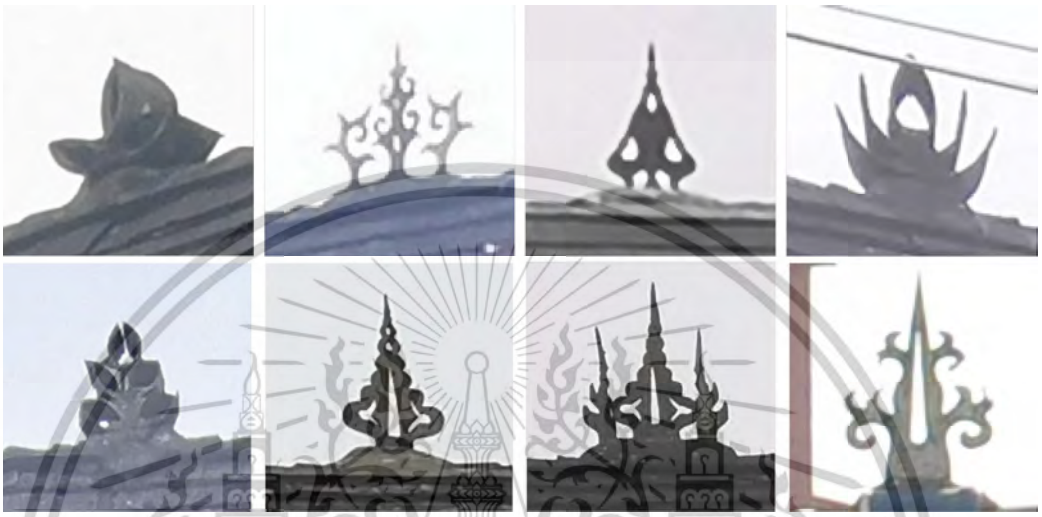
The origin of the Pagoda of a temple can be traced back to the Tang and Song dynasties, and its original function was to facilitate joint sealing of the ridge. Pagoda of a temples were originally used in temples and halls, and then gradually popularized in the folk. In folklore, the Pagoda of a temple is often regarded as the incarnation of Jiang Taigong, Jiang Taigong can seal the gods, used to do residential Pagoda of a temple, meaning that it can suppress the house. Pagoda of a temple also because higher than the ridge, has the actual role of lightning, meaning that it can bless the safety of the residence. "The Pagoda of a temple was initially based on totem worship, and later combined with the ideas of feng shui, rituals, customs, and

religion, etc. The Pagoda of a temple is not only a manifestation of the image of the building, but also a reflection of the cultural connotation and regionalism characteristics of the building in different periods." (Ting, & Yu, 2024)According to interviews with local people, Pagoda of a temple Temple was originally installed in temple buildings and gradually used in residential construction later.

There are many types of Pagoda of a temple decorations depending on the region, such as lotus, vase, pagoda, attic, phoenix tail and so on. Regardless of the type of Pagoda of a temple, it expresses some kind of symbolism or the good wishes of the owner of the house. (Table 4.14-1)

In Xishuangbanna traditional residential ridge Pagoda of a temple form is refined and evocative. The form and material of the Pagoda of a temple in modern architecture are more gorgeous and exquisite. The modeling can reflect the local worship and beliefs. Such as curled peacock or phoenix tail, pagoda, lotus shape, symmetrical side phoenix and so on.(Table 4.14-2)

Table 4.14 Forms of Pagoda of a temples on the principal ridge of a traditional old dai building and new Dai dwellings

1	**Forms of Pagoda of a temples on the principal ridge of a traditional old building** 
2	**Forms of the ridge Pagoda of a temple of the principal ridge of new Dai dwellings** 

(4) BO FENG BOARD DECORATION: LACE

Bo Feng board, also known as wind blocking board or eaves board, dry structure of the building roof overhang, Bo Feng board as a decorative wood or

cement board between the roof and eaves, in the Dai architecture is a very characteristic and functional decorative construction, often installed on the roof and under the eaves. It not only has practical functions, but also carries rich cultural symbolism. (Zhang, & Tao, 2021)

A. Functionality:

Protective function: installed under the eaves of the roof, Bofeng board plays the role of shielding from strong wind, rain and sunlight, especially in the rainy Dai area, this function is particularly important. It prevents wind and rain from entering the interior directly, thus effectively protecting the building structure.

Structural Function: It helps stabilize the eave's construction, making it more structurally sound and preventing external forces from damaging the edge of the eave.

Decorative Function: In addition to its practical function, the Bo Feng board is also an important decorative component of Dai architecture. Its delicate carvings and various patterns not only enhance the beauty of the building, but also reflect the local culture and beliefs.

B. Decorative features

The decorative style of bofeng panels is usually characterized by rich carvings, with the most common motifs including peacocks, phoenix birds, dragons, linden leaves and other elements. These carvings usually present delicate lines, emphasizing symmetry and balance, and have developed their own unique styles in different buildings.

Patterns: The peacock pattern is particularly typical, symbolizing beauty and nobility, and is also a very revered bird in Dai culture. Dragon motifs are also widely used in Bo Feng boards, symbolizing power and sanctity, reflecting the connection between the Dai and the surrounding Buddhist culture. In addition, other patterns such as flowers, animals and geometric patterns often appear in the decoration of Bo Feng boards, enriching its cultural expression.

Color: The color of traditional Bofeng boards is relatively simple, mainly wood color or painted with a single color. With the development of the times, especially in the modern Dai architecture, the color of the Bo Feng board is more diversified, usually using gold or bright colors to coordinate with the overall style of the building, so that the building looks more vivid.

C. CULTURAL SIGNIFICANCE

Bofeng boards are not only a decorative part of the building, but also carry rich cultural symbolism. Its patterns and shapes are often closely related to the religious beliefs and folklore of the Dai people.

Totem Worship: In the Dai culture, the patterns on the bofeng boards are mostly related to local totem worship, such as peacocks and dragons. These patterns are not only an expression of aesthetics, but also a kind of worship and reverence for nature and animals, and they hold people's desire for a better life.

Buddhist influence: As the Dai people are deeply influenced by Buddhist culture, many of the decorative patterns on the bofeng boards also have Buddhist symbolism. For example, the linden leaves symbolize wisdom and enlightenment,

and the phoenix bird pattern symbolizes the divine bird in Buddhist legends, representing good fortune and holiness.

Mapping of life and nature: Dai architectural decorations often reflect the concept of harmonious coexistence of man and nature. The plant and animal decorations on the bofeng boards express people's respect and love for the natural world and show the Dai people's dependence on and worship of nature.

Generally speaking, through the observation of several village buildings, the Bofeng board lace has become an indispensable decorative construction in Dai architecture with high universality. It not only has practical protective and structural functions, but also has colorful decorative features and cultural meanings. It reflects the inheritance and innovation of Dai culture, and also leaves a unique regionalism mark in architectural aesthetics. (Figure 4.12)

Figure 4.12 Lace trim for cornice boards

(5) SUSPENDED FISH DECORATION

Suspended Fish, as an important decorative element in Dai traditional architecture, is commonly found under Pediments and roof corners, which has both functional use and contains rich cultural symbolism and decorative aesthetics. The following is a compendium of the origin, function, decorative features and cultural symbolism of the Suspended Fish.

A. Sources

Suspended Fish originated from traditional Chinese architectural decoration and was gradually integrated into Dai architecture with the spread of history and culture. It first appeared in wooden buildings in the Central Plains, especially in the parts of eaves, flying buttresses and arches. The Suspended Fish is usually in the form of a fish or a decoration similar to a fish, symbolizing auspicious creatures in the water. This decoration gradually evolved into the Suspended Fish decoration unique to Dai architecture as the Dai people exchanged with other cultures. (Jie, 2022)

B. Functions

The Suspended Fish is not only a decorative object for the building, but also has some important practical functions:

Aesthetic function: Suspended Fish are usually hung below the eaves or corners of the roof, used to beautify the overall appearance of the building, enriching the visual hierarchy of the building.

Protective function: In some traditional buildings, the position of the over Suspended Fish is at the connection between the eaves and the wall, which helps to block the wind and rain under the eaves, and at the same time reduces the impact of the wind on the corners of the building, and plays a role in protecting the building structure.

Protection from Evil: The design of the Suspended Fish not only has the practical function of protection, but also contains the symbolism of protection from evil. Traditionally, the fish symbolizes good luck and prosperity, but also has the

effect of preventing the invasion of evil spirits, hanging under the eaves of the house can protect the homeowner from unlucky things.

C. DECORATIVE FEATURES

Variety of forms: The Suspended Fish decorations of the Dai ethnic group are not only limited to the shape of fish in terms of form, but can also be expressed in other patterns related to nature and religion, such as peacocks, dragons, phoenixes and so on. These decorations are shown through carving, hollowing and other techniques, with smooth and delicate lines, and have a very high sense of craftsmanship and beauty.

Materials: Traditional Dai Suspended Fish are mostly made of wood, with exquisite carving techniques, usually harmonizing with other wooden structures on the eaves and corners of the roof. With the development of modern technology, metal and other modern materials are also gradually used in the production of Suspended Fish, but its form and symbolism are still retained.

Color application: the Suspended Fish decoration is more colorful, mainly bright colors, commonly gold, yellow, or red and green. These colors symbolize good luck, wealth and prosperity in Dai culture and complement the overall style of the building. (Figure 4.13)

summarize

As an important decorative element in Dai architecture, the Suspended Fish integrates the dual influences of Chinese and Southeast Asian cultures, which not only has a protective function, but also carries rich cultural symbols and aesthetic

values. With rich forms and exquisite craftsmanship, it is not only a beautifying decoration of the buildings, but also an important symbol of Dai culture, reflecting people's good wishes for good luck, wealth and protection from evil. Through the decoration of Suspended Fish, Dai architecture shows the deep cultural heritage and unique regionalism style.

Figure 4.13 Decoration of over Suspended Fish in the corner of the roof

4.2.2 The "disorder" and "order" of the Dai architectural style

The architectural style of villages in Xishuangbanna is characterized by individual mutation, and the architectural style of different villages has certain individual characteristics. However, in the overall observation, the villages in Jinghong area of Xishuangbanna actually contain certain universality, with a large number of similarities in their architectural forms, building materials, structural features, etc., which have universal characteristics. Therefore, while observing and analyzing the disordered and ordered forms of architectural style of the villages in architectural Xishuangbanna, its law can be found.

The formation of architectural style is a complex system interfered by many factors. All of these complex factors influence and constrain the spontaneous construction system, thus forming a certain construction mechanism that creates the current status of residential houses. These complex factors include the villagers' cognition, the villagers' personalized aesthetics, and the villagers' demand for housing. They include the villagers' attitude towards culture and the influence of foreign cultures. The construction process is also influenced by new technologies, new materials, and new construction modes. This includes the intervention and involvement of the architectural team, construction team, and designers in the construction process. The construction process will also be influenced and constrained by the general background of the era, local policies, and the control behavior of the government and the village committee on the development and construction of residential houses and villages, and so on. While we analyze and view the formation of village style and features and the law of spontaneous construction, we should also objectively consider the comprehensive influence of other factors.

Of course, the definition of the degree of disorder and order mentioned in the study's concept is relative in nature; there is no absolute disorder or absolute order. The study is evaluating the degree of disorder and order in the architectural style and features. Observations are made on the principle of mutual comparison and reference. Through this contrasting observation, the reasons for the disorder of spontaneous construction between villages and villages are constantly analyzed,

while the influence of complexity factors on architectural style is considered. Thus, we will objectively characterize the disordered or ordered state of the residential style and features of the Dai villages in Xishuangbanna, and find out the reasons for the disorder caused by spontaneous construction. It will also analyze the influence of dominant objective factors on the architectural style of Xishuangbanna villages.

4.2.2.1 Disorder under spontaneous construction

In the spontaneous construction mode, villagers have higher authority to build on their own initiative, but of course there are some restrictions in the construction. In the process of self-construction, villagers will carry out construction according to their own preferences, needs and construction budget, and the final effect of their construction has a high degree of uncertainty. This is one of the reasons for the diversity of residential styles.

At the same time, in the specific construction of the limit part, the specific behavior of the villagers will often exceed this limit, such as illegal construction, private alteration, blind expansion and other phenomena often occur, these problems are usually caused by the regulatory system and regulations are not comprehensive, which often affects the organization of the spontaneous construction of the behavior of the organization can not function normally or reasonably, resulting in the village environment, order and chaos. The construction mode under the other organization mode can effectively control some irrational villagers' personal behavior, but at the same time, it also stifles the possibility of non-linear development of the building, and the villagers' creative behavior according to the external influences on

the building no longer exists.

(1) Confusion caused by spontaneous construction of different building forms

In the process of spontaneous construction, villagers and construction organizations carry out spontaneous construction according to the shape of the site, the orientation of the house, as well as the functional needs, the area of land and other factors. In the process of building houses, the height of the house, the floor, the building structure, the building form, the form of the staggered building, and so on, are all different. Of course, this is unavoidable unless there are strong external factors to constrain and intervene. (Figure 4.14)

Figure 4.14 Chaotic Building Form and style and features

(2) Confusion caused by different build materials and colors

In the construction process, villagers have absolute dominance and high spontaneity, and villagers choose the construction materials as well as the types and colors of materials according to their own preferences and needs. However, this spontaneous construction behavior will lead to the appearance of different colors, materials and forms of the residential houses in the village. These

architectural appearances account for a large proportion of the buildings, which can easily give people the first visual impact. When a large number of materials, colors, and materials of different wall, façade, and roof surfaces appear in a village, it will lead to the whole village's appearance looking very chaotic. (Figure 4.15)

Figure 4.15 Materials and colors of different facades and roofs

(3) Disorder caused by unauthorized construction

After completing the construction of the main body of the house, the residents will build or spontaneously remodel the house according to the needs of daily life, and these remodels may be compliant or non-compliant behaviors. This kind of spontaneous behavior, and the use of cheap materials and simple construction forms of construction, often lead to the whole village style and features pattern confusion. In the course of visiting with local villagers, we also learned that the village committee or the government opposes or prohibits these unauthorized construction behaviors. This includes prohibiting some villages from using cheap materials such as color steel tiles to build village structures. (Figure 4.16)

Figure 4.16 unauthorized construction

4.2.2.2 "Disorder" caused by the decline of regional characteristics

Architecture is the response of human beings to the external environment, and different forms of response in different regions characterize the regionality of architecture. Although the mode of architectural construction in Xishuangbanna villages is a spontaneous mode of decision-making, the specific mode of construction has been transformed. The specific form of the architectural system is largely influenced by foreign cultures, such as the Han architectural model and European architectural style, which have a greater impact on the modern Dai residential architecture. In the construction process, the local construction teams and craftsmen have been guided and controlled by the long-standing construction form of contracted work and materials or contracted public work and materials, and the effect of coordinated and blind obedience has led to a very similar language of response to the village buildings, and many similarities in their specific features. The mutual imitation of many villagers in the construction process also leads to the convergence of architectural forms and the lack of regionalism culture.

Although the architectural generation and evolution of Xishuangbanna villages are self-organized and spontaneous, what is missing is the ability of reasonable self-development and self-generation, the separation of the roles of housing users and builders, and the attenuation of individuality response or reasonable response, the loss of macro-regionalism of the architecture in the region.

For example, in Manjing Dai Village, the regionality of the newly-built residential houses is greatly weakened at the present stage, and the architectural form shows more of a state of modern architecture and European-style architecture. Visually, it is still possible to observe the wind pattern of the Dai roof core. However, this form has been greatly weakened, and if such a way of construction continues to develop, it will greatly attenuate the regionalism characteristics of the Dai. With the passage of time, the Dai characteristics will gradually disappear. The attenuation of the regionalism characteristics will also lead to the confusion of the whole village. Or even lose the characteristics of the Dai architecture itself. (Figure 4.17)

Figure 4.17 Weakening of regionalism

4.2.2.3 "Order" and "disorder" under the influence of objective factors

In the process of visiting and analyzing the residential villages in Xishuangbanna, through observing and analyzing the architectural status quo of a number of villages, we can summarize a very significant law: the government's intervention and guidance play a certain role in shaping the style of the villages. Especially in some tourist villages or villages participating in the construction of beautiful villages, the government requires villagers to follow specific design norms in the construction of houses through certain interventions, so as to achieve unity in architectural style, materials, colors and decorations, and to ensure that the overall image of the village is harmonious and beautiful.

First, the role of government intervention is mainly manifested in the provision of clear architectural design guidelines and management measures for villages. These

measures generally cover the overall unity of the architectural style, the tidiness of the village environment and the protection of cultural and ecological resources unique to the village. For example, the Government will formulate a series of detailed building codes covering details such as the height of houses, the angle of sloping roofs, the material and color of tiles, and the decorative patterns of external walls. These codes ensure the consistency of the overall style of village architecture and the formation of a harmonious architectural style and features, especially in the context of tourism development or ecological protection, where such mandatory requirements are particularly prominent.

In this process, villagers' architectural freedom is somewhat restricted, but this does not mean that the space for personalized design is completely lost. Under the premise of following the government's architectural requirements, villagers can still express their own aesthetic and cultural characteristics by choosing different decorative details and color combinations. For example, while maintaining a uniform sloping roof form, villagers can express the totems or auspicious objects in Dai culture by choosing eave decorations or bofeng board lace with national characteristics, which not only meets the specifications but also retains personalized expression.

Secondly, government intervention is combined with market demand. Especially in tourist villages, the unity and beauty of the architectural style is crucial to the development of the tourism industry. Uniform and tidy village architecture not only enhances the visual experience of tourists, but also helps to showcase the

local ethnic culture and ecological beauty. For example, in some villages in Xishuangbanna, the government subsidizes and guides villagers to use eco-friendly building materials and culturally distinctive decorative motifs when constructing their houses, thus shaping the village's "business card" and attracting more tourists to visit and experience the village. This not only creates a source of income for the villagers, but also protects local cultural and environmental resources. (Figure 4.18)

In addition, this intervention is equally applicable in beautiful village construction projects. The Government not only pays attention to the architectural appearance of villages, but also enhances the quality of the overall environment through village planning, public infrastructure construction and greening. This systematic planning and implementation has gradually transformed some villages from their previous dilapidated and cluttered state into neat, beautiful and culturally attractive tourist attractions. This intervention policy has not only improved the physical appearance of the villages, but has also greatly improved the living conditions of the villagers and brought about an increase in economic benefits.

To sum up, the role of government intervention in the architectural style of villages is mainly reflected in the enhancement of the overall aesthetics and coordination of villages through the standardization of architectural forms, the unification of materials and colors, and the implementation of orderly decorative norms. This intervention, especially in the construction of tourist villages and beautiful villages, plays an important role in shaping the overall image and promoting economic development. At the same time, it has, to a certain extent,

made the villagers' freedom in architectural design limited, but through diversified detailing and decorative techniques, the villagers are still able to maintain the individual expression of their culture under the traditional norms. This combination of government intervention and cultural protection has enabled the villages in Xishuangbanna to retain their unique Dai cultural characteristics while adapting to the demands of modern development. (Figure 4.19)

Summary: When the government intervention is strong, the style of village buildings usually shows a high degree of uniformity. By prescribing design elements such as building materials, colors, and roof forms, the government ensures the consistency and aesthetics of the village's overall appearance, presenting a clean and tidy visual effect. However, when government intervention is weaker, villagers' spontaneous construction is enhanced and villagers have more autonomy and creativity in house design. They build according to their personal preferences, economic conditions and living needs, resulting in more diversified village architectural styles and even great differences in styles, forms and decorations. This diversity enriches the visual image of the village to a certain extent, but the overly dispersed design direction may lead to the dissonance and confusion of the overall style and features, affecting the overall coordination and cultural heritage of the village.

Figure 4.18 Popular Tourist Villages-Mangana Village

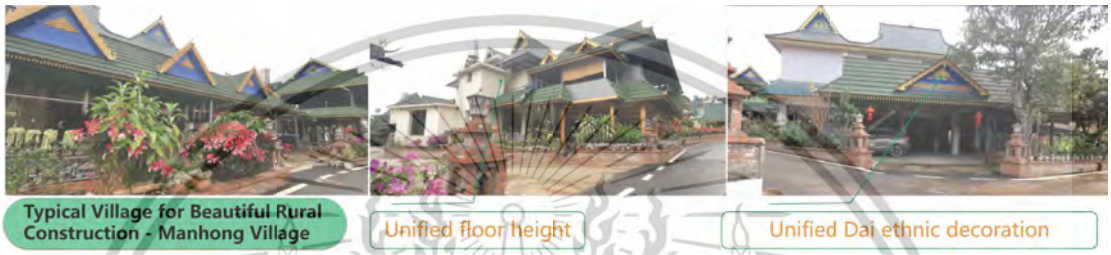


Figure 4.19 Typical Village for Beautiful Rural Construction-Manhong Village

CHAPTER 5

DISSCUSION AND CONCLUSION

This study systematically analyzed the interview data and on-site research photos through in-depth research on the characteristics of the Dai residential style and features and the spontaneous construction law in Xishuangbanna, using the rooting theory and the typology theory, which consisted of two main parts. One part is based on the method of qualitative research by coding the interview texts at three levels after interviewing the local villagers and integrating the research with the research method of rooting theory. The other part, through the research on several villages in Xishuangbanna, compares the collected photos with observation, and uses typology theory to hierarchically summarize the salient features of Dai dwellings in Xishuangbanna, and to find out the reasons for the disordered and ordered architectural style and features of the villages. The two parts are interrelated and form a mutual evidence relationship.

This chapter will discuss and summarize the content of the data analysis to form the conclusions of the study. At the same time, go over some of the problems and limitations that have arisen in the study and provide comments on future research in order to refine the shortcomings of the study and expand and extend it.

5.1 DISCUSSION

5.1.1 Architectural cultural heritage and innovation

As an important carrier of traditional culture, Dai residential houses, their

features and construction rules not only reflect the historical memory and cultural identity of the Dai people, but also provide rich inspiration and materials for modern architectural design. How to inherit the Dai architectural culture while combining modern architectural technology and aesthetic demand for innovation is an important direction for future research. Researching and finding the "core" of Dai architecture is also an effective means of passing down Dai architectural culture. It has certain reference value for cultural innovation and modern integration of Dai architecture in the future.

5.1.2 The role of the government and the participation of residents

The government plays an important role in shaping the village style and features, but excessive intervention may also inhibit villagers' creativity and individualized expression. Therefore, it is worthwhile to explore in depth how to find a balance between government guidance and villagers' participation, so as to maintain the unity and aesthetics of the village style and features while respecting villagers' autonomy and cultural diversity.

5.1.3 Influence and integration of foreign cultures

With the acceleration of globalization, the influence of foreign cultures on the style of Dai dwellings has become more and more significant. In the architectural form of Dai residents nowadays, we will see more modern or European styles presented, and the villagers' cognition is also changing. How to absorb and draw on the beneficial elements of foreign cultures while maintaining the architectural characteristics of the Dai, and realize the fusion of tradition and modernity, is an

important issue for the future development of the Dai folk dwellings.

5.1.4 Discussion of Spontaneous Construction Laws and Functional Adaptations

Through interviews and observations, we found that Dai villagers show a high degree of autonomy and innovation in the design of their architectural appearance when building their own houses, although they are limited by certain resources and technology. They are good at utilizing locally available materials and combining their own aesthetic preferences and functional needs to create an architectural style that is both in line with the local climatic environment and reflects their personal characteristics.

This pattern of spontaneous construction is reflected in a number of ways. First, villagers often follow a "practical-beautiful" balance in the design of their buildings. They not only pay attention to the functionality of the building, such as floor space, floor level, lighting, ventilation, sunshade, drainage, drying and recreation, etc., but also strive to achieve harmony and aesthetics in their appearance. Secondly, villagers are good at borrowing, innovating and imitating during the construction process. They will retain and pass on traditional building elements and techniques, but also improve and innovate according to the development of the times and personal preferences. This kind of flexible conversion between tradition and modernity makes the Dai dwellings diversified and modernized while maintaining the traditional style.

In terms of functional adaptability, Dai houses also show remarkable

advantages. As villagers have a deep understanding of the functional needs of their own houses, they are able to take into full consideration the actual needs of their families, such as living, storage, cooking, dining and restrooms, during the construction process, so as to create a living space that is both practical and comfortable. This functional adaptability is not only reflected in the internal layout of the house, but also in the design of the building's exterior, such as the slope of the roof, the size and position of the windows, etc., all of which are carefully designed in accordance with the local climatic environment and the needs of living. In terms of lifestyle, the traditional habits of the Dai ethnic group will also be retained, but the current lifestyle of Dai residents is no different from that of the Han ethnic group, and the construction of buildings will also make changes to meet these needs.

Therefore, the spontaneous construction process is a complex and diversified system, and he is influenced and constrained by multiple factors of local culture, custom, life pattern, policy, demand, climate, and safety, and only by deeply rooting in the local area can we summarize the construction rules and patterns of the Dai dwellings in Xishuangbanna.

5.1.5 Practical significance and value

Through in-depth interviews with local residents in XiShuangBanna, this study not only reveals the centrality of roofs and decorative elements in Dai architecture, but also deeply analyzes the complex interactions between villagers and the government, designers and construction teams in the process of self-built houses.

This discovery not only enhances our understanding of the spontaneous construction tradition of Dai architecture and its inner rules, but also provides a valuable empirical basis for the preservation and inheritance of Dai architectural culture.

In the typological observation study, we further identified the "core" elements of Dai architecture and its decoration, and revealed the deep-seated reasons behind the diversity and confusion of Dai architectural style and features through comparative analysis across villages. This rational observation and analogical analysis based on multiple cases not only verified the core findings of the interviews, but also pointed out the possible paths and directions for the future development of Dai architecture in Xishuangbanna.

The practical significance of the study lies in the fact that it provides specific strategies for the Xishuangbanna region and even the wider Dai settlement on how to maintain architectural characteristics and pass on ethnic culture in the process of modernization. By clarifying how new Dai buildings should incorporate traditional elements and how to harmonize the relationship between residents and the government in order to promote the benign development of spontaneous construction, this study provides important practical guidance for the sustainable development of Dai architecture.

The study will also bring certain academic value. It not only enriches the theoretical system of Dai architecture research, but also provides a referenceable research paradigm for other ethnic architecture research through the methodological innovation of empirical research. By digging deeper into the cultural connotation and

social function of Dai architecture, this study provides a new perspective for understanding the importance of architecture as a cultural carrier, and also injects new vitality into the cross-research in the fields of ethnology, architecture, and cultural heritage protection.

5.1.6 Validity of typological theories

By hierarchically summarizing the research photographs of several villages in Xishuangbanna through typological theory, it is found that the salient features of Dai dwellings have a certain universality in different villages. This universality is not only reflected in the architectural forms and decorative details, but also in the functional adaptability and cultural symbolism of the dwellings. The theory of typology provides an effective tool and method for understanding and analyzing the Dai residential style and features.

In addition, this study adopts the observation method to collect photo data and combines it with the typological method for systematic analysis, thus revealing the characteristics and laws of Dai architecture. This method is not only scientific, but also provides a powerful tool for us to distill common patterns from diverse village forms. Through the application of typological theory, we are able to understand the unique charm of Dai dwellings more deeply, and at the same time provide new perspectives and methodological support for the research in related fields.

5.1.7 Reliability of two-way verification

This study adopts diversified research methods to ensure the reliability and depth of the study. First, by analyzing the interview texts meticulously through

rooted theory, we successfully distilled the core categories and internal laws, which provided a solid theoretical foundation for understanding the Dai folk dwellings and their cultural context. This process not only enhanced the explanatory power of the study, but also ensured the depth and breadth of the analysis results.

In order to further verify the accuracy and general applicability of these preliminary findings, we adopted a two-way verification strategy. On the one hand, the observation method was utilized to directly collect on-site data, including physical photographs of residential houses, other intuitive information; on the other hand, the typology method was applied to systematically classify and comparatively analyze these observations, from which the categories and laws proposed in the previous rooted theoretical analyses were searched for and confirmed. This two-way validation process combining empirical observation and theoretical generalization not only enhances the robustness of the research conclusions, but also effectively avoids the bias or limitations that may be brought about by a single method.

In summary, through the initial construction of the rooted theory and the subsequent two-way validation based on the observation method and typology, this study has constructed an analytical framework with both depth and breadth, which strongly confirms the reliability of the study and provides a scientific and rigorous research paradigm for the study of Dai folk dwellings and even wider cultural studies.(Figure 5.1)

Figure 5.1 Core aspects of the discussion

5.2 CONCLUSION

This section will summarize and discuss the following core points: (a). the "core" characteristics of Dai architecture in Xishuangbanna;(b). a summary of the spontaneous construction laws of Dai architecture, and (c). the disorder and order of Dai architecture. It also reveals the relationship between several core points. The main conclusions are as follows:

5.2.1 Distinctive features of Dai residential style and features (core)

Through in-depth research and analysis of the Dai residential style and features in Xishuangbanna, this study comprehensively analyzes the salient features of the Dai residential style by combining the theory of rootedness and the theory of typology. It is found that the distinctive features of Dai dwellings are mainly embodied in the two aspects of architectural construction and decoration, which must be embodied in the construction of modern Dai buildings no matter how they are constructed. On the other hand, these features together constitute the unique

regionalism style and cultural connotation of Dai dwellings, and it is the existence of these features that allows people to see at a glance that these are Dai dwellings. At the same time, the retention of these features in modern Dai architecture is also an effective form of continuing the inheritance of Dai architectural culture.

5.2.1.1 Architectural Constructive Features:

The Dai dwellings show distinctive features in their architectural construction, among which the most representative constructive features are: Hip-and-Gable Roofand double eaves. With its unique shape and beautiful lines,Hip-and-Gable Roofhas become the iconic element of Dai dwellings. This roof form not only has good drainage function, but also gives the building a dynamic and light visual effect.

The double eave design is based on the gable roof, adding an additional layer of eaves to further enrich the building's sense of hierarchy and three-dimensional effect. At the same time, the double eave also has certain drainage and shading functions, preventing rainwater from flowing along the wall and protecting the wall from erosion by rainwater.

These two architectural components must be formed in all Dai architecture and have become an integral part of Dai dwellings.

(1) The characteristics of Hip-and-Gable Roof and Double eaves of the Dai nationality are refined

The characteristics of the Hip-and-Gable Roof Mountain and the double eaves of the Dai people, as well as their presentation and guidance in the construction mode of the Dai people's modern houses, are detailed.

A.Roof features

Roof form: The roof of Hip-and-Gable Roof has a unique shape, which is composed of four sloping roofs at the front, back, left and right and a triangular vertical plane perpendicular to the roof ridge, forming a roof form with four sides of slopes. This form not only looks beautiful, but also enhances the stability and climate adaptability of the building. In the hot Xishuangbanna, it can form a certain barrier to light and heat, ensuring relative coolness inside the house. The design of sloping roofs is also beneficial for roof drainage in Xishuangbanna, where there is more rainfall. Compared to flat roofs, sloping roofs can avoid water accumulation and reduce the possibility of roof leakage. In terms of functionality, it provides an additional layer of protection for the building.

Angle and slope: The roof slope of Hip-and-Gable Roof is moderate and reasonable. The reasonable roof angle also ensures good drainage effect and avoids excessive scouring of the roof by rainwater. At the same time, the design of the slope also takes into account the local climate conditions and rainfall, ensuring that the roof remains intact during long-term use.

Pediment and decoration of the roof: Pediment is also an important decorative construction of Hip-and-Gable Roof Peak. Its shape resembles a small, protruding roof with decorative walls. At the same time, Hip-and-Gable Roof Mountain has smooth lines and beautiful shapes, and often adds decorative components at the edge of the roof, such as Dai lace, Suspended fish, kissing animals, etc., to enhance the artistic effect of the building. Of course, this part can be

classified as a decorative construction of Dai architecture, but it also belongs to one of the components of the roof.

The necessity of construction: Through interviews and observations, we have concluded that the Xieshan roof of the Dai ethnic group is the most prominent and necessary architectural feature. Therefore, in the current or future construction, no matter how the main body of the building changes, it must ensure that the roof form of the building is Hip-and-Gable Roof. So as to better inherit and reflect the prominent characteristics of the Dai ethnic group.

B.Double eave feature

Hierarchical and three-dimensional effects: Double eaves enrich the layered and three-dimensional effects of the building by adding a layer of eaves on the basis of Hip-and-Gable Roof. This design not only enhances the visual effect of the building, but also improves its practicality and comfort. The double eave design also originated from the traditional Dai ethnic architecture, but its form has undergone significant changes in the evolution of the building.

Structure and Support: The construction of double eaves requires meticulous design and reasonable support structures. Usually, the lower eaves of a double eave serve as load-bearing structures, while the upper eaves serve as decorative and shading elements. At the same time, a certain space will be formed between the two eaves, providing ventilation and shading functions for the interior of the building.

Materials and Craftsmanship: The construction of double eaves requires

the use of high-quality materials and exquisite craftsmanship. Common materials include laying tiles on the foundation of wooden or steel structures. In terms of craftsmanship, Dai ethnic decorations, Pediment, or colorful paintings will also be installed to highlight the ethnic characteristics and cultural connotations of the building.

The necessity of construction: Modern double eaves can be said to be the evolved form of Dai architecture. It not only has functionality, but also greatly enhances the architectural features of the Dai ethnic group. Therefore, in the future construction of Dai ethnic dwellings, Dai style double eaves should be designed and installed on the main building subject to the budget of the villagers.

(2)How to present this feature in the construction mode of Dai modern dwellings

In the construction mode of Dai modern folk houses, the characteristics of Hip-and-Gable Roof and double eaves can be presented in the following ways:

Keep traditional elements: keep the traditional elements of Hip-and-Gable Roof and double eaves in the design, such as roof shape, angle, slope, etc., to reflect the unique style of Dai folk houses.

Innovative materials and processes: On the basis of retaining traditional characteristics, new materials and processes can be innovatively used, such as using modern building materials and construction techniques, adding glass curtain walls, steel structures, etc., to improve the durability and safety of buildings and ensure the convenience of construction.

Incorporating modern design: Properly incorporating modern elements into the design, while maintaining Dai ethnic characteristics, can also promote design innovation. Make the architectural form more innovative and full of design sense. To form an architectural style that combines tradition and modernity.

(3) Guiding Opinions and Construction Precautions

Roof form and angle: during the construction process, ensure that the roof form and angle of Hip-and-Gable Roof meet the traditional design requirements to ensure the stability and beauty of the building. At the same time, the span and dimensions of the main building during construction should also be considered. When encountering building corners or long building volumes, horizontal and vertical roofs can be staggered and spliced together to solve the problem of long roof spans and increase the visual sense of hierarchy. Also pay attention to adjusting the slope of the roof to adapt to the local climate conditions and rainfall.

Material and process selection: When selecting materials and processes, their durability and safety should be fully considered. Try to maintain a certain degree of uniformity in the selection of materials. The selection of materials may also maintain certain characteristics, such as new materials imitating wood grain or installing wooden wall panels on steel-concrete walls, which can maintain the Dai ethnic characteristics in appearance. In terms of color, guidance from the government, village committee, or designer can be followed to maintain a relatively unified architectural style. At the same time, attention should be paid to the environmental friendliness and sustainability of materials to reduce their impact on

the environment. The Hip-and-Gable Roof can be covered with a poured flat top, and the internal framework structure of the roof can be constructed using wood or square steel. Install tiles on the frame. This construction method has low cost, fast construction, easy maintenance, and will not bring excessive load to the roof. If the cost is sufficient, it can also be directly poured into shape using reinforced concrete.

Structural design and support: In structural design, it is necessary to ensure that the supporting structure of the double eave is stable and reliable. At the same time, attention should be paid to the spatial arrangement between the two eaves to ensure ventilation and shading effects inside the building. In terms of structural design, it is recommended to seek professional designers to draw construction drawings, which can facilitate construction approval and provide professional structural design to ensure safety. In terms of the overall form of the house, it is recommended to retain the Stilt Style Architecture and create an elevated level on the first floor to meet the personalized needs of Dai residents.

Construction quality control: During the construction process, it is necessary to strictly control the construction quality to ensure that the process requirements of each link are met. At the same time, it is necessary to strengthen on-site management and supervision, and promptly identify and solve problems.

5.2.1.2 Decorative features:

In terms of decoration, Dai ethnic dwellings also demonstrate rich cultural connotations and unique artistic styles. The Pediment on the roof, the decorations on the Pediment, the Zoomorphic ornamentss and Suspended fish decorations in

the corners of the house are all important components of the decorative features of Dai ethnic dwellings. These decorative elements beautify the appearance of the building. They not only intuitively reflect the characteristics of Dai architectural culture, but also reflect the pursuit of beauty by the Dai people, and contain profound cultural connotations and folk beliefs.

Decorative art of roofs

(1)Pediment and Gable wall decoration:

Function: The Xieshan roof of Dai ethnic dwellings is mainly decorated with Pediment. Pediment are not only beautiful and rich in Dai ethnic characteristics, but also can enrich the layers of roofs. In the design and construction of Dai roofs, this decorative construction must be presented.

Styling and symbolism: The sloping roof is often decorated with Dai ethnic patterns such as peacocks on the Pediment. Different forms of lace are carefully carved to form various auspicious patterns, such as lotus flowers, peacocks, elephants, etc. These patterns are not only beautiful, but also rich in symbolic meaning, such as lotus symbolizing purity and elegance, and peacock representing auspiciousness and wealth.

Installation: Pediment is installed in the direction perpendicular to the roof, which is small and exquisite. The installation quantity is also relatively arbitrary, and can be determined according to the preferences of the homeowner. Installation should handle the interfaces between roofs, ensure waterproofing and water guidance, and prevent rainwater leakage from affecting the service life of the roof.

(2) Zoomorphic ornaments and Suspended fish Decoration:

The "Zoomorphic ornaments" is an important decorative construction at both ends of the roof ridge of the Dai ethnic group. There are many ridges on Hip-and-Gable Roof, but the end of almost every ridge needs to be installed with kissing animals. The shape of the Zoomorphic ornaments can be chosen according to the homeowner's personal preference and construction budget. Zoomorphic ornamentss come in various forms, mostly auspicious beasts such as dragons and phoenixes, symbolizing guarding homes and warding off evil, praying for blessings and good fortune. There are complex realistic forms as well as simplified forms.

At the corner of the roof eaves, Dai ethnic dwellings often have Suspended fish decorations. Suspended fish are often installed through carving or prefabricated construction in one go, with diverse forms, sizes, and colors. Suspended fish not only serves a decorative purpose, but also carries the symbolism of exorcism and auspiciousness, while also serving as a closure under the eaves. Suspended fish are mostly carved from wood, with realistic shapes, symbolizing abundance every year and a prosperous life. These decorations not only enhance the three-dimensional and layered sense of the building, but also add a strong cultural heritage.

(3) Bo Feng board and lace:

The eaves and edges of Dai ethnic dwellings are usually adorned with exquisite eaves boards, which locals call "lace". These 'lace' pieces are crafted with delicate wood carving techniques, featuring diverse patterns ranging from abstract geometric shapes to concrete flowers, birds, fish, and insects, each piece resembling

a work of art.

They not only protect the eaves and prevent rainwater erosion, but also add an elegant and dynamic touch to the building with their unique artistic charm.

(4) Decorative nature of the Pagoda of a temple:

As another prominent feature of the roof of Dai folk houses, Pagoda of a temple is usually located in the center of Principal ridge, with different shapes, including pagoda shaped, flame shaped, lotus shaped, etc., implying good luck, peace and prosperity. However, it is worth noting that not all residential buildings in Dai villages are equipped with the Pagoda, which reflects the diversity and flexibility of Dai architecture in decorative features. In some regions, due to differences in economic, cultural, or geographical conditions, the style and installation of Pagoda of a temple may also vary, resulting in distinctive architectural styles.

Summarize

The distinctive features of Dai dwellings are fully embodied in both architectural constructive and decorative aspects. These features not only highlight the unique charm of Dai architectural culture, but also provide valuable inspiration and reference for modern architectural design. No matter the existing Dai architecture in modern times or the construction of Dai architecture in the future, the above features will be retained, so that the characteristics of Dai architecture can be reflected and the culture can be inherited.

5.2.2 Complex systems of spontaneous construction laws

Villagers have a high degree of spontaneity when they build houses, and they

build according to their own preferences, needs and economic conditions. This spontaneous construction has led to the diversification of residential styles, but also brought about the problem of chaotic styles. Government intervention and guidance have played an important role in shaping the overall appearance of villages, and have helped to achieve a unified and beautiful village appearance through the formulation of building codes, the provision of financial support and the guidance of villagers in the use of traditional building materials.

The construction process of Dai dwellings is a complex and intertwined system, which is deeply influenced by a variety of internal and external factors. Villagers show a high degree of spontaneity in building houses, and they make decisions according to their own preferences, needs and economic conditions, and this spontaneous construction mode has brought about a diversity of house styles, but at the same time it has also led to the problem of chaotic styles.

Internal influencing factors: The law of construction and the principle of constructability play a vital role in the construction of residential buildings. Villagers follow certain material selection, spatial layout and construction methods during the construction process, and these factors directly determine the appearance and function of the houses. At the same time, the participation of construction teams and designers also provides technical support and design guidance for the construction of houses, and their professional intervention improves the quality and overall appearance of the houses. However, the dominant role of the villagers in the construction should not be ignored, and their decisions are often based on actual

needs and life experience, which leads to the diversity of the functions of the houses and a high degree of adaptability to life.

External influences: External factors also have a profound impact on residential construction. Government control and intervention play a key role in shaping the overall appearance of the village. By setting building codes, the government guides villagers to use traditional building materials and improve living conditions, thus enhancing the overall aesthetics and functionality of the village. At the same time, the government's financial support also provides strong support for the construction of residential buildings, guiding villagers to improve the quality of living while maintaining the traditional style. However, the government's intervention needs to be balanced with the villagers' spontaneous construction to ensure that the unification of the style and features does not jeopardize the autonomy of the villagers and the diversity of the dwellings.

Functionality and applicability: The design of residential buildings needs to give full consideration to the needs of villagers in their daily lives. Reasonable spatial layout, convenient transportation routes and perfect supporting facilities are important manifestations of the functionality of residential buildings. At the same time, the construction of residential buildings should be adapted to the local climatic environment and lifestyle, such as setting up designs suitable for ventilation and lighting to enhance the comfort of living. This combination of functionality and applicability makes the Dai residential houses convenient and comfortable for modern life while maintaining the traditional style.

In summary, the spontaneous construction process of Dai dwellings is a complex and intertwined system, jointly constrained and influenced by internal and external factors. By coordinating the autonomy of villagers and the guidance of the government, it is possible to realize the unity and beauty of the village style and features, and at the same time ensure the functionality and adaptability of the dwellings. This balance and coordination is the essence of the law of spontaneous construction of Dai dwellings.

5.2.3 Diverse causes of disorder and order in the style and features

The disorder and order of village architectural style are affected by many factors, including the spontaneous construction of villagers, the degree of government intervention, the influence of foreign cultures and the use of new technologies and materials. When the government intervention is strong, the village style is usually more uniform; while when the government intervention is weak, the spontaneous construction of villagers will be enhanced, resulting in diverse or even chaotic styles.

The disorder and order of village architectural style is a complex and multidimensional problem, especially in Dai villages, this phenomenon is particularly significant. Through the comprehensive analysis of related factors, we can understand more deeply the reasons for the disorder and order of the architectural style and features of Dai ethnic houses.

a. The degree of government intervention has a decisive impact on the unity of the village style and features.

When government intervention is strong, through the formulation and implementation of unified building plans, village styles are often able to maintain a high degree of uniformity, such as the residential styles of villages built by the government or popular tourist villages, which are characterized by order, coordination and aesthetics. However, when the government intervention is weak, the spontaneous construction behavior of the villagers will increase significantly, resulting in the diversity and even chaos of the style and features. This diversity is not only reflected in the architectural form, functional structure and color, but also includes the phenomenon of unauthorized construction, which makes the whole village look disorganized.

Therefore, to a certain extent, the external intervention of the government can regulate the process of spontaneous construction. However, there are certain restrictions on this regulation, and it is not mandatory to interfere with all construction activities. Housing construction is a complex process, in which various factors such as land occupation, orientation, climate, demand, function, budget and so on should be considered. Therefore, the dominant power of housing construction still lies in the villagers. The government only gives villagers some necessary guidance on housing construction, and reviews the approval process of housing construction, so as to ensure the unity of style and features, the continuation of characteristics, and the legality and compliance of construction.

Combined with relevant documents issued by Xishuangbanna government and interviews with villagers. Government intervention and control are mainly reflected in

the following aspects:

①There are certain requirements for the uniformity of architectural appearance; Ensure the preservation and inheritance of Dai characteristics; A monolithic sloping roof with rich shape changes with the characteristics of the traditional Dai culture as the main body must be set up. The building veranda, lobby, awning, roof staircase, roof equipment room, building and site entrance and exit must also be set up with sloping roof shape decoration.

② The sloping roof of the building shall be designed as a permanent component of the concrete structure, with the obvious identification characteristics of the traditional architectural culture of the Dai people in Xishuangbanna. The sloping roof shall not be replaced by simple and temporary components in new buildings. The sloping roof shall comply with relevant national codes for organized drainage.

③ Strict control of floor area; The construction shall be carried out according to the land area planning of each village. It is not allowed to expand at will and occupy the public area; As for the requirements of line withdrawal, it should be strictly implemented in accordance with the standards;

④ Requirements for building floors and floor heights; The building shall be constructed according to the standard height of each village; Generally, the construction height of Dai Folk Houses in Xishuangbanna villages should not exceed 3 floors;

⑤ The appearance transformation shall conform to the protection and

development plan of traditional villages. Modern building materials such as colored steel tiles, glazed tiles, hollow bricks and bright paint shall not be used. The construction shall try to maintain the relative unity of colors.

⑥ Focus on transformation style. Put forward guiding requirements for building volume, facade design, group composition, color, material, decoration, etc., and build a building group that conforms to the symbolic buildings and styles of the Dai nationality.

⑦ Pay attention to the transformation process and quality. The construction administrative departments at all levels shall carry out the characteristic transformation work in accordance with the capital construction procedures, strengthen the safety and quality management of the project, and control the supervision and completion acceptance.

⑧ The sloping roof with Dai Architectural cultural characteristics must be designed, constructed and accepted simultaneously with the main building. If the construction is not carried out in accordance with the approved characteristic design scheme, the main building shall not be subject to completion acceptance. Without approval, the original building roof shall not be added or covered with simple buildings, structures, iron towers, water tanks and other equipment.

⑨ Middle and high-rise buildings and high-rise buildings can reflect the cultural features of Dai traditional buildings in various forms, but the components with national features must have obvious identification and decoration of Xishuangbanna national traditional culture.(Figure5.2)

西双版纳傣族自治州
城乡规划管理技术规定（修订）

第六章城市景观管理
第一节 城市风貌控制

Figure 5.2 contents intercepted from the technical regulations on urban and rural planning management in Xishuangbanna (Revised)

b. Spontaneous construction by villagers is another major cause of style and features diversification.

Villagers will make decisions according to their own preferences, needs and economic conditions during the construction process, which leads to the diversity of building forms. Different forms, functional structures, colors, and the individual needs of villagers, including unauthorized construction, all contribute to the formation of architectural styles, making villages appear diversified, which leads to the confusion of architectural styles. However, this kind of diversity is not entirely negative, and moderate diversity can enrich the cultural connotation and style and features level of the village.

Villagers' spontaneous construction behavior, as an important factor affecting the diversification of village architectural style, its complexity and versatility can not be ignored. This behavior not only endows the village with unique charm, but also brings a series of challenges, especially the confusion and disorder of architectural

style.

① Direct embodiment of personalized needs

When building houses, villagers often make decisions based on personal or family preferences, living habits and actual needs. This highly personalized choice leads to huge differences in the form, functional structure, material use and even decorative style of buildings. For example, some families may prefer spacious courtyards to meet the needs of farming activities, while others may pay more attention to the comfort and privacy of indoor space. This accumulation of differences makes the architectural style of the whole village present a non standardized and diversified state.

② Limitations and differences in economic conditions

Economic conditions are one of the important factors that determine the choice of villagers' buildings. Due to different income levels, savings capacity and consideration of construction costs, villagers' investment and choice in building houses will also be significantly different. Families with better economic conditions may tend to adopt more modern and expensive building materials and designs, while families with limited economic conditions may pay more attention to practicality and economy and choose more traditional or simplified building schemes. This economic stratification not only aggravates the diversification of architectural style, but also may lead to obvious visual fracture and imbalance within the village.

③ Lack of unified planning and guidance

Compared with the orderly planning led by the government, villagers'

spontaneous construction often lacks overall consideration and unified guidance. In the absence of a clear planning framework, villagers' building behavior is often based on personal wishes, lacking consideration of the overall environment, architectural style and future development. This disorderly construction method is easy to lead to problems such as disordered architectural layout, unreasonable space utilization, and uncoordinated architectural style, which will affect the overall beauty and livability of the village. Villagers may also ignore the safety, durability and harmony with the surrounding environment when building, resulting in uneven building quality and even potential safety hazards.

④ The phenomenon of private building and disorderly construction occurs frequently

In the process of spontaneous construction, due to the lack of an effective regulatory mechanism, the phenomenon of private building and disorderly construction occurs from time to time. This includes not only unauthorized expansion and reconstruction, but also temporary buildings and facilities built at will. These unplanned building behaviors not only destroy the original architectural order and spatial pattern of the village, but also may cause potential safety hazards and affect the quality of life of the villagers and the overall image of the village.

⑤ The balance between moderate diversification and excessive diversification

Although the spontaneous construction of villagers has brought about the diversification of architectural style, excessive diversification may also lead to chaos

and disorder. Moderate diversification can enrich the cultural connotation and landscape level of the village, and enhance the identification and attraction of the village. However, when this diversification exceeds the reasonable limit, it may evolve into disorder and chaos, affecting the overall beauty and harmony of the village.

The spontaneous construction behavior of villagers not only promotes the diversification of village architectural style, but also brings challenges of chaos and disorder. In order to realize the sustainable development of the village and the effective inheritance of culture, it is necessary to strengthen the planning guidance and improve the supervision mechanism on the basis of respecting the personality and needs of the villagers, so as to realize the orderly diversification of the architectural style and the harmonious unity of the overall style of the village.

c. Villagers' subjective perceptions of the architectural style of the village also influence the orderliness of the style.

Although villagers generally believe that the diversification of building forms is inevitable and that subjective construction behavior brings about diversified forms, they also hope that the appearance of the village can be relatively uniform and tidy. This ambivalence reflects the complex attitude of the villagers towards style and features management and increases the difficulty of style and features management.

As one of the key factors affecting the order and disorder of the landscape, the complexity and diversity of villagers' subjective cognition of the landscape of village buildings can not be ignored. The following is an in-depth analysis of this

phenomenon, especially from the aspects of villagers' cognition, aesthetics, building attitude, recognition and insight of Dai traditional culture, and acceptance of new technology and new construction mode:

① Cognitive and aesthetic diversity

Villagers' cognition and aesthetic concept of architectural style are different, which directly affects their construction decision. Some villagers may prefer to retain the traditional architectural style, believing that it represents the essence of Dai culture and historical memory; While other villagers may prefer modern, European or mixed architectural styles, believing that they reflect the progress of the times and personal taste. This diverse cognition and aesthetic concept makes the architectural style in the village present a complex and diverse state, with both the traditional beauty of simplicity and the modern sense of fashion. However, when this diversity exceeds a certain limit, it may lead to the confusion and disorder of the landscape.

② Contradiction of housing construction attitude

Villagers often show a contradictory attitude in the process of building houses. On the one hand, they hope that their houses can be different and reflect their personality and taste; On the other hand, they hope that the whole village can maintain a relatively unified and clean style. This kind of contradictory psychology makes it difficult for villagers to make decisions when building houses. They not only want to pursue individuality, but also worry about damaging the overall style. This contradiction not only increases the difficulty of landscape management, but also reflects the complex attitude of villagers in landscape management.

③ Recognition of Dai traditional culture

Villagers' recognition of Dai traditional culture is also an important factor affecting the order of architectural style. Some villagers have deep feelings and identity with traditional culture. They prefer to integrate traditional Dai elements into the construction of houses to inherit and carry forward Dai culture. While some villagers may be indifferent to traditional culture and prefer to accept foreign culture and modern architectural style. The recognition of this difference makes the architectural style in the village present a dynamic balance between inheritance and innovation. However, when this balance is broken, it may lead to confusion and disorder of style.

④ Insight and acceptance of foreign culture

Villagers' insight and acceptance of foreign culture also directly affect the formation of architectural style. With the progress of society and the circulation of information, more and more villagers began to contact with foreign culture and modern architectural style. After seeing the wider world, some villagers began to try to integrate foreign elements into their housing construction in order to pursue a more fashionable and personalized style. However, this attempt may also lead to confusion and disorder in the village style, especially when foreign elements conflict with traditional culture.

⑤ Cognition of new technology and new construction mode

With the progress of science and technology and the innovation of construction technology, more and more new technologies and new construction

modes are introduced into the field of village architecture. Some villagers are open and receptive to these new technologies and models, believing that they can improve the construction efficiency and quality, and also bring more novel and unique architectural styles. However, other villagers may be conservative and resistant to new technologies and new models, believing that they will destroy the traditional architectural style and cultural characteristics. This different cognition makes the architectural style in the village present a complex intertwined state between tradition and modernity.

The villagers' subjective cognition has an important impact on the order and disorder of the landscape. In order to achieve the harmonious unity and sustainable development of the village style, it is necessary to strengthen the guidance and education of villagers, improve their cultural literacy and aesthetic ability, respect their personality and needs, and promote the organic integration of traditional and modern, local and foreign culture.

d. The influence of foreign cultures is also an important factor leading to the disorganization of the village style and features.

In the Dai villages, the mix and match of European style and Dai style small houses are becoming more and more popular. Although this kind of mix-and-match style reflects the villagers' pursuit of fashion, it has also led to the confusion of the village style. Villagers imitate each other in the process of construction, which makes this kind of mix-and-match style spread rapidly in the village, further aggravating the confusion of the style and features, and also leading to the degradation and

disappearance of the characteristics of Dai architecture. However, this is indeed a fact that prevails and may continue to grow, which also makes us think about the integration and symbiosis of Dai culture and foreign culture in the future.

In Dai villages, small western style houses with European style and Dai style are increasingly popular. Although this mix and match style reflects the villagers' pursuit of fashion, it also leads to the confusion of the village style. The villagers imitate each other in the construction process, which makes this mixed style spread rapidly in the village, further aggravates the confusion of the style, and will also lead to the degradation and disappearance of the characteristics of Dai architecture. But this is indeed a fact that is widespread and may continue to grow, which also makes us have to think about the integration and symbiosis of Dai culture and foreign culture in the future.

① Influence of foreign culture

Foreign culture, especially western centered modern culture and aesthetic concepts, were introduced into Dai villages through media, tourism, education and other channels. These cultural elements quickly attracted the attention of villagers with their novel and fashionable characteristics. The villagers began to be exposed to architectural styles and design concepts different from the traditional ones, such as the magnificent, symmetrical and decorative details of European style buildings, which are in sharp contrast to the lightness, transparency and natural integration of the traditional Dai dwellings.

At the same time, relevant material manufacturers, construction teams and

designers are also affected. Demand generates supply. The corresponding European materials, structures, doors and windows have also been mass produced and put into the building materials market. When purchasing building materials, villagers will also consider using European or modern style construction. This also led to cultural collision and integration. The construction team and designers will also design and construct European style and Dai style houses according to the prevailing wind direction.

② The infiltration of modern style and European style

With the improvement of living standards and the change of aesthetic concepts, villagers began to pursue more modern and personalized living space. Modern style buildings are integrated into their residential design by the villagers because of their concise and practical characteristics, as well as those symbolic elements of luxury and status in the European style, such as large windows, roman columns, arch doors, etc. This mix and match not only satisfies the villagers' curiosity and pursuit for new things, but also reflects their yearning for a higher quality of life.

③ Villagers' imitation and collaboration

In villages, when a family builds a new house with modern style or European elements, it often becomes the object of imitation for other villagers. This imitation behavior is not limited to architectural appearance, but also includes interior decoration, furniture selection and other aspects. The effect of actual construction is often more convincing. The villagers hope to show their economic strength and social status in this way, and also hope to maintain a certain degree of "synergy" with

the surrounding environment. However, this thoughtless imitation and follow-up behavior will also indirectly lead to the rapid homogenization of the architectural style in the village. This change may be positive or negative. This is also one of the factors leading to the confusion of the village style.

④ The confusion of architectural style in Dai villages

With the continuous infiltration of foreign culture, modern style and European style, and the imitation of villagers, the original harmonious and unified architectural style in Dai villages has been broken, the original "stable order" has been broken, and the village style has seen new "ups and downs". The lightness, transparency and natural integration of traditional Dai dwellings are covered by the massiness, closeness and decoration of modern architecture, and the traditional wood structure Dai dwellings gradually withdraw from the "historical stage". This will also make the overall landscape of the village become messy. This chaos not only affects the beauty and harmony of the village, but also poses a threat to the inheritance and development of the traditional culture of the Dai nationality.

⑤ Thinking and Countermeasures

In the face of the influence of foreign culture on Dai People's houses and the confusion of village architectural style, we need to think deeply and take effective countermeasures.

On the one hand, education and publicity can enhance the villagers' sense of identity and pride in traditional culture, and guide the villagers to correctly view the impact of foreign culture and modern style;

On the other hand, we can learn from successful cases and experience to explore a sustainable development model suitable for Dai villages, such as through planning guidance, policy support and other ways to encourage villagers to carry out appropriate innovation and transformation on the basis of maintaining the traditional architectural style. At the same time, it can also strengthen the screening and integration of foreign culture, make it complement the Dai culture, and jointly promote the harmonious development and cultural inheritance of the village.

e. The influence of construction materials and technology on residential forms.

With the continuous emergence of new technologies and materials, villagers will choose according to existing technologies and materials in the construction process. This choice not only affects the appearance of the building, but also affects the overall style of the village. Different construction technologies and materials will bring different construction effects, which makes the village features diversified.

The impact of construction materials and technology on the form of residential buildings is a multidimensional and far-reaching issue. They not only shape the physical form of buildings, but also profoundly reflect the changes of the times, regional characteristics, and the lifestyle and aesthetic orientation of residents.

① Materials and architectural appearance

Traditional materials and features: in villages with a long history, Dai traditional building materials such as bamboo, wood, stone, brick and tile are widely used. Because of their natural properties and processing methods, these materials give the

appearance characteristics of simple and heavy houses, and also form a harmonious symbiotic relationship with the surrounding environment. This traditional architectural form is also the most distinctive Dai Architectural form.

New materials and modern style: with the development of science and technology, new building materials such as reinforced concrete, steel, red cement brick, glass, plastic, aluminum profile, colored steel tile, ceramic tile, asbestos tile and other materials are gradually popularized in the field of rural construction. These materials not only improve the firmness and durability of the building, but also bring more possibilities for residential design through its unique visual effect and plasticity. Modern houses often use simple and lively lines, large-area windows and transparent spatial layout, showing a more open and modern style.

But the popularity of new technology and new materials has also brought great changes to the style of Dai People's houses. The original "stable state" was broken and a new "order" began to form. In the process of construction, the villagers' random selection and collocation of materials may lead to the confusion of Dai style.

② Technology and building performance

Traditional technology and wisdom: the traditional Dai construction technology, such as mortise and tenon structure, dry fence structure, buckle type tile roof, not only reflects the wisdom of the ancients, but also endows the houses with good physical properties. However, this technology is gradually lost, and only a small number of local Dai people master this technology. In addition, the reduction of

demand and the high construction cost of pure wood structure houses have led to the loss of traditional construction technology.

Modern technology and efficiency: modern construction technologies, such as prefabricated components, modular buildings, concrete pouring, steel structure frame construction, have greatly improved the construction speed and accuracy of buildings. The construction cost of the new technology is also relatively low. High penetration rate. Workers are easy to find. The application of these technologies makes the construction of residential buildings more efficient and environmentally friendly, and also provides residents with more diversified living options.

So although modern Dai people like the dry fence structure of Dai houses, they will choose the modern construction technology of reinforced concrete to build their own houses. This has also led to new changes in the architectural style of Dai villages, and brick and wood houses have been gradually eliminated. The steel concrete structure houses are fully covered, forming a new village style. This is the inevitable structure of social development. With the changes of production and lifestyle, new technology and materials will replace the old model. But this kind of architectural style often has not formed a stable "order". There is a "fluctuation" phenomenon. It may require long-term development or certain intervention of external forces to be more "stable" and form a relatively orderly "Dai style".

③ Thinking: interaction between materials and technology

Integration of materials and technology: in the construction of residential buildings, the integration of materials and technology can often create a unique

architectural effect. Using modern technology to improve or innovate traditional materials can give them new vitality and expressiveness. At the same time, the application of new materials also needs corresponding technical support to achieve its best performance.

Regionality and Innovation: in the evolution process of residential forms, regional characteristics and innovation coexist. On the one hand, regional materials and technologies are an important part of residential forms, which carry local culture and historical memory; On the other hand, the introduction of innovative materials and technologies has also brought new inspiration and vitality to residential design. This interactive relationship makes the form of folk houses keep the traditional charm while keeping pace with the times and constantly innovating. In the future Dai building construction, new materials and technologies can be used to reflect the characteristics of Dai characteristic materials, which are very close to traditional materials in appearance and have distinctive characteristics. In fact, new materials and technologies with convenient construction and reasonable cost are used. This can not only meet the modern construction mode, but also have better weather resistance of materials and convenience of construction. It can also well reflect the characteristics of Dai Folk Houses.

The influence of construction materials and technology on the form of residential buildings is multifaceted and far-reaching. They not only shape the appearance and performance of dwellings, but also reflect the changes of times and the diversity of regional culture. Diversified materials and construction technology

will lead to the confusion of architectural style, so in the future residential construction, we should continue to explore the integration and innovation of materials and technology, in order to achieve a more sustainable, livable and cultural residential form. At the same time, the government and the village committee can formulate certain guidelines for the villagers to give positive guidance to the construction while ensuring the spontaneity of the residents, so as to ensure that the architectural style is more beautiful and relatively unified.

f. The impact and significance of the government's external intervention

The external intervention of the government has brought a far-reaching impact on the shaping and protection of the architectural style of Dai villages, and its value and significance are reflected in many aspects

First of all, the moderate intervention of the government provides an effective control mechanism for the architectural style of Dai villages. This control not only ensures the unity, coordination and neatness of the village style, but also promotes the long-term sustainable development of the village. Under the guidance of the government, Dai villages can maintain their unique national characteristics and avoid the loss of cultural characteristics due to blind imitation or "conformity" effect in the process of modernization. This kind of control behavior helps to maintain the harmony of village appearance, improve the overall beauty of the village, and create a more livable living environment for residents.

Secondly, government intervention is of great significance for the inheritance and continuation of Dai Architectural culture. As an important part of national culture,

Dai architecture carries rich historical information and national memory. However, under the impact of the modernization process, many traditional architectural cultures are facing the risk of being forgotten or marginalized. The government's control behavior can effectively protect and inherit these valuable cultural heritage, and let the Dai Architectural Culture glow with new vitality in the new era. This not only satisfies the residents' sense of identity and belonging to traditional culture, but also provides strong support for the dissemination and promotion of Dai culture.

In addition, the external intervention of the government has played a significant role in the construction of beautiful villages and the creation of Dai City cards. As a famous tourist city, Xishuangbanna's unique Dai culture has become one of the important factors to attract tourists. The government intervention not only improved the popularity and reputation of Dai villages, but also promoted the development of local tourism economy. By creating a beautiful village and city card with Dai characteristics, Xishuangbanna has not only won widespread attention and recognition in the domestic market, but also displayed the unique charm of Chinese minority culture on the international stage.

The government's control behavior has played an indispensable role in the construction and protection of Dai's dwellings. It not only maintains the architectural style and cultural characteristics of the village, but also promotes the inheritance and development of Dai culture, providing strong support for the construction of beautiful villages and the creation of city cards. In the future, the government should continue to strengthen investment and management in this field to promote the

sustainable development of Dai villages and the prosperity of culture.

Summarize:

the disorder and order of the architectural style and features of Dai residential buildings are the result of the combined effect of many factors, such as the degree of government intervention, spontaneous construction by villagers, the influence of foreign cultures, and the use of new technologies and materials. In order to maintain the harmony and unity of the village style and features, it is necessary for the government, villagers and all sectors of society to work together to find a balance. It is necessary to respect the individual needs and aesthetic differences of the villagers, and to give full play to the guiding role and supervisory duties of the government; at the same time, it is also necessary to pay attention to the influence of foreign cultures, and to guide the villagers to appropriately absorb the elements of foreign cultures while maintaining the characteristics of traditional cultures; finally, it is necessary to rationally utilize the new technologies and materials in order to improve the quality of the buildings and the harmony of the style and features.(Figure 5.3)

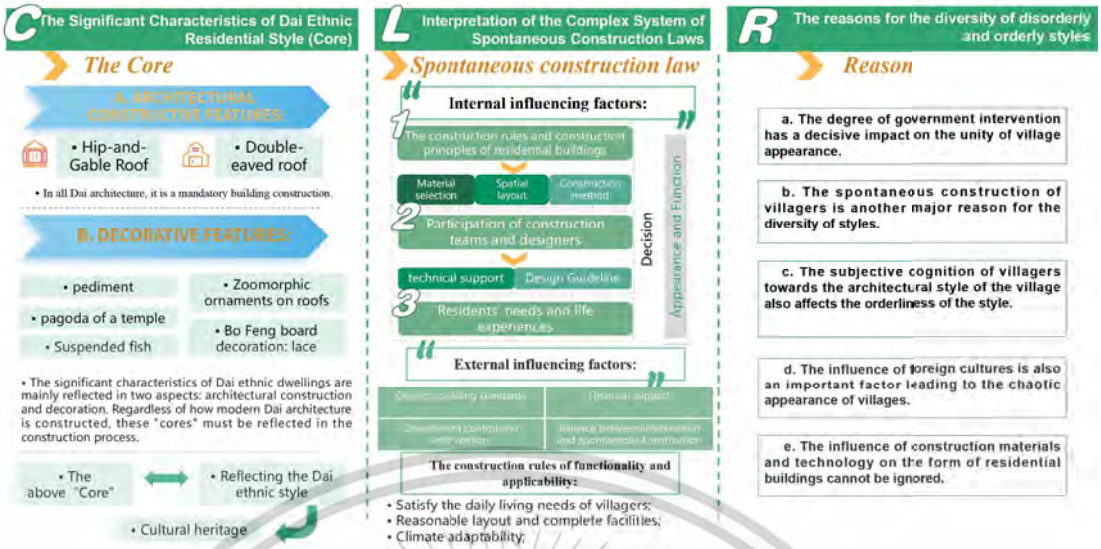


Figure 5.3 Conclusion of "C, L, R" induction

5.3 LIMITATIONS AND PROBLEMS IN THE STUDY

5.3.1 Sample limitations

This study mainly focuses on 12 typical villages in Jinghong area of Xishuangbanna, three of which are traditional Dai villages. The sample range may not be able to fully reflect the overall style and construction pattern of Dai dwellings. There is still more room for excavation in terms of diversity and commonality. Future research can expand the sample range to cover more regions and types of Dai dwellings.

In the interview part, the study mainly focuses on seven villages with modern Dai ethnic houses to conduct interviews and collect data. There are many difficulties faced during the interview process, such as: unwillingness to be interviewed, no one at home, or inability to express themselves clearly due to old age, and other objective reasons, which lead to insufficient sample size for the interviews.

5.3.2 Limitations of data collection methods

a. This study is purely qualitative in nature as it mainly uses interviews and on-site research to collect data. There may be subjectivity and one-sidedness in the conversion of research results.

b. During the interview process, the local people are used to speaking the local language, which brings some difficulties to the interview. Since most of the interviewees were villagers whose literacy level was not high, they were not able to express the relevant content in greater depth during the interviews, which also led to insufficient depth and breadth of data collection.

c. In the observation method part, only using photographic records may not provide a more comprehensive observation of the building. Aerial photography can be utilized in later studies to enhance the observation of the building.

5.3.3 Applicability of theoretical models

Although this study constructed a theoretical model of Dai residential features and construction laws, the applicability of the model still needs to be further verified and improved. Future research can verify the model in more regions and types of Dai dwellings, and correct and optimize the model according to the actual situation.

5.3.4 Inadequate demonstration of spontaneous construction laws

It has been mentioned several times in the study that summarizing spontaneous building patterns is a complex task because of the numerous complex factors involved. These factors are intertwined, resulting in significant variability in the construction of each household. Given the variability of this complex system, it is

difficult for the research to comprehensively cover all its details.

Specifically, the process of spontaneous construction is influenced by multiple factors such as access to resources, technical conditions, control policies, personal aesthetics, local climate, functional needs, as well as internal and external culture and traditional customs. These factors vary across households and individuals, resulting in a rich and diverse style and features of construction practices. Therefore, despite research efforts to reveal the universal laws of spontaneous construction, it is still difficult to fully capture and represent the full picture of this complex system.

The research inevitably has certain limitations in exploring this complex system. Nonetheless, the study seeks to distill construction principles and experiences of general guiding significance through in-depth analysis of typical cases, so as to provide reference for subsequent research and practice.

5.4 RECOMMENDATIONS FOR FUTURE RESEARCH

5.4.1 Expanding and deepening the sample size

In the future research process, in order to obtain more accurate, comprehensive and highly representative interview data, we should begin to expand the sample size of the interviews. By selecting interviewees from different backgrounds, age groups and social roles in a broad and in-depth manner, we can more accurately capture the diversity and complexity of the construction process of Dai ethnic houses. Such an expansion will not only help to improve the scientific nature of the data, but also ensure the validity and universality of the research conclusions, providing a more solid empirical foundation for the inheritance and

development of Dai architectural culture.

Future research can combine various data collection methods such as questionnaire surveys and remote sensing monitoring to improve the objectivity and accuracy of the research data. The research methodology can also be synthesized with qualitative plus quantitative research methods to make the research results more objective and accurate.

In the observation method stage, drones can be used to take flying samples or to scan a three-dimensional model of the village, thus providing a more precise control of the village buildings.

5.4.2 Deepening cross-regional comparative studies

Future research can deepen the cross-regional comparative study to explore the similarities and differences in the style and features of Dai dwellings in different regions and the cultural, social and economic factors behind them, as well as to explore the relationship between human beings and architecture. Through the comparative study, we can have a more comprehensive understanding of the style and features characteristics and construction rules of Dai dwellings.

5.4.3 Focus on the functional adaptation of residential houses

With the development of society and changes in people's lifestyles, the functional adaptability of Dai folk houses also faces new challenges. Future research can focus on the changes in the functional adaptability of dwellings and their influencing factors, and put forward corresponding suggestions and measures for improvement.

5.4.4 Strengthen interdisciplinary cooperation

The research on the characteristics of Dai folk houses and their construction rules involves many disciplinary fields, such as architecture, sociology, culture and so on. Future research can strengthen interdisciplinary cooperation, synthesize the theories and methods of different disciplines, and promote the in-depth development of research.

In summary, this study provides useful references and insights for understanding and protecting the Dai architectural culture through the in-depth exploration of the characteristics of the Dai residential style and features and the spontaneous construction law in Xishuangbanna. Future research can further expand and deepen on this basis, contributing more wisdom and strength to the inheritance and development of Dai folk houses.

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Appendix A

XISHUANGBANNA SEMI STRUCTURED INTERVIEW QUESTIONNAIRE

XISHUANGBANNA SEMI STRUCTURED INTERVIEW QUESTIONNAIRE

Interview Opening Words:

Hello, I'm a graduate student of Siena University of Technology, my thesis is researching on the design of the exterior of the Dai architecture in Xishuangbanna, and I would like to gain a deeper understanding of the Dai architecture through interviews, can I delay you for a while to conduct the interviews?

This interview will be conducted mainly through a question and answer format, all content in the interview will be used solely in my academic paper and will not be used for any other purpose, in order to ensure the validity of the interview, please answer each question truthfully, if there are no questions we will begin the interview.

Basic Information

(1)Gender:

(2) Your age is:

(3) Your occupation:

(4) Location of interviews:

(5) Interview time:

1. Causes of building disorganization

(1) I see that there are quite a lot of building types in the village, do you think that the village appearance looks chaotic? What do you think are those aspects that contribute to the chaotic appearance of the buildings? For example:

-Building form or style

-Color or material

Non-uniform floor heights

-Roof form

-unauthorized construction

-Other

Do you think the government's actions affect the appearance of the building?

(2) Do you think there needs to be uniformity in the look of buildings in the village? Or should they be built according to the wishes of each family?

(3) Are villagers concerned or aware of the appearance of buildings?

(4) Will the government control the appearance of villages? What are the main controls on those convenient surfaces? Are there some restrictions on self-built houses? How do you think about the government's intervention behavior? How do the villagers and the government balance the construction behavior?

(5) What do you think of such foreign cultures as European-style doors and windows, Roman columns, and bottle-post railings that appear in Dai architecture?



(6) If your family built a new house what material would you use? For example: wood or modern reinforced concrete?

(7) Where do you buy the materials for building your house? Or is it provided by the construction team?

(8) Why was a blue tile roof used? Is there a saying about it?

(9) Regarding the height of the building, how many floors are usually built in the village? Are there any requirements or restrictions imposed by the village or government? Will there be budgetary constraints?

2. Housing construction and implementation

(1) When was your house built?

(2) Was your house built according to your own wishes? Or did you take the lead in designing and building it through a designer and a local construction team? Do you build your house with reference to the houses built by others in the village? Is there a reference standard?

(3) Can you tell us about your home and the major steps and processes involved in building it?

(4) How did the villagers make decisions and cooperate during the building process?

(5) What factors do you think influenced the completion and quality of the building during implementation?

(6) Were there any difficulties or challenges encountered during the design and implementation process? How were they resolved?

(7) How to choose the material of the exterior wall and roof?

(8) The choice of windows and doors? How is lighting ensured?

(9) Is the construction pattern of the compound uniform?

(10) Will the first floor overhead remain? What is the function?

(11) Do you think it is better to use traditional or modern materials for the exterior of buildings?

(12) What are the influences you care more about in the process of self-build?

3. Dai architectural features (core)

(1) What do you think are the most important Dai features in building a house? (i.e., what is the feature that must be preserved no matter how it is built) Does the dry-structure need to be preserved?

(2) Are these architectural features primarily considered functional or aesthetic?

Extension (aesthetics: whether it has an ethnic connotation; functionality: e.g., sloping roofs for rainwater drainage)

(3) How have these architectural features developed historically and culturally?

(4) How do you think the decorative elements of Dai architecture should be preserved and inherited? (Which decorative features must be preserved and inherited)

(5) What are the decorative core elements? What do the locals call them? What are the symbols?

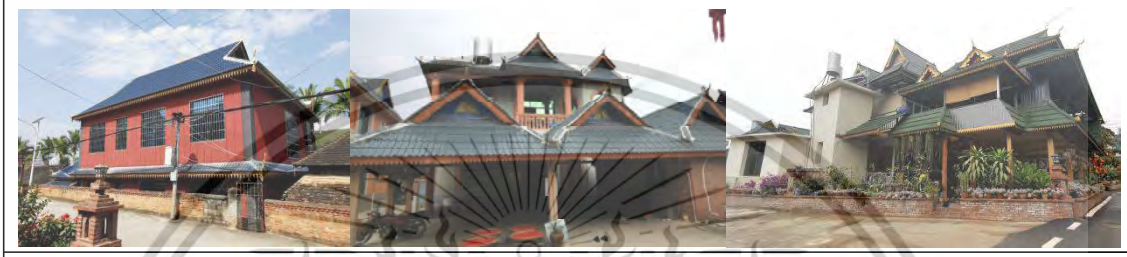
(6) How are Pediments set up?

(7) What is the setting and character of the entrance image?

(8) If you were given a choice, which type of house would you choose to build when you build it? Why?

A. Distinctive wood-frame Dai architecture

B. Modern buildings with strong Dai characteristics



C. Modern Minimalist Dai Architecture

D. European + Dai style mixing

4. Use of functions

(1) How does residential architecture now fit into the current lifestyle? Can you expand on this?

(2) What was your biggest concern during the building process?

For example: appearance, whether the use of the function meets the needs of life, the rational use of space, the price of construction, and so on.

(3) How were natural factors such as climate, lighting, and orientation taken into account during the building process?

(4) Can you describe the characteristics of Dai architecture in terms of structure and layout?

(5) Is the preservation of the small terrace a custom inherited from the Dai? What function does it serve now?

(6) What is the function of the elevated floors and courtyards?

(7) Functionality of kitchen and bathroom and setting of area

(8) How are pergolas and shade handled?

(9) How to ensure hot water and house cooling

(10) Installation and setting of security windows

(11) Discussing the functionality of roofs

5. Recommendations and expectations.

(1) What suggestions or ideas do you have for improving the architectural style of the village?

(2) What role do you think the government or relevant organizations should play in promoting architectural unity?

(3) What are your expectations for the future architectural style of the village?

Appendix B

AUTHOR BIOGRAPHY

AUTHOR BIOGRAPHY

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Research findings:

1. Yifan Zhang, Yanin Rugwongwan. "Analysing and Designing Regional Houses in Xishuangbanna A Self-Organization Theory Perspective" . Kurdish Studies.

2. Yifan Zhang, Yanin Rugwongwan. "Design of Dai architectural space based on experiential spirit of place" . Pakistan Journal of Life and Social Sciences.