Developing an Analytic Method of Cultural Landscape Characteristics for Sustainable Development: In the Context of Traditional Villages in the Changbai Mountain Region

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Doctoral Dissertation

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Abstract

Traditional villages refer to villages with material and intangible cultural heritage, as well as high historical, cultural, scientific, artistic, social, and economic value. However, with multiple challenges, such as agricultural modernization, urbanization, and the development of rural tourism and their impacts, traditional villages are constantly being destroyed by construction, development, and tourism. Presently, the disappearance of the heterogeneity of the cultural landscape is becoming a common problem, and several traditional villages face inevitable destruction or even disappearance.

The formulation of optimization strategies for the sustainable development of traditional villages is necessary to realize rural revitalization. Chinese rural policies have already produced initial results, as evidenced by the recent signs of economic recovery and successful ecological conservation. However, several rural issues still need to be addressed, especially in northeast China. At present, research on the cultural landscape is mostly limited to the ancient villages in central and southern China, whereas research on landscape sustainability in the traditional villages in northeast China is lacking. This thesis systematically studies the cultural landscape of 11 traditional villages in the Changbai Mountain area based on sustainable development.

This study proposes a prospective research framework for the sustainable development of cultural landscapes. The main purpose was to highlight the influence of applying importance-performance analysis and the geographic information system–space syntax method to study the cultural landscape of Changbai Mountain traditional villages and reveal a future scenario of the research area. The subobjective was to identify cultural landscape characteristics based on sustainable development. Minor research was needed to identify the required development strategy approach using a statistical analysis method. This dissertation consists of three parts comprising eight chapters. The second part (Chapters Four to Seven) is the focus of this dissertation; the research of each chapter is based on the conclusion of the previous chapter, corresponding to four research stages.

This study was conducted in four phases. The first stage of the four phases was the pilot study, which is the fourth chapter. The second stage (Chapter Five) involved the recognition and identification of cultural landscape characteristics by using a geographic information system and space syntax. The third stage was the statistical analysis of cultural landscape characteristics by the A-IPA approach. Based on the identification index system of the cultural landscape characteristics of Changbai Mountain traditional villages in Chapter Four, the author extracted the corresponding evaluation index from the results of Chapter Five and established an index system of 15 carriers of cultural landscape characteristics based on the four pillars of sustainable development. Afterward, the author

verified the construct validity of the questionnaire by performing exploratory factor analysis. The A-IPA models with originality are established in Chapter Six. This phase aims to make sustainability strategies more accurate by modifying the relationships between indicators, considering their relative impacts. Based on the results of the A-IPA analysis of stakeholder-based sustainable development with respect to the importance of stakeholder perceptions, sustainability strategies to develop Changbai Mountain traditional villages are suggested in Chapter Seven (the last stage). The basic research in Chapters Five and Six and applied research in Chapter Seven demonstrate knowledge innovation.

The originality of this research lies in the recognition, identification, and management of traditional villages' cultural landscape characteristics, which are comprehensive, intersecting, and exploratory, and the recommended sustainable development strategies. This study integrated multidisciplinary research methods to identify and systematically analyze the cultural landscape characteristics of Changbai Mountain traditional villages and to construct influencing factors. Additionally, the author innovatively used a combination of the structural equation model and the four pillars of sustainable development to adjust the IPA method.

This study provides a new idea for the research of the cultural landscapes in a region with complex and diverse historical cultures.

Keywords: cultural landscape, sustainable development, traditional village, Changbai Mountain, rural revitalization

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List of Acronyms

AGFI	Adjusted Goodness of Fit Index
AIPA	Adjusted Importance-Performance Analysis
CAD	Computer-Aided Design
CFI	Comparative Fit Index
CL	Cultural Landscape
CLC	Cultural Landscape Characteristics
CMIN/DF	Chi-square to df ratio
CPC	Communist Party of China
DEM	Digital Elevation Model
ECO	Economic
EI	Explicit Importance
EI-P	Explicit Importance Performance
EFA	Exploratory Factor Analysis
ENV	Environment
ENVI	The Environment for Visualizing Images
GFI	Goodness of fit index
GIS	Geographic Information System
IFI Delta2	Incremental Fit Index
IPA	Importance Performance Analysis
KLEKs	Kultur Lands chafts Elemente Kataster
MIPA	Modified Importance-Performance Analysis
MIT	Massachu-setts Institute of Technology
NFI	Canonical Fitting Index
NGCC	National Geomatics Center of China
NGOs	Non-Governmental Organizations
RMR	Root Mean Square Residual
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Model
SD	Sustainable Development
SDGs	Sustainable Development Goals
SOC	Society
P＆S	Peace ＆ Security
TIPA	Traditional Importance-Performance Analysis
TV	Traditional Villages
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational，Scientific，and Cultural Organization
WCED	World Commission on Environment and Development

Chapter One
Introduction

Background of Study and Overview of Findings
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1.1 Background of Study and Overview of Findings

1.1.1 Background

1.1.1.1 The requirement for sustainable development of village cultural landscapes

Since the late 1980s, a series of problems have resulted in the sharp deterioration, hollowing, and disintegration of traditional villages and the rapid disappearance of the local cultural landscape (CL); moreover, the rapid economic development and successive urbanization in mainland China has led to the contemporary rural landscape planning losing a clear development direction[1-3]. The CL of villages is facing unprecedented challenges [4]. Results from field surveys conducted by the China Village Culture Research Center have revealed that the ecological regime of traditional villages is worrisome. For instance, the total number of traditional villages with historical, minority, and regional cultures, as well as architectural art research value was 9,707 in 2004 but only 5,709 villages survived in 2010, decreasing by 7.3% per year on average and quickly disappearing by 1.6 villages every day in the Yangtze River and the Yellow River Basins[3]. In short, 1.104 million villages have vanished[4]. This situation of natural villages disappearing every day is fearsome. The traditional village CL stands at the crossroads of survival and death. The protection and sustainable development of the village CL heritage cannot be delayed.

1.1.1.2 Policy support for traditional villages

Research on the CL of traditional villages cannot be separated from policy support. At present, the protection policies of traditional villages in mainland China have gone through three stages: First, during department regulations from 1986 to 2007, it was proposed for the first time to protect villages with concentrated cultural relics and historic sites that fully reflect the traditional features and ethnic groups of a certain historical period. Protection systems and normative documents were established and formulated, and cultural departments participated in the work of historic cultural towns and villages[5]. Second, during the period of legal guarantee from 2008 to 2011, the protection of villages became more systematic and legalized, and tourism departments began to participate in the protection and development of villages. Intangible cultural heritage was also protected and prioritized[6]. Third, the protection of traditional villages has been in a dual-track system since 2012. In April 2012, the Ministry of Housing and Urban-Rural Development, the Ministry of Culture, the State Administration of Cultural Heritage, and the Ministry of Finance jointly launched a survey of traditional Chinese villages[7]. In August of the same year, *the China traditional villages list* was released, which was reviewed by an expert committee composed of experts in architecture, folklore, silicification, art, heritage, and anthropology. By 2019, a total of 6,819 traditional villages had been selected. The specific protection work is to be allocated and implemented by special funds from the central government[8].

China proposed the implementation of a rural revitalization strategy for the first time in 2017[9]. On January 2, 2018, the central government clearly proposed to gradually realize the comprehensive revitalization of rural areas and to regard “village revitalization” as a national strategy in the new period. In February of the same year, the implementation of a series of policies and programs, such as the " Improvement of Rural Living Environment,” ushered in opportunities for the protection and development of traditional village culture[10]**.** In September 2018, the CPC Central Committee and the State Council issued the *Strategic Plan for Rural Revitalization (2018-2022)*, which proposed that traditional villages, historical and cultural villages, and so on should be included in characteristic protection villages, and the protection and development of characteristic resources should be planned rationally[11].

The abovementioned major policies are based on both economic development and, more importantly, on the revival and inheritance of rural culture. Government policies help both official and non-governmental organizations to effectively participate in the protection and management of the sustainable development of the village cultural landscape.

1.1.1.3 The traditional village culture in Changbai Mountain has diversified characteristics

The protection of cultural diversity has gained become a broad consensus among scholars. Regarding cultural diversity, regional culture has gradually been acknowledged and accepted by all circles. Village cultural landscape heritage is an important part of the composition of multiple cultures, which can intensively reflect the historical culture, traditional style, folk customs, regional features, and other landscape information of a certain area. From the perspective of architecture, architectural innovation and heritage inheritance are the two sides of the core mission of the discipline. In 2001, UNESCO discussed in the “*Universal Declaration on Cultural Diversity*” the protection of innovative diversity and heritage diversity and the spirit of advocating innovation derived from heritage corresponds to it [14]. Because of the diversity of culture, the settlement landscape that people can perceive shows its unique charm.

1.1.2 Research questions

A comprehensive survey of the rural landscape research integrating theories and methods from many disciplines, according to the ecological and cultural crises of traditional villages, the discussion is conducted from multiple perspectives. In particular, the social and cultural interpretation of rural landscapes and research on human behavior have increased significantly in recent years and has grown in depth and breadth. However, there are some issues worth considering. Although the study of village cultural landscape involves a wide range of fields, it lacks research on the sustainable development of cultural landscape, and the phenomenon of "deviation from the main body" appears in the integration of multiple disciplines. The Changbai Mountain area has a long history and

diverse cultures, and its CL is unique in that it displays the characteristics of a variety of ethnic minorities. Identification and extraction of CL factors and the construction of a sustainable development framework and other related research work are among the crucial research work on landscape rescue protection of traditional rural settlements in Changbai Mountain. Based on the fact that the level of preservation is limited, the historical and cultural elements of the settlements are not well protected, and the landscape pattern of multiple settlements is seriously damaged, the traditional rural landscape of Changbai Mountain is systematically combed to construct the CL identification system in the eastern region of Jilin Province. Research related to sustainable landscape development management are particularly important. In addition, it is also important to determine a balance of management methods that protect the traditional CL and that develop the local economy. This is also the focus and the research problem that the current study of Changbai Mountain, a regional CL, seeks to address. It is also hoped that the innovation reflected in this research makes breakthroughs.

1.1.3 Overview of Findings

This research aims to study the recognition, identification, and management of cultural landscape characteristics of traditional villages and the strategy of sustainable development, which is comprehensive, intersecting, and exploratory. In particular, the integration of multidisciplinary research methods, such as the identification of cultural landscape characteristics and the construction of influencing factors and its Adjusted Importance-Performance Analysis (IPA), are utilized. Therefore, there are several obvious research aims on this subject as delineated in the following.

(1) Establish a sustainable development framework based on the characteristics of cultural landscapes. The construction of the "identification factor" of the cultural landscape of the traditional villages with multifarious ethnic minorities by drawing on the relevant methods of settlement typology and architecture. This represents a more reasonable and effective way for the in-depth exploration and scientific expression of the inner elements of the cultural landscape.

(2) A "large-medium-small" spatial scale structure analysis model was summarized by analyzing traditional village forms to decompose and by combining any settlement complex under the guidance of this model.

(3) This thesis used multidisciplinary integration method which is sociological and geographical methods. The author innovatively used the combination of the structural equation model and the four pillars of sustainable development to adjust the IPA method. Data management and dynamic protection and monitoring of the cultural landscape of traditional villages in Jilin Province, Changbai Mountain, based on the exploration of cultural landscape impact

factors; Innovated the formulation of sustainable management methods for traditional villages.

(4) Applying the A-IPA method, which combines the four pillars of sustainable development based on the results of the questionnaire for stakeholders to propose SD strategies based on the interests of local residents, CL protection, and tourism planning. These results will provide a scientific theoretical basis for CL protection, tourism planning, and rural revitalization.

(5) The contribution of this thesis to knowledge science is embodied in the innovation of methods. The statistical method used in this research, the A-IPA approach, is instructive on research on knowledge science. Statistics is a very component of knowledge science. Although the object of this thesis is the CL, however, ultimately, it is the study of the relationship among people and the relationship between people and the environment. This is in line with the core of knowledge science research aims to discover and extract valuable knowledge from large volumes of data.

1.2 Research Objectives

There are three research objectives in this dissertation, which are as follows:

(1) To excavate some representative CL characteristics of traditional villages and construct corresponding identification mechanisms to establish a certain paradigm for the research of traditional village cultural landscape characteristics and their influencing factors through research on traditional villages in the Changbai Mountain area.

(2) To tentatively divide the CL characteristics of traditional villages in the eastern part of Jilin Province, Changbai Mountain.

(3) To provide theories, methodologies, and materials for the preservation of CL and the restoration of local features and management systems of traditional villages in different regions of the country through the A-IPA method of establishing structural equations based on the pillars of sustainable development.

1.3 Academic and Practical Significance of the Research

1.3.1 Academic Significance of the Research

First, this exploration is suitable for the sustainable development theory of Chinese traditional village CL. At present, there is much research on village morphology in academic circles, but few on culture. This dissertation, based on the research and

exploration of the village CL, summarizes the theoretical system of sustainable development of the multi-ethnic village CL and plays a certain role in enriching the research results in this field.

Secondly, it provides new perspectives and ideas for the study of traditional village CL. This dissertation used the four pillars of sustainable development as the framework and studies the village CL based on the relationship between the characteristics of the village CL and the interests of stakeholders to provide a new perspective and fresh ideas for the sustainable development of villages with more precise orientation and better pertinence. Moreover, this research provides a method for multidisciplinary and integrated research on the CL of the village. Spatial Information Technology (SIT), which is based on geographic information system (GIS), has the characteristics of objective information acquisition, accurate positioning, flexible management, spatial attributes, and intuitive expression[12], which is quite suitable for studying the characteristics of Changbai Mountain village's morphology, site selection, and so on. In addition, it is consistent with the requirement that cultural heritage science utilizes spatial information science as its technical support and application. Using space syntax to analyze the small and medium-scale space of the village, which plays an important role in extracting the cultural factors of the village[13]. The traditional villages of Changbai Mountain are mostly located in the complex historical geography and cultural environment, which is proper for the application conditions of the IPA method in statistics, which is the influence factor analysis method of CL of various ethnic minorities. In this study, the use of the IPA method is adjusted theoretically based on the four pillars of sustainable development. In addition, the viewpoints and methods of urban and rural planning, architecture, anthropology, and ethnology have been applied at different levels of this research, which is helpful in constructing village research methods.

1.3.2 Practical Significance of the Research

The International Council on Monuments and Sites (ICOMOS) released *The World Heritage List and Tentative List: Filling the Gaps* in May 2004. The report found that the number of CL world heritage sites in the Asia-Pacific region remained insufficient[14,15]. Research from the perspective of CL is of great significance for the world heritage protection of emerging C-type traditional villages in Changbai Mountain. It is worth the expectations for the future of the village. However, how to learn from and promote several valuable experiences of traditional village construction in the development of rural areas, such as respecting nature, recognizing small-scale and recognizable space environments, sorting out the juxtaposition and mixing of folk customs. Universality and irreplaceability are also crucial content of CL research on villages. The eastern part of Jilin Province has an extremely rich concentration of ethnic cultures in a limited geographical area and is a "rich mine" of cultural diversity. The sustainable development research carried out in this area has practical significance.

1.4 Position of the Research

Science and rationality are the basic concepts in this research. However, when faced with basic judgments about how to treat "other cultures" that are different from itself, such as the beliefs of ethnic minorities, this research takes the position of "cultural relativity" in anthropology, that is, to respect and understand each cultural value and affirm the existence of values and significance of each kind of culture in the process of understanding and communication. From this standpoint, culture is only a possible value choice of people facing the outside world, and there is no judging of cultures as superior or inferior.

Based on the above perspectives, return to the position of local values, and the thematic perspective oriented by local stakeholders thus gains more prominence. Researchers need to maintain an objective and neutral perspective to avoid prejudice. This research strives to combine the local-oriented thematic approach with the researcher-oriented objective approach to avoid value presuppositions in the research process.

1.5 Structure of This Dissertation

This study is structured into eight chapters and represents the logical flow of the research work in achieving research findings. This dissertation consists of three parts comprised of eight chapters. The first part consists of Chapters 1, 2, and 3. The second part is the focus of this dissertation, including Chapters 4–7. The research of each chapter is based on the conclusion of the previous chapter, which corresponds to four research stages. The third part includes the eighth chapter, which is the summary of this research. The details of each chapter are as follows.

Chapter 1 expounds the background of traditional village CL research in Changbai Mountain and introduces the significance, position, and the three objectives of the research.

Chapter 2 analyzes and sorts the practice and research related to the CL of traditional villages.

Chapter 3 elaborates on how to design the research stage and expound the research method and data sources.

Chapter 4 provides a set of preliminaries that set the stage for the overall study, such as a survey and literature for the basic situation of traditional villages. Eleven traditional villages were selected as the research sample. Finally, the identification system of CL characteristics was established to present a preliminary set of findings.

Chapter 5 identifies the CL characteristics of traditional villages under the

framework of sustainable development based on the results of the previous chapter. This chapter serves as a connecting link between the preceding and the following.

Chapter 6 establishes and designs the carrying factors of CL and a questionnaire to analyze the indicators that need to be improved and to be valued by an adjusted IPA method, which is built on three structural equation models based on importance, performance, and the importance of four dimensions. Afterwards, applying suitable weightage to the four dimensions, the corresponding index was obtained.

Chapter 7 represents corresponding strategies that are in line with the sustainable development of local CL according to the results of the previous chapter. Strategies based on the optimized IPA model of the CL of traditional villages simultaneously embody, objectify, and institutionalize the policies geared toward the revitalization of their CL.

Chapter 8 elaborates on the research conclusions and limitations, and it also describes expectation for the sustainable development of traditional village cultural landscape research.

Chapter Two
Literature Review

Concepts Related to Traditional Villages

Theoretical and Applied Foundations of the Cultural Landscape

Theoretical and Application of Sustainable Development

Research Gap

References

The CL of the village has constantly been changing along with the activities and reproduction of human beings on earth. People's knowledge of traditional villages and CL has also gone through a very long process. There are many ways to understand and research various types of CL in each country. However, it is critical to ensure the sustainable development (SD) of the CL of traditional villages with scientific and technological progress and the further development of urbanization.

This chapter mainly elaborates on three aspects. First, it summarizes the related concepts of traditional villages. Second, it introduces a brief theoretical development history and classification of CL and summarizes the situation of countries with advanced technology and broad experience in the protection and management of historical and cultural heritage and CL. Finally, the theoretical and application of SD are examined. This dissertation aims to identify the characteristics of CL and, conduct investigation and strategy research on CL carriers. Therefore, the focus of this chapter is CL and SD research.

2.1 Concepts Related to Traditional Villages

In modern geography, villages are interpreted as rural settlements, where mainly farmers who work on the surrounding land live [16,17]. There is a connection between the concept of village and settlement. A village is a specific settlement with distinctive features of the geographical environment, industrial structure, and residents' characteristics[18-20]. The geographical environment of the village needs to be on the periphery of the urban environment. The industrial structure needs agriculture as the leading industry, and the characteristics of residents include a population whose primary work is agricultural production.

In April 2012, the relevant ministries and commissions of the State Council jointly issued the "Notice on Conducting Investigations on Traditional Villages", unifying customary titles such as "ancient villages" and "historical villages" as "traditional villages", and specified the concept of traditional villages. Traditional villages refer to villages that were formed earlier, have more abundant traditional resources, have specific historical, cultural, scientific, artistic, social, and economic values, and should be protected[21]. The word "tradition" is modified to highlight the historical continuity of traditional villages and the carrying capacity of agricultural civilization. The traditional villages mentioned in this dissertation are villages that have gone through generations of development and inheritance. These villages can be preserved and have been affected by the current urbanization process and modern planning because they tend to be isolated. These villages retain the original settlement layout and rural landscape characteristics and have cultural heritage bequeathed from the development of human history.

The connotation of traditional villages widely recognized by the current academic circles is also the main basis for the selection of traditional Chinese villages, which is

embodied in the following three aspects. First, the traditional architectural features are intact. Vernacular buildings, historical buildings, and cultural relics are concentrated and distributed in pieces, or the number of them exceeds one-third of the total number of buildings, which fully display the traditional features of a certain period. Second, the site selection and pattern of traditional villages reflect traditional characteristics and highlight local typicality, which is integrated with the environment and closely related to production and life. Traditional villages maintained the specific historical and cultural background and are intactly preserved in the pattern, reflecting conventional life, ways, and culture. Third, intangible cultural heritage with inherited living is retained. Intangible cultural heritage has multiple categories and prominent characteristics and is inherited completely.

Scholars have achieved many research achievements in traditional villages thus far. The present research on traditional villages focuses on heritage preservation [21], land utilization [22,23], infrastructure development, and spatial differentiation [24], as well as countermeasures against the negative impacts of tourism [25], diet [26], stewardship of cultural resources [27], and related fields.

2.2 Theoretical and Applied Foundations of the Cultural Landscape

2.2.1 Abbreviated History of the Cultural Landscape

Ratzel, one of the founders of cultural geography, was the first to propose the concept of CL as a term. He systematically expounded on the concept of CL in *anthropogeography* [28]. He perceived that CL has various forms connected to natural landscapes due to human activities and is a unique combination of various cultural characteristics. He emphasized the significance of studying ethnic, linguistic, and religious landscapes and the dissemination of culture. Human activities and development were strictly restricted by the geographical environment. In the 1920s, Carl O. Saue (1925) formally proposed CL and advocated the interpretation of CL as the core of a cultural approach to geography[29] [30]. Traditional cultural geography led by the Berkeley School began to study the origin and evolution, composition and classification, cognition, and interpretation of CL[31]. In the second half of the 20th century, under the guidance of the cultural diversity strategy in the globalization era and the concept of SD in the ecological field, the modern heritage protection movement was widely implemented on a global scale, and the scope of historical heritage protection was more oriented toward CL. From the 1960s, the term CL became increasingly adopted in other disciplines and entered the terminology of environmental management[32]. In 1992, the United Nations Educational Scientific and Cultural Organization (UNESCO), World Heritage Committee (WHC), International Council on Monuments (ICOMOS), and International Union for Conservation of Nature (IUCN) revised the selection criteria for "World Heritage". They officially included "cultural landscape" with specific regional cultural characteristics and outstanding and universal values into the category of cultural heritage, which can also be

called "regional cultural heritage landscape", aiming to protect the regional cultural traditions represented by cultural heritage landscape[33]. In December of the same year, CL was included in the "World Heritage List." Since the end of the 20th century, the research trend of the humanities and social discipline of modern human geography has led to the transformation of CL's research paradigm. It uses interdisciplinary research methods to explore the deep cultural meaning of landscape material appearance from multiple perspectives.

As one of the research topics of cultural geography, CL has been defined as a fundamental concept by many researchers. Although CL was often referred to as a historical landscape, it was defined as a "landscape modified by human activity" by F. Ratzel [34]. The interpretation of CL is distinguishing because each country has a different history and culture. The United States National Park System (NPS) defines CL as "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values" [35]. The Australian Heritage Council (AHC) defines CL as a change in natural characteristics and elements caused by human behavior, thus forming a material region to interpret regional characteristics in a tangible pattern and reflect the interrelationship between humans and landscapes[36]. The Japanese concept of "Cultural Landscapes" (文化的景観), belonging to the "Cultural Properties", was defined in *Cultural Properties of Japan* as the production and life of the people presented in a certain area and the Geo-cultural features of a region, which are indispensable to understand the lifestyle of the Japanese people living in the area[37].

Research on CL is mainly reflected in the connotation, origin, and changes of CL[38]; perception[39, 40]; interpretation[41]; composition and classification[42]; preservation[43, 44] and administration so far[45]. Some countries have upgraded the preservation and management of CL to the level of national systems.

2.2.2 Cultural Landscape Categories and Traditional Villages in Cultural Landscape

At present, many international and national institutions define multiple types of CL. Since 1984, UNESCO's World Heritage Committee has been preoccupied with "cultural and natural Heritage", especially "rural landscapes", and adopted it as the selection criterion of Cultural Heritage in 1991. To make the "Cultural Landscapes" have deterministic standards, "*Operational Guidelines for the Implementation of the World Heritage Convention*"[46] proposed that CL falls into three main categories. The Categories of Word Heritage Cultural Landscape include: ① A clearly defined landscape designed and created intentionally by man, which is often (but not always) associated with religious or other monumental buildings and ensembles[47], such as the Cultural Landscape of Sintra, Portugal, which was included in the *World Heritage List* in 1995[48] and the Aranjuez Cultural Landscape, Spain; ② The organically evolving landscape originated from certain

social, economic, administrative, and religious needs and developed to its current form through related connections or mutual adaptation with the surrounding natural environment. They fall into two subcategories: a relict (or fossil) landscape and a continuing landscape. For example, Cultural Landscape and Archaeological Remains of the Bamiyan Valley and Rice Terraces of the Philippine Cordilleras; ③ Associative cultural landscape, which is characterized by its connection with natural factors, religion, art, or culture rather than cultural evidence. Simultaneously, CLs are required to meet some or all cultural heritage standards, but it does not exclude CL from meeting the standards of natural heritage. For example, Uluru-Kata Tjuta National Park in Australia, Lushan National Park in China, and Sacred Sites and Pilgrimage Routes in the Kii Mountain Range in Japan.

Other countries and regions also classify cultural landscapes according to their local and regional cultural characteristics. Nation Park Services (USNPS) in the United States of America divides CL into four categories: ①Historic Sites; ②Historic Designed Landscape; ③Historic Vernacular Landscape; and ④Ethnographic Landscape[49]. The Australian Heritage Council (AHC) divides cultural landscapes into eight categories: ① Associative landscapes; ② Landscapes that reflect cultural processes that are still active; ③ Places related to a single historical activity or period; ④ Places that represent layers of history; ⑤ Places that demonstrate the dependence of historical activities on natural systems; ⑥ Linear landscapes; ⑦ Thematically linked places within a landscape; and ⑧ Places representing multiple themes or multiple values[36].

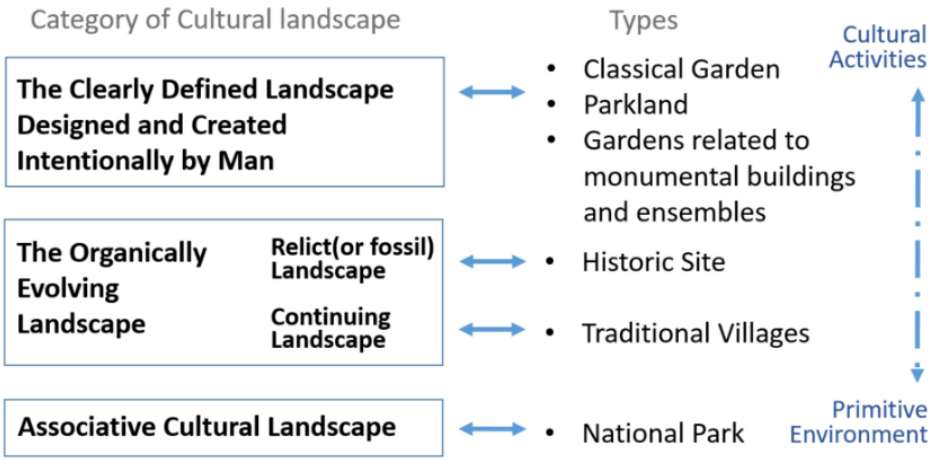

Figure 2.1. Traditional villages in cultural landscape categories

Chinese cultural geography scholars generally believe that CL is a humanistic landscape created by human activities and superimposed on the natural environment. CL

has always been an important component of human geography. The cultural landscape defined in this article refers to cultural groups shaping nature. Based on this thesis, the research object is traditional villages. Naturally, spiritual culture is the driving force and the medium. Moreover, the traditional rural landscape has been a hot topic in CL research in recent years. Its specific definition can be summarized as the spatial image of rural settlement culture created by people in a certain area in a certain historical period[50,51]. Therefore, traditional rural landscapes are a type of phenomenon of CL. The traditional village only refers to the settlement itself, which is the carrier of the traditional rural landscape. The traditional rural landscape includes the settlement itself and its environment.

Based on the strength of the connection between nature and culture, the traditional villages in this article generally belong to organically evolving CL, as shown in Figure 2.1.

2.2.3 Sub-categories of Cultural Landscape in Traditional Villages

CL is the product of human subjective creation and traces of life based on the natural environment. It is the external manifestation of human culture and spirit. Nature provides the material basis for the human landscape, and human behavior provides development power for the human landscape. Culture and spirit give soul to the human landscape. CL is an embodiment of human civilization and is characterized by regionalism, historicity, and nationality features. In the broad sense, there are two types of human civilization, that is: material civilization and spiritual civilization. Zhao and Li regard CL as a "cultural regional complex" and propose that the cultural regional complex includes three levels: ① foundation-physical geographical factors; ② strongly restricted by physical geographical factors, visible material culture, and folk customs culture; and ③ the cultural atmosphere and mentality pervading the entire region[52]. CL is a complex organically combined approach with three aspects: natural base, material system elements and nonmaterial value connotation. Wang summarized that the cultural attributes of CL could be divided into three components, namely, material culture, institutional culture, and spiritual culture[53]. Moreover, according to the division of landscape elements: tangible material parts such as settlements, streets, residential groups, spatial environment; nonmaterial cultural connotation parts: customs, religious beliefs, etc. Therefore, CL is divided into tangible CL and intangible CL[54].

This dissertation aims to study the CL of traditional villages, so this section divides the sub-categories of tangible CL and intangible CL from the perspective of spatial scale and folk culture based on the historical and cultural characteristics of the village.

2.2.3.1 Tangible cultural landscapes

Traditional villages are the reservation of tangible human CL. Tangible CL is an

integral part of the village landscape. This mainly indicates CL with a certain material morphology and structure that are tangible. Material elements are closely related to the production and life of villagers, including traditional dwelling houses, main public buildings, and major facilities. It is the best indication of a cultural foundation and is the core element of village culture. The tangible CL of traditional villages is mainly manifested in the following aspects:

① Buildings and architectural complexes with typical social, historical, and cultural significance. ② A combination of historical blocks or traditional residential areas with unique planning ideas, creativity, and landmark buildings. ③ The whole of a settlement that has played a particular role in history. ④ Recognized as a settlement of unique ornamental value. ⑤ Various venues and daily utensils in traditional life. According to the large, medium, and small scale of space, this paper divides the tangible CL of traditional villages into site selection, settlement forms, street patterns, traditional houses, etc., as shown in Figure 2.2.

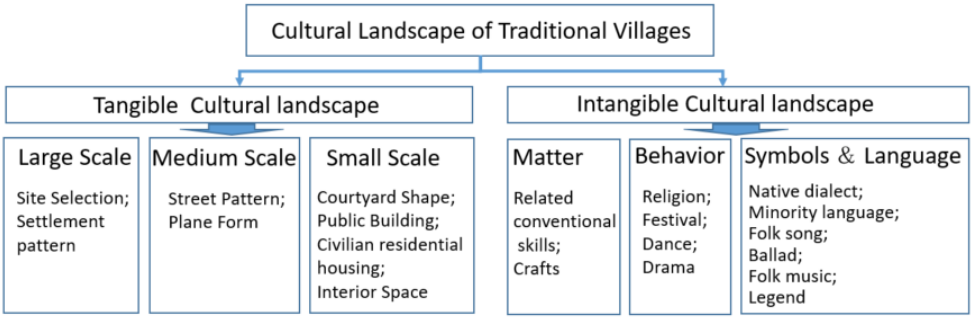

Figure 2.2. Sub- categories of cultural landscape in traditional villages

2.2.3.2 Intangible cultural landscapes

The content of intangible CL covers people's sentiments, religion, value orientations, social system norms, folk customs, ethics, and morals. As the nerve center of our personal and collective memories, its essence consists of customs, beliefs, thoughts and consciousness, aesthetic and emotional knowledge, and skills[55].The intangible cultural landscape is the basic cultural form rooted in human social life from the essence of culture. It directly originates from people's folklife and manifests as folklore. Folklore, which meant "folk knowledge" or "folk wisdom", could be translated as "the science of folk knowledge" as a term[56]. Folklore is the matrix and foundation of the intangible culture of human society.

The intangible CL forms that this article focuses on can be broadly summarized as folklore at the material level, behavior level, symbol, and language level, as shown in Figure 2.2. ① From the material point of view, it refers to the technology, craft, and

implements in folk life, as well as all objects or objects that can be observed and perceived by folk processing, production, or creation. ② Behavioral perspective: a form of folklore that is spread and preserved in the form of customs. ③ Signs and language refer to folk literature and oral folklore, while signs and languages are the means of cultural accumulation and storage. The existence and development of any culture depend on a set of unique symbols and languages, and all aspects of culture also need to be reflected and inherited through language.

2.2.4 Overview of Cognition and Management for the Cultural Landscape

There are differences in the understanding and management of CL in different regions due to the diversification of history and culture and unbalanced economic development worldwide. This section introduces CL's research and practical experience from North America, Europe, Japan, and Australia, which all have significant experience in cultural landscape practice research.

2.2.4.1 North American

North America has a vast territory because it has a vast and rough natural environment as its background, and its history is composed of immigrants and multi-ethnic integration. The selection of its protection content is closely related to its historical culture and natural geographical characteristics.

United States

In 1916, the United States established the National Park Service (NPS), which is responsible for the protection and management of American national parks and formed a relatively complete cultural landscape management system in its national park system. Initially the focus was on the preservation of buildings, until the 1930s when the NPS began to recognize the importance of landscapes. As the NPS began to revise its policies in the 1980s, a new policy included protection for CLs. In 1994, the NPS expanded the content of its Cultural Resource Management Guidelines (NPS-28) to formally include the protection and management of cultural landscapes. In addition, the NPS issued Preservation Brief #36 in 1994 (*Protecting Cultural Landscapes: Planning, Treatment, and Management of Historic Landscapes*), which provides comprehensive information on the protection and management of cultural landscapes[35]. NPS developed two management tools, the Cultural Landscape Inventory (CLI) and the Cultural Landscape Report (CLR), in the mid-1990s. CLI is used to form a database to record the basic information of CL location, historical development and evolution, landscape elements and characteristics, and management. The CLR records the history, current situation, and governance methods of the CL to evaluate the importance and completeness of the landscape. When CL changes, it is necessary to write CL reports to ensure the continuity of the characteristics and elements

of CL. The management of CL in the United States usually goes through the following steps: historical research; inventory and records of the status quo; analysis and evaluation of site integrity and importance; determination of CL protection methods and treatment plan; determination of CL management planning and management ideas; determination of maintenance strategies for CL; and reports on remediation and future research plans. After the realistic treatment plan, the specific remediation methods for the management of CL include ①Preservation: Maintenance of current status and material integrity. The focus is on repairing current features with existing materials. ② Restoration: The focus is on rebuilding or restoring the missing elements. ③ Reconstruction: Reconstruct the appearance of a particular period in its historical location, including architectural forms, elements, site details, landscapes, structure, or other construction. If the contents of the CL Preservation Plan have been implemented, then the corresponding Maintenance Plan should be adjusted.

Canada

Historic Sites and Monuments Board of Canada (HSMBC) defines CL as Aboriginal cultural landscapes, which is a site that Indigenous peoples consider valuable because it is rooted in what matters to people closely associated with the land[57]. The concept of "Aboriginal cultural landscapes" was proposed by the historian Susan Buggey, and it was widely recognized and a corresponding operating guide was formed [58]. HSMBC believes that the concept of an aboriginal cultural landscape has built a bridge between the aboriginal worldview and heritage protection. They always hope to increase the recognition of indigenous people's history and culture at the national level. The following aspects were highlighted: ① Indigenous people with long-term relationships with CL should participate in site identification. ② The identification system includes spiritual, cultural, economic, social, and environmental values. ③ Measures, values, boundaries, and other aspects are defined. The cultural and natural elements used to express the importance of CL may be understood by scholars today.

2.2.4.2 Europe

In October 2000, the Council of Europe launched the "common heritage of Europe" campaign, jointly launching in Florence, Italy, an international convention on the discussion of the European Landscape at all scales -- *European Landscape Convention*[59, 60]. The convention promotes the conservation of landscapes in Europe, and management and planning promote cooperation among European countries on landscape issues. To some extent, the European Landscape Convention embodies environmental SD goals in a broad sense, as it focuses not only on typical landscapes but also on ordinary landscapes, which determine the environmental quality of Europe [61]. The understanding of the landscape is mainly considered from the following aspects: physical relief; settlement pattern; mainland

use; economic activities; presence or absence of features; residential areas; important wildlife habitats; and heritage of past human activity. The purpose of the *European Landscape Convention* for landscape identification and evaluation is to establish a rational platform for long-term conservation and improvement and provide cooperation and exchange for the preservation and management of CL in European countries. Meanwhile, the public plays an important role in the evaluation process. However, a European-level convention is not enough to provide more detailed guidance at the operational level due to the expansive meaning of the European landscape and the complex and diverse status quo.

Germany

The concept of "cultural landscape" in Germany originated from German human geography, and the German classical philosophical tradition and was based on modern industrialization in a broad sense. The research and practice of CL in Germany has always been in an important position in the international academic community. Since the 1990s, the German Federal Environmental Foundation (Deutsche Bundesstiftung Umwelt) has been dedicated to protecting German CL and has tried to put forward the concept of CL suitable for developing local history and culture. In 1993, an international expert conference on "Cultural Landscapes of Universal Value" was held in Schorfheide-Chorin, Brandenburg, Germany. In 1995, the conference results were compiled and published in cooperation with UNESCO[33,62]. On this basis, Germany proposed the concept of "Historical and Cultural Landscape" (Historische Kulturlandschaft), which is a typical and unique cultural landscape formed by historical, archaeological, historical, and cultural elements and structures[63]. Simultaneously, several national- and state-level related laws and regulations stipulate the protection of "Historical Cultural Landscapes". The Federal Nature Protection Law of Germany (D a s Bundesnaturschutzgesetz) particularly emphasizes the protection of the unique identity of historical and cultural landscapes, pointing out that in addition to natural landscapes, historical and cultural landscapes and the cultural, architectural, and historical ground sites representing them should also be protected as a whole. In addition, the principle of treating historical and cultural landscapes is to have a standardized method, that is, the need for cataloging, data compilation, and evaluation of historical and cultural landscape elements. Since 1999, "KLEKs", a collection system of CL elements based on voluntary behavior, have been established in Germany. Its purpose: to collect historical and cultural landscape elements based on GIS data in as much detail and coverage as possible[64,65]. The research on CL is generally divided into seven steps: ① The construction of historical and cultural landscape element systems. ② Extraction of element information. ③ Discovery of element frequency. ④ Establishment of key areas of individual landscape elements. ⑤ Cluster analysis of elements. ⑥ Division of historical and CL areas. ⑦ Propose corresponding protection or management opinions. CL research is based on the spatial division of geographic data and involves the application of multidisciplinary methods, such as in-depth and extensive

collection and induction work, which is very suitable for the complexity of historical and cultural landscapes and conducive to the continuation and maintenance of the diversity of landscape types in Germany. Germany's reasonable and effective quantitative statistical method and its application in CL research and practice are worthy of reference by other countries and regions.

Italy

Italy, which has a very rich cultural heritage, started its research on CL early. Meanwhile, it has a more comprehensive and profound understanding of CL, and has formed a guiding model that focuses on heritage protection and coordinates local social and economic development. In 1960, the first declaration entirely dedicated to historical centers in Italy, *the Charter of Gubbio* was issued[66]. Its central content is to call on the government to formulate restrictive measures and stop approving modern projects and construction plans built on historical sites. The Ministry of Cultural Heritage, established in 1975, is the department responsible for the administration of cultural affairs of the Italian government[67]. There are more than 20 cultural relics administrations under the Ministry of Cultural Heritage, responsible for the management of cultural relics and scenic spots throughout the country. In 1985, the Prime Minister's Office instructed the construction of industrial facilities, airports, railways, highways and other public projects to conduct environmental assessments (people, animals and plants, and groundwater sources). The purpose was to analyze the impact of construction projects on cultural landscape properties (direct and indirect effects, positive and negative effects, short-term, medium-term and long-term effects). In 1986, the Italian government established the Ministry of Environment, which combined management of CL protection and natural environmental protection[68]. In 2004, Law No. 42 "Florence Resolution" was promulgated, proposing not only to protect the historical, cultural and artistic value of landscape wealth, but also to protect the natural environment of the region[69]. In 2006, "Environmental Code" was approved, that stipulates that any construction project must undergo an environmental assessment, mainly focusing on the analysis of the impact of the project on the environment[70]. Italy has formed a unique management model in the protection and utilization of cultural heritage, that is, the public management department is responsible for the protection of cultural heritage, and the operation, management, and utilization (economic income) are implemented by private individuals and enterprises. The cultural relics protection policy combining the government and the private sector has aroused the enthusiasm of all sectors of society.

2.2.4.3 Japan

Cultural heritage conservation in Japan has formed a relatively complete system in terms of historical environmental protection laws and policies. Japan expanded the

scope of its protected "cultural heritage" to "cultural landscapes" by revising the "*the Law for the Protection of Cultural Properties*". Moreover, *the Landscape Protection Act* was enacted to form a legal protection system based on CL in 2004[71]. Items of particular importance can be designated "Important Cultural Landscapes". *The Law for the Protection of Cultural Properties* was amended in 2005 to formally define CL and form a protection mechanism for the inherent landscape of the region[72]. The Division of Cultural Properties conducted two survey practices from 2000 to 2003 and 2005 to 2007, which is has clear classification and effective operability and has greatly promoted the construction CL of Japan. It explores cultural sustainability, which enriches and broadens the connotation and research fields of the world cultural landscape by combining the industrial landscape with the regional landscape. The Japanese cultural landscape pays more attention to the continuity of the landscape in the current era and highlights the characteristics of the landscape formed in connection with agriculture [73-75]. It presents a trend of interdisciplinary research. In addition to the traditional geographical research field, it is also conducted from the perspective of evaluation strategies [76,77], biodiversity [74], and landscape restoration [78]. The content of CL preservation includes confirmation of location and scope, constituent elements, basic protection policies, principles of due consideration to land use, maintenance matters, necessary institutional matters, and other necessary matters.

2.2.4.4 Australia

AHC's management of CL is based on the implementation of *The Burra Charter* passed in 1979 and follows the logic of Identification-Analyze-Assess Significance-Rectification-Protection[79]. The prerequisite is the identification, analysis, and evaluation of the CL and the results of the investigation and understanding. The content contained in the "identification system" is more complicated: Set the Historical context ; Define the landscape; Survey & Document; Conduct detailed historical research. The rectification measures for CL are divided into five steps: no action, preservation, restoration, reconstruction, and adaptation[80]. In general, the characteristics of CL are maintained based on the status quo and historical statements and the importance of the CL. Simultaneously involves the development of resource protection goals and strategies, tourist management measures, budgets, action plans, and other content that require community participation, zoning planning, and phased implementation [36].

In summary, although the management procedures of the protection systems in the above areas are different, they generally follow the principles of CL that are supported by laws and policies, respect for local history and culture, multidisciplinary collaboration, and coordinated development of tourism, heritage, and landscape management.

2.3 Theoretical and Application of Sustainable Development

2.3.1 The Abbreviated History of Sustainable Development

In 1968, The Club of Rome, an informal international association, was founded in Rome. It aims to discuss and study the common problems faced by humanity and put forward new attitudes, new policies, and new systems that should be adopted to reverse the unfavorable situation[81]. The research team headed by MIT professor Dennis L. Meadows submitted the first research report, *The Limits to Growth,* after establishing the club in 1972. This report provided the basis for the germination of the thought of SD[82]. The United Nations Conference on the Human Environment held in Stockholm, Sweden, on June 5, 1972, established the United Nations Environment Programme (UNEP)[83]. The document formed by this conference-*Our Common Future* report defined 'sustainable development' as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs". It has played a significant role in the final formation and dissemination of the concept of SD. In the 1980s, the term SD was used in the International Union for the Conservation of Nature's World Conservation Strategy (1980)[84]. The concept of SD did not receive international attention until 1987 when the World Commission on Environment and Development (WCED, Brundtland Commission) published *Our Common Future*. In 1992, the United Nations held the Earth Summit in Rio de Janeiro, and 168 countries signed the famous *Rio Declaration on Environment and Development* and *Convention on Biological Diversity* (CBD)[85]. Until the summit meetings in New York, USA, in 1997 and Johannesburg, South Africa, in 2002, both focused on SD and tested their global results, SD has gained international attention[86].

The SD of scholars committed to constructing theory and practice is not only a concept. In the early 1990s, physicist and economist M. Munasinghe, after analyzing the experience and process of economic development in various countries, believed that the development of a country should include three main goals: economic growth and social equity, and environmental stability. He proposed that the development of any country or place (including villages) should prioritize the balance between ecological, economic, and social factors[87]. In 2006, he founded the Munasinghe Institute for Sustainable Development and proposed the concept of "sustainomics" and a practical methodology[88]. Simultaneously, the ecological environment, economic growth, and social equity have become the three important pillars of sustainable development, and the theoretical connotation of SD has also been established[89]. This view was maintained until the beginning of the 21st century, before new challenges began. First, UNESCO initiated the *Universal Declaration on Cultural Diversity* in 2001[90]. Then, in 2005, it promoted the *Convention on the Protection and Promotion of the Diversity of Cultural Expressions*[91]. In 2009, the Spanish Municipal Government of Barcelona in United Cities and Local Governments produced a culture and sustainable development report. In this report, institutional innovation and cultural policy are the main points[92]. Subsequently, in 2010, the United Cities and Local Governments (UCLG) continued the report's main points and drafted the proposal of *Culture: The Fourth Pillar of Sustainable Development*. Culture has become the international consensus of SD and is considered the fourth pillar of SD by UNESCO. In May 2013, in Hangzhou, China, the Hangzhou government and UNESCO organized the

Culture: Key to Sustainable Development international conference and adopted the *Hangzhou Declaration* [93]. The theoretical connotation of SD includes four elements: environment, economy, society, and culture. According to the UN 2030 Sustainable Development Agenda, the 17 SD goals included four pillars of SD—economic, social, peace and security, and environmental sustainability.

2.3.2 Sustainable Development of the Cultural Landscape

SD is not just a theoretical concept; scholars are committed as much to the practice of SD as its theory The Diversity of Cultural Expressions) was first adopted by UNESCO in 2005 [94]. Culture has a crucial role in the Sustainable Development Goals (SDGs) [95]. On 19 November 2015, the 20th General Assembly of the States Parties to the World Heritage Convention (WHC) adopted a policy on integrating an SD perspective into the processes of the World Heritage Convention[96]. Both tangible and intangible goals need resources that are protected and carefully managed because they are the tractive force for achieving the SDGs and the enablers of culture-forward solutions that can ensure the success of interventions to achieve the SDGs. CL is regarded as a part of world heritage, as defined by the world heritage committee; according to the committee, "cultural properties represent the combined works of nature and of man" [97]. CL began to be protected by an international legal instrument after the UNESCO summit in Paris in November 1972 [98], when ensuring the sustainability of CL became a pivotal issue. There are at least 40,000 protected areas in the "*Nations List of National Parks and Protected Areas*" database of the United Nations Environment Programme (UNEP) and the World Conservation Monitoring Center (WCMC), which has great significance for CL and environmental protection[99].

CL is the essence of SD and has a significant link with the development cycle system [100]. Many scholars have researched the SD of CL, among whom W. Vos & H. Meekes[101] have highlighted their ambitions for the future of the SD of CL in regions with a long history from the perspective of landscape ecology and nature conservation to set out a new direction that integrates disciplines [102]. As CL is generated in the process of human transformation of nature, the role of humans cannot be ignored [103]. Zahra [104] incorporated the language of local architectural patterns in contemporary mountain architecture by documenting and conserving CL with the local community. Others identify the characteristics, structure, ecological value, and attributes of CL within the framework of SD to propose special indicators to orient to strategic design choices in CL reinvigoration and reuse projects [105–108]. Sustainable landscape management is an inevitable path for CL development [109].

The protection and inheritance of CL is the issue of SD. Maintaining the diversity of traditional cultural forms and the stability of natural ecology can enable the material forms of CL to have the ability to self-renew based on maintaining their inherent

characteristics to adapt to new changes. Therefore, rural cultural landscapes should follow the principles of SD in terms of protection and development, and utilization. Based on protecting natural resources and the ecological environment, we should pay attention to the changes in CL in time and space to realize the SD of CL. This paper proposed optimized strategies based on four pillars of SD for rural revitalization to support the management of traditional villages.

2.4 Research Gap

Traditional villages are villages with both a material and intangible cultural heritage that have high historical, cultural, scientific, artistic, social, and economic value. However, with the impacts of multiple challenges, such as agricultural modernization, urbanization, and the development of rural tourism, traditional villages are constantly being destroyed by construction, development, and tourism. Presently, the disappearance of the heterogeneity of cultural landscape (CLs) is becoming a common problem, and many traditional villages face inevitable destruction or even disappearance. Therefore, the formulation of optimization strategies for the SD of traditional villages is necessary to realize rural revitalization.

Chinese rural policies have already produced initial results, as evidenced by the recent signs of economic recovery and successful ecological conservation. However, several rural issues still need to be addressed, especially in northeast China. At present, research on CLs is mostly limited to the ancient villages in central and south China, whereas research on the traditional villages in northeast China with respect to landscape sustainability is lacking. In addition, there is still a lack of statistical research based on feedback from local residents on cultural landscape characteristics (CLCs). The main purpose of this study is to provide a decision-making basis for the development of a sustainability strategy for CLs and the cultural revival of traditional villages.

Chapter Three
Research Methodology

Research Design

Research Method

Data Sources

Reference

This chapter elaborates the research methodology in which the research design and main research procedures of the dissertation are explained. It begins by outlining the major research procedures in four phases. It then focuses on the synthetic research method, which includes geographical research, statistical research, interdisciplinary research, and methods of combining theory with practice. Finally, this chapter presents the major data sources, such as the sample traditional villages, maps and geospatial data, and the questionnaire data.

3.1 Research Design

This study focuses on proposing an ingenious research framework for the SD of CLs. The main purpose is to highlight the influence of applying importance-performance analysis (IPA), the Geographic Information System (GIS), and the space syntax method to study the CL of the traditional villages in Changbai Mountain and reveal the future scenario of the research area.

This study is realized in the four following phases (as represented in Figure 3.1):

(1) Pilot Study（Chapter 4）

At this stage, the author applied field survey and literature review methods, which are the basis for obtaining research materials and analyzing and making arguments. In the field investigation, the primary data (first-hand information) were obtained by collecting local chronicles and other literature on the specific research objects, a questionnaire survey, interviews, and electronic maps. The existing relevant literature was compared and verified using the literature method. The areas that needed to be improved were identified, and then a new research perspective was developed. In the end, the traditional village samples in this dissertation were screened out, and a cultural landscape feature recognition system was proposed.

(2) Recognition and Identification of Cultural Landscape Characteristics Using the Geographic Information System and Space Syntax (Chapter 5)

According to the four pillars of SD, the author established a framework that includes a CL index system. This chapter used spatial syntax, GIS, spatial analysis, and other methods to conduct multi-dimensional analysis on village site selection, spatial form, street space, and residential features from large, medium, and small scales in this phase. In addition, Auto CAD and Depth Map software were used to calculate the integration of morphological variables, which represent the aggregation or dispersion degrees of one unit space and other spaces in the system. According to the pillar and goal of SD, combined with geographical, historical, and intangible culture factors, the characteristics of the traditional village CL in the Changbai Mountain region were extracted, which include both common

characteristics based on environment and economy and specific characteristics based on society and life.

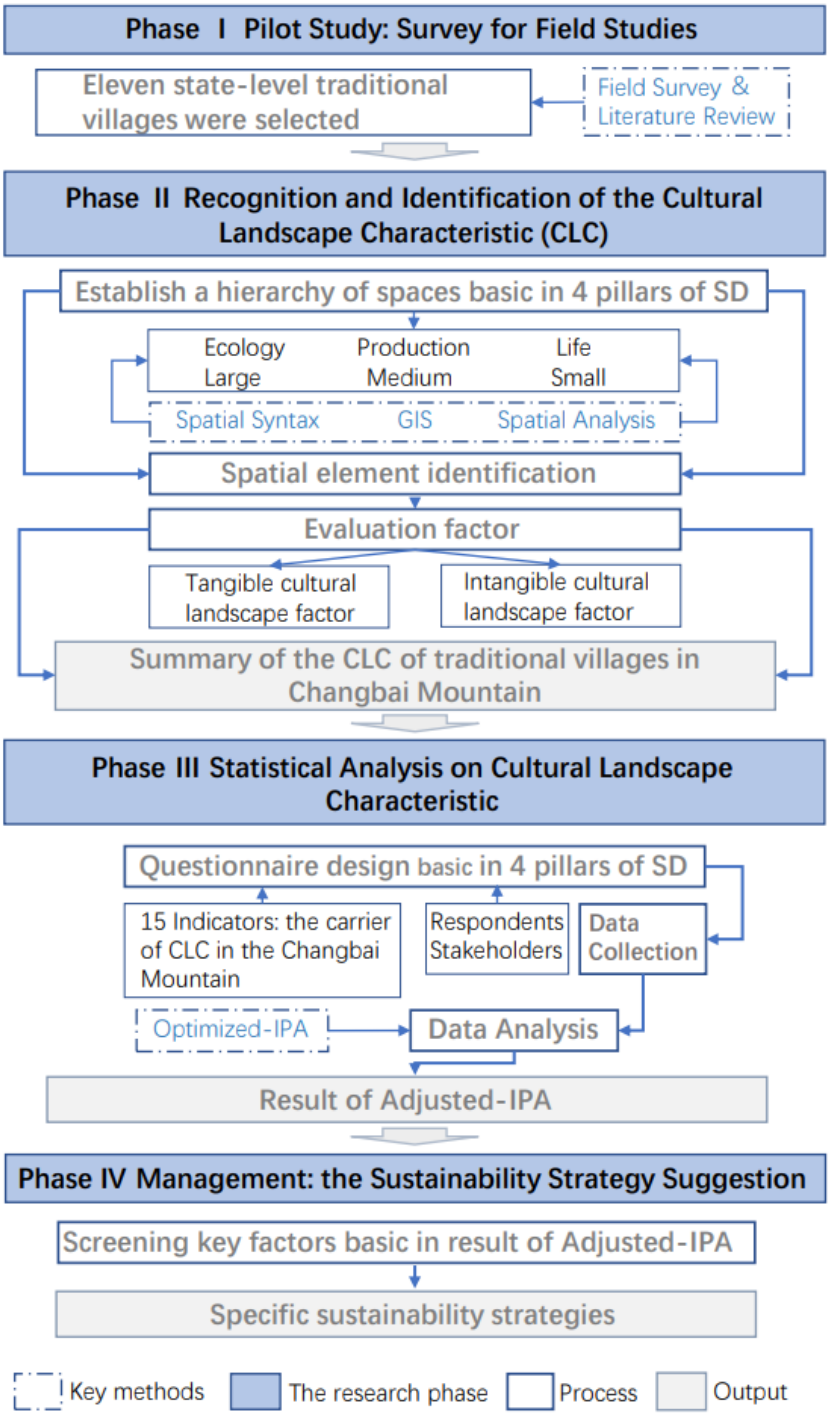

Figure 3.1. Research design of the dissertation

(3) Statistical Analysis of Cultural Landscape Characteristics Using the A-IPA Approach (Chapter 6)

Based on the cultural landscape characteristics (CLCs) of Changbai Mountain, the author extracted the corresponding evaluation index and established an index system based on SD. This research directly adopted 15 carriers of CLCs based on the four pillars of SD and verified the construct validity of the questionnaire by performing an exploratory factor analysis (EFA) [110]. Three IPA models were established: the traditional IPA (TIPA), modified IPA (MIPA), and adjusted IPA (AIPA) models. The aim of this phase is to make sustainability strategies more accurate by modifying the relationships between indicators in light of their relative impacts.

(4) Management: Sustainability strategy suggestions based on the results of A-IPA (Chapter 7)

Based on the results of the analysis of the AIPA of the stakeholders in the SD framework, with respect to the importance of stakeholder perceptions, sustainability strategies for developing traditional villages on Changbai Mountain were suggested.

This study comprehensively uses the methods of geography and statistics to conduct a systematic study of the cultural landscape of traditional villages in Changbai Mountain, which provides new ideas for research on the CL in a region with complex and diverse historical cultures.

3.2 Research Method

3.2.1 Combining literature investigation and fieldwork

The application of the literature survey method aims to collect, identify, organize, and research the literature to form a scientific understanding of facts [111]. This paper conducts in-depth research on the minority, cultural, and historical changes of villages by searching various documents and exploring their generation and evolution. In addition, through the literature search, the basic theories about the protection of the CL heritage—the research results of history, culture, architecture, ecology, and other related disciplines in the field of cultural landscape heritage protection—were consulted. Representative actual cases of cultural landscape heritage protection in the international arena, as well as relevant materials on ethnic villages, etc., were taken as the theoretical basis and guidance of the thesis.

The investigation method is one of the most common and basic methods in scientific research. It is a method of collecting materials about the actual or historical

situation of the research object in a purposeful, planned, and systematic manner, which includes historical methods, observation methods, and other scientific methods, such as conversations, questionnaires, case studies, and quizzes, to understand social phenomena systematically. Moreover, it involves analyzing, synthesizing, comparing, and summarizing the large amount of data collected in the survey [112]. This research summarizes the research report to integrate it into the research topic through multi-directional investigation and analysis of the field. In addition, the environments of settlements, monomer buildings, spiritual spaces, and other contents were studied in combination with literature from the perspective of the combination of subject and object.

3.2.2 GIS and space syntax

The GIS is a computer system that can comprehensively process spatial data and information [113]. In Chapter 4, establishing a related database includes dividing the scope of the study area and the specific geographic location of the village using the GIS and analyzing the geographic factors of Changbai Mountain. In Chapter 5, the GIS is further used to classify the slope of the study area, and the slope gradient of the study area is further divided by the GIS. Simultaneously, the ecological, production, and living spaces of the village are divided into the small-scale village model. Finally, space syntax is used to analyze the street structure of the village.

3.2.3 A-IPA method

In 1977, the IPA method was first proposed by Martilla and James and was mainly used for product attribute research [114]. Since the early 1990s, this method has been widely used in the evaluation of the tourism and leisure industries [115,116]. The IPA analysis method can map the obtained data in the four quadrants of the construction one by one and determine the order of optimization and improvement through the analysis of object limits. This helps managers integrate resources and optimize resources to improve user satisfaction. In Chapter 6, the A-IPA analysis method is used to construct a matrix based on the SD framework and EMS to obtain the scatter diagram of each indicator in four quadrants and to determine the optimization direction and resource allocation of each CL carrier by analyzing the characteristics of the quadrants.

3.2.4 The methods of multi-disciplinary integration and multi-dimensional analysis

Research on CLs is a multidisciplinary field with many techniques [117]. The study of the sustainable development of CLs is a systematic project that has interdisciplinary, practical, and marginal aspects [32]. On the one hand, it is inseparable from the general methods of cultural geography, such as geographical information technology, urban and rural planning, architecture, and other disciplines with different research methods and trains of thought. On the other hand, people need to use the relevant

approaches of sociology, anthropology, statistics, history, and other disciplines. In this dissertation, many methods are used to deeply explore and demonstrate the historical value, artistic value, scientific value, and economic value of CLs, comprehensively improve the efficiency of CL research, and adjust management strategies.

(1) With the help of historical "literature analysis" and anthropological "field investigation," this dissertation investigates and excavates the characteristics and landscape history of traditional village CLs.
(2) With the aid of the "typology" and "morphology" methods of geography and architecture, traditional settlement morphology and prototype identification were carried out based on GIS, contributing to the classification of landscape characteristics and the analysis of the macro environment of site selection based on geography-based spatial information technology [118].
(3) The middle-scale and small-scale spatial analysis of tangible CLs are realized by means of cultural context cognition in space syntax and the physical mapping of architecture.
(4) The CL characteristics and the impact factor of the landscape are rationally judged through a sociological "collective interview method," an "in-depth interview method," and other forms.
(5) The questionnaire method was used to conduct online questionnaire surveys of relevant residents and tourists in the Changbai Mountain area.
(6) Based on the structural equation model of the four pillars of sustainable development and the IPA method of optimization in statistical methods [119], the sustainable development management strategies of traditional villages are studied to discuss the path of CL protection and the SD of traditional villages in Changbai Mountain.

3.3 Data Sources

3.3.1 Traditional villages

The list of traditional villages for the dissertation was selected from the five batches of a national "*List of Traditional Villages*" published by the Ministry of Housing and Urban-Rural Development, the Ministry of Culture, and the Ministry of Finance from 2012 to 2018. A total of 16 traditional villages in Jilin Province were included, and 11 "Chinese traditional villages" were selected as the research objects in this dissertation.

3.3.2 Maps and geospatial data.

Geographic location information derives from open Internet resources, such as the national basic geographic information data in the National Geomatics Center of China (NGCC) and ENVI remote sensing images. The topographic data on the National Basic

Geographic Information website (nfgis. nsdi. gov. cn) [120] derives from the Chinese Academy of Sciences' Geospatial Data Cloud (http: / /www.gscloud.cn /) website [121]. In this study, an electronic map with 1/5,000 vector data was used, which covers all unincorporated villages in the study area in detail and can provide exact location information. The geographic information obtained through public channels, such as Google Earth and the Baidu Map, constitutes the supplementary data for this research.

3.3.3 Data collection of conventional architecture, folk culture and intangible cultural landscape

Conventional architecture, folk culture, and intangible CL materials of traditional villages come from the sorting and screening of literature. Appendix II shows the Chinese monographs and literature I consulted during the preliminary investigation. It includes work on residences and buildings, historical data on science and technology, local chronicles, manners and customs, and regional culture and minority culture. It objectively demonstrates the history, culture, and local characteristics of traditional villages in Changbai Mountain from all levels. In addition, I investigated many related materials in foreign languages.

Moreover, the official in Dapuchahe Village provided information for us to study the village's historical transformation. The director of the Yanbian Autonomous Prefecture History Museum was very active in helping us investigate the Korean villages. Maintaining and restoring the local CL features is the common aspiration of those managers and local officials.

3.3.4 The questionnaire data

From March to June 2020, an online questionnaire was distributed to officials, official institutions, and non-governmental organizations in the surveyed regions. A total of 428 copies of the questionnaire were collected; 33 invalid questionnaires were eliminated, and 395 copies were recovered.

Chapter Four
Pilot Study

Introduction

Literature, Data and Their Sources

Research Area

Results

Summary

Reference

4.1 Introduction

The Changbai Mountains have an exceptional cultural background given their long-established history, while their traditional rural cultural landscape (CL) is unique. However, owing to rapid urbanization and other factors such as industrialization, traditional settlements in the Changbai Mountains have suffered varying degrees of damage, with some of them even disappearing altogether. Considering that the number of preserved villages is limited, it appears that the historical and cultural elements of the villages have not been well preserved, and many landscape patterns have been seriously damaged. It is particularly significant and imperative to systematically explore the landscape of traditional rural settlements in the Changbai Mountains, construct a special index system of traditional village landscape in the region, and conduct relevant academic studies on landscape protection of typical variable settlements. This is also the focus and difficulty of the study on the CL of the Changbai Mountain, a regional village, and it is also the point where this research hopes to make a breakthrough.

In order to excavate the CL characteristics of traditional villages, this chapter aims to analyze and study the environmental status of the region, such as elevation, slope, aspect, hydrology, and other natural conditions, by applying the *geographic information system* (*GIS*) to the two spatial dimensions of the Changbai Mountain mountainous area and the Changbai Mountain region in the broader sense, paving the way for subsequent chapters to explore the identification of tangible CL characteristics. In additional, according to the investigation and literature search, the elements of CL are organized, and the authenticity and accuracy of the data information and demonstration research are enhanced, in contrast to the specific status quo of the research object and experience. Through an analysis of various documents and records, this study ascertains the formation and changes in the CL of traditional villages. In addition, through literature survey, the history, culture, customs, and other intangible CL foundations of villages in the Changbai Mountain area are elucidated. Consequently, a comprehensive analysis is conducted to analyze the identification index of traditional village CL characteristics in the Changbai Mountains to provide a basis for subsequent chapters.

4.2 Literature, Data, and Their Sources

The historical and humanistic documents of the Changbai Mountain area include a wide range of publications such as county, city, and local annals, place–name examination, forestry annals, Jilin customs, and administrative division maps of Jilin Province during different historical periods as well as other relevant materials. According to the classification characteristics of CL, combined with the development process of the Changbai Mountain area, representative materials are selected. These comprehensive data reflect the dynamic process of the completion, development, stability, and intensification of traditional villages in the Changbai Mountains, and accurately reflect the economic, social,

and ethnic conditions of traditional villages at that time. Geographical data are mainly derived from the topography and geomorphology of the Changbai Mountains, DEM data from the Geospatial Data Website of the Chinese Academy of Sciences (http: / /www. gscloud, cn /), and the 1:50 map of Jilin Province after substantial investigation and correction.

Some of the information in this study comes from field surveys. For example, there is limited information on Dapuchaihe Village in the literature. The author contacted city officials in Dunhua in charge of Dapuchaihe Village: Secretary Chen and Mayor Hao. The historical and cultural changes in Dunhua and Dapuchaihe were dictated by Secretary Chen and Mayor Hao and recorded online by the author. Meanwhile, the author actively contacted and cooperated with the government, museums, tourism companies, non-governmental organizations and other groups, and focused on solving the practical problems of the optimization of the development of CL in the process of urban and rural development, such as the optimization of human settlement environment and the protection and development of CL.

In the actual operation process, on-site investigations and literature studies were repeated and complemented each other. Several important research locations and points were also supplemented with the deepening of the author's understanding.

4.3 Research Area

4.3.1 The Abbreviated History of the Changbai Mountains

The Changbai Mountain area is one of the cradles of nurturing ancient Chinese history, and a place where many ethnic groups are active. According to historical statistics, since ancient times, about a hundred ethnic groups have survived, developed, migrated, evolved, and merged here. The ancestors of the Northeast had multiplied and lived in the Changbai Mountains during the primitive society. The ancient people of northeast China began to enter a patriarchal society. Many tribes living there gradually merged into four ethnic groups, namely the Sushen (肃慎), Yemaek (秽貊), Donghu (东胡), and Huaxia (华夏). They successively established their own national regimes in the Changbai Mountain area, namely Buyeo (夫余国), Goguryo (高句丽国), Balhae (渤海国), Daejin (大金国), and later Jin (后金国), and ultimately created the Qing regime that ruled the entire country. In general, the Changbai Mountains were developed relatively late, since it was designated as a holy land during the Qing Dynasty, after being considered as the birthplace of the Manchu. In the seventh year of the Kangxi Emperor's Reign (1688), the land reclamation order of Liaodong was abolished and access to the Changbai Mountains was banned by building a wicker border. People were forbidden from entering the mountain for grazing, hunting, and ginseng gathering for more than 200 years. Therefore, the Changbai Mountain Reserve basically maintains its original state. However, with the influx of refugees for reclamation

and occupation by imperialist countries owing to political corruption of the Qing Dynasty since the mid-19th century, the Changbai Mountains were impelled to become an important timber production base. Railways and roads were built in the Changbai Mountains to transport timber, and they were heavily guarded along the route. On the eve of the end of the Second World War, the forests along the railways and highways in the Changbai Mountains were almost completely deforested.

The earliest records of the Changbai Mountains appeared in the pre-Qin era (before 221 BC). In the *Classic of Mountains and Seas*, the first popular geographical work in ancient China, it is referred to as "Buxian Shan," arising from the "Hexagrams Xian" in the *Book of Changes*, meaning it has the sense of immortals. This title demonstrates the awe held by ancient ancestors toward the Changbai Mountains, and all the ethnic minorities living in Northeast China expressed admiration and deification for the largest mountains in the region. It was called Tutai Mountain during the Northern and Southern Dynasties (420–589). According to the Book *Tang · Biography*, the Changbai Mountains were called Taibai Shan during the Tang Dynasty (618–907). Since the Changbai Mountains are considered to be the birthplace of Jurchens, in the year of Mingchang of the Jin Dynasty (1190–1196), a temple was built on the Changbai Mountains, and it came to be considered a holy land. After the Liao (916–1125) and Jin (1115–1234) dynasties, the name Changbai Mountains" began to be widely used [122]. Changbai Mountains was not only referred to in the literature, but it also affected the naming of administrative divisions. In the Liao Dynasty, the "Changbai Mountain Jurchen Mansion" was established; in the Qing Dynasty (1644–1912), it was the "Changbai Mansion," the Republic of China (1912–1949) was renamed as "Changbai County"; the People's Republic of China was established as "Changbai Korean Autonomous County," etc. Until today, the name Changbai Mountains has a history of nearly a thousand years, and it has become the designated name for these mountains.

Since ancient times, the Changbai Mountains has been constantly worshipped. In the Qing Dynasty, it reached the pinnacle of perfection, and not only hired scholars to fabricate the myth of the ancestors of Aisin Gioro, but several outstanding emperors of the Qing Dynasty Kangxi, Qianlong have personally visited the Changbai Mountains to offer their worship. From the myth of the birth of the ancestors, to the worship of Emperors Hongtaiji, Shunzhi, and Kangxi, the Qing Dynasty exalted the Changbai Mountains to an extremely lofty throne.

The Changbai Mountains can be considered the cradle where people from all ethnic groups in Guandong have flourished for generations and the ecological barrier of the three Provinces of Liaoning, Jilin, and Heilongjiang. The Changbai Mountain culture has a long-standing history. It is not only considered the cradle of the Liao, Jin, and Qing Dynasties but also a vital subculture in northeast China. This complex transformation of history and culture is crucial for studying the characteristics of the Changbai Mountains' regional CL.

4.3.2 Geographical Location of Research Area

4.3.2.1 Natural environment

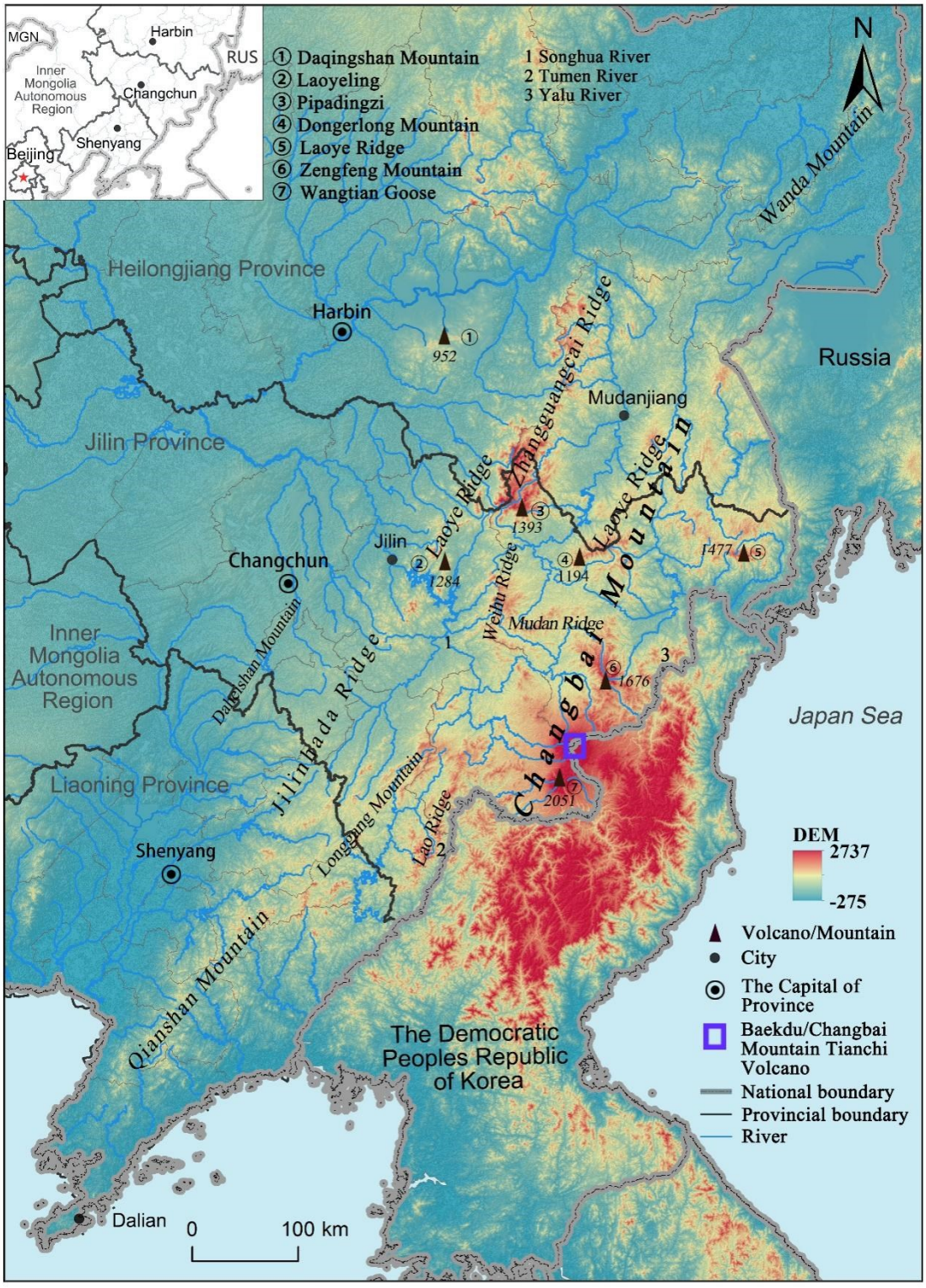

Figure 4.1. The Changbai Mountain System

The geographical location of the Changbai Mountains, broadly defined, is located in the eastern mountainous region of Northeast China, between 38°46′ ~ 47°30′N latitude and 121°08′ ~ 134°E longitude. Starting from the northern foot of the Wanda Mountain range in the north and extending to the Laotie Mountain range in the south, it is about 1,300 kilometers long and about 400 kilometers wide from east to west, in a spindle shape with an area of about 280,000 square kilometers, as shown in Figure 4.1. It is composed of multiple rows of northeast–southwest parallel fold fault mountains, basins, and valleys [123]. The eastern column contains the main vein of the Changbai Mountains. In a narrow sense, the geographical location is divided into the main peak of the Changbai Mountains and its surrounding areas in the southeast of Jilin Province. A portion of the border between China and North Korea is part of North Korea, also known as Baekdu Mountain. However, the research area in this study refers to the mountainous area of the Changbai Mountains, located in the east and north of Jilin Province and borders the Provinces of Heilongjiang and Liaoning in the southwest, and is adjacent to North Korea and Russia in the southeast and east, respectively**.** The Changbai Mountains generally has a temperate continental mountain climate affected by the monsoon, and the climate has diversity [124]. The main climatic features are: long and cold winters, short and cool summers. The eastern side of the Changbai Mountains is influenced by the Sea of Japan, which is warm in winters and cool in summers, such as the valley plains in Yanbian. There is no summer above 1,200 meters, and the spring and autumn are combined. Precipitation monsoon characteristics are obvious, generally concentrated in summer, accounting for more than 60% of the annual precipitation. The low altitude area experiences more southeast winds in summer, more westerly winds in winter, and the prevailing westerly wind at the top of the mountain all year round. Within a radius of 50 kilometers with Tianchi as the center, the Changbai Mountains can be classified into three climatic zones: mid-temperate, cold temperate, and sub-frigid. Within these three climatic zones, there are four climatic subdivisions. Considering active accumulated temperature as the boundary, it is classified into seven humid climate zones. The dense river network in the Changbai Mountains is the "source of the three rivers": Yalu, Tumen, and Songhua. The drainage pattern is radial.

4.3.2.2 Natural resources

The land resources in the Changbai Mountain area belong to the mountainous land resource zone of dark-brown soil in temperate mixed coniferous and broad-leaved forest in eastern Jilin Province in the land resource zoning system of Jilin Province. The land area of the Changbai Mountains spans 9581118.96 hectares, of which the Yanbian Korean Autonomous Prefecture accounts for 45.4%; Tonghua City 16.3%; Baishan City 18.2%; and Jilin City's Panshi, Huadian, Jiaohe, and Liaoyuan City's Dongfeng 20.1 %. Forestland accounts for 77.16% of the land area of the Changbai Mountains, farmland 13.48%, orchards 0.8%, pasture 0.4%. The Changbai Mountains are an important forest

timber base, with more than 80 types of economic trees. The Changbai Mountains also has a diverse variety of wildlife[125]. The place abounds with medicinal plants, including ginseng, codonopsis, fritillaria, and schisandra fruit, among others. The Changbai Mountains are also rich in tourism resources.

Precipitation in the Changbai Mountains is abundant, with the annual precipitation mostly reaching more than 600mm, while in the south it is 800–1,000mm. The precipitation during the growth period of crops is 400–500mm, accounting for 57.5% of Jilin Province. Local precipitation is more in the mountainous areas than in plains, coastal areas than inland areas, windward slopes than leeward slopes in mountains, and high-altitude than low-elevation places. Water resources in the mountainous area of the Changbai Mountains are abundant. The Songhua River originates from the Tianchi of the Changbai Mountains and has abundant water, with a navigable mileage of 657 kilometers, and a navigable mileage of 298 kilometers during dry seasons. The Yalu River rises at the southern foot of the main peak of the Changbai Mountains and is 596 kilometers from its source to the Hunjiang River estuary. The Tumen River originates from the northern foot of the Changbai Mountains and flows into the Sea of Japan via Fangchuan, spanning a total length of 520 kilometers. The Tumen River's navigable mileage is 159 kilometers, with the navigable mileage in the dry season at 20 kilometers. The light energy resources in the Changbai Mountains are insufficient, and heat resources are extremely insufficient. The heat resources are distributed unevenly, decreasing from low latitudes to high latitudes. There are abundant wind energy resources.

The natural environment is the main reason for the production-style and life-style of the Changbai Mountain area. An understanding of the natural environment such as climate, hydrology, landform, and animal and plant resources is conducive to the analysis of the cultural landscape characteristics in the following chapters.

4.3.2.3 Social circumstances

① Administrative divisions

In terms of administrative location, it forms a border between China and North Korea, demarcating the national boundary. To the north of the Changbai Mountains lies China, and to the south is North Korea. The Changbai Mountain system comprises the administrative region of Liaoning, Jilin, and Heilongjiang Provinces within China. Within the boundaries of Liaoning Province, there are 24 cities and counties, including Shenyang, Fushun, Anshan, Dalian, and Dandong (Figure 4.1); 29 cities and counties in Jilin Province, including Changchun City, Siping City, Jilin City, Tonghua City, and Yanji City; and 26 cities and counties in Heilongjiang Province, including Harbin, Jiamusi, Mudanjiang, Jixi, and Qitaihe. Table 4.1 and Figure 4.2 show the administrative regions included in the research areas mainly discussed in this paper. These regions include the Korean Autonomous

Prefecture-level cities of YanbianBaishan, Tonghua and its counties (cities), and Jilin City under the jurisdiction of Jiahe and other cities, prefectures, counties (cities) and districts (25).

Table 4.1. The Administrative Scope of the Changbai Mountain Mountainous Areas

Name of prefecture-level city and autonomous prefecture	Name of county-level city, district, and county
Korean Autonomous Prefecture of Yanbian	Yanji，Tumen，Huichun，Dunhua，Longjing，Helong，Wangqing，Antu
Baishan City	Linjiang，Jingyu，Fusong，Jiangyuan，Changbai Korean Autonomous County，Hunjiang
Tonghua City	Dongchang，Erdaojiang，Jian，Meihekou，Tonghua，Huinan，Liuhe
Jilin City	Huadian，Panshi，Jiaohe
Liaoyuan City	Dongfeng

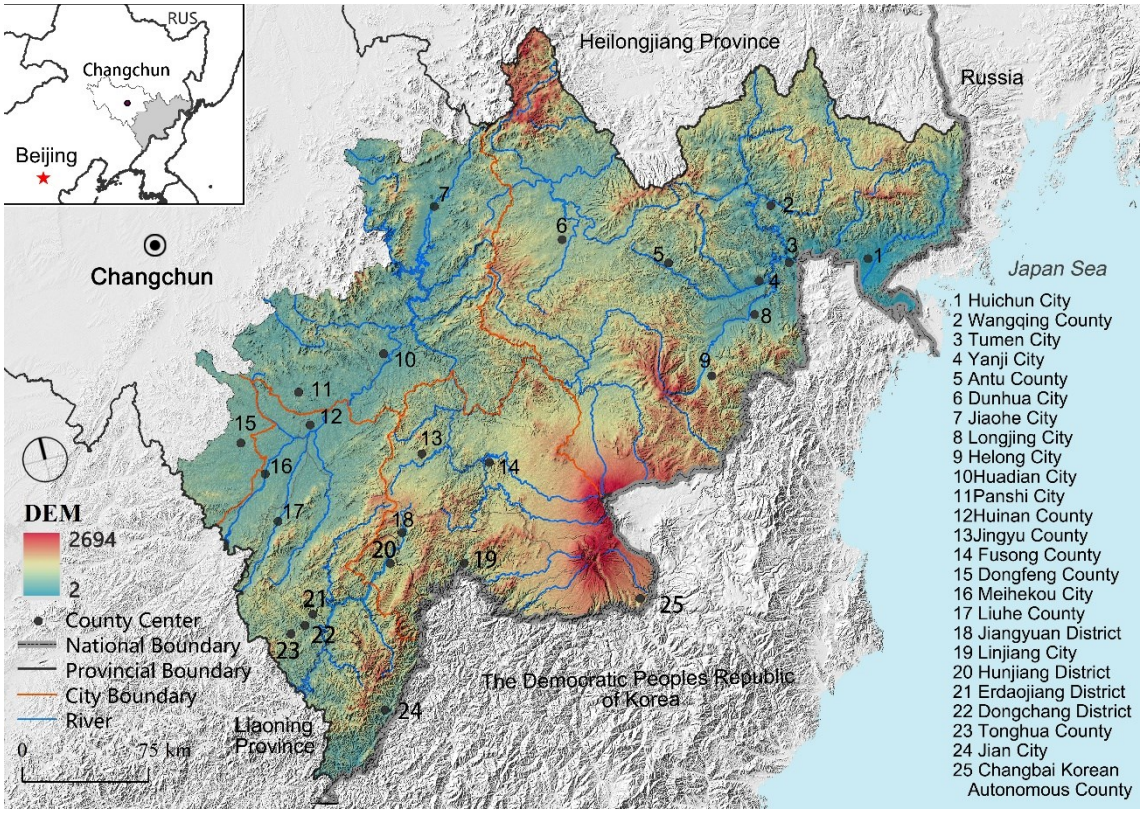

Figure 4.2. The Scope of the Changbai Mountain Mountainous Areas

②Ethnic composition

Since ancient times, the Manchus and their ancestors (Sushen, Yilou, Wuji, Jurchen,

etc.) have been living in the Changbai Mountains for generations. Jianzhou Jurchen unified the various tribes of Jurchen during the Ming Dynasty, and gradually formed a whole is a sign of the formation of the main part of Manchu. The underground archaeological discovery proves that as early as the pre-Qin period, the minority culture in the Changbai Mountain area has been influenced by the Han culture in the Central Plains. The Han people in the Central Plains have gradually entered the Changbai Mountains through various channels. From the early years of Jiaqing (1760–1820), a large number of refugees from the pass entered the hinterland of Jilin and gradually spread to the west, southeast, and northwest of the Changbai Mountains. They are mainly engaged in ginseng gathering, fishing and hunting, logging, and reclamation. The Hui nationality first entered northeast China around Guangxu during the Qing Dynasty (1450s), with the number of Hui nationals entering Jilin reaching its peak in 1877. In the eighth year of Tongzhi (1869), a large number of Koreans from the Hamgyong area crossed the Tumen and Yalu Rivers to migrate to eastern Jilin Province. In the 1930s and the 1940s, some Koreans from the south of the Korean Peninsula migrated to the Changbai Mountain area. In 1937–1941, more than 24,000 North Korean families migrated to Northeast China. The Korean nationals who moved to the Changbai Mountain in Jilin Province developed and built the Changbai Mountains along with other ethnic groups in China. They have made contributions in the course of a difficult history and gradually merged into the 56 ethnic groups in China.

With natural changes and social development, the Manchus, the Hui, the Han from the Central Plains, the Koreans who migrated, and other ethnic minorities are in the process of changing migration, their cultures merged and their economies developed together. After 1949, owing to factors such as marriage migration and job transfers, the proportion of the minority population gradually increased. Currently, the Changbai Mountain mountainous can be considered a multi-ethnic area inhabited by the Han, Manchu, Korean, Mongolian, Hui, and Xibe communities. The Han people accounted for 73% of the total population, Manchu 19%, Korean 7.6%, Hui 0.13%, and other minorities 0.27%. The Changbai Mountain mountainous area has gradually transformed into a multi-ethnic cultural region, with distinctive characteristics and a developed society.

The Changbai Mountains have a long-standing history. It is not only considered the birthplace of several dynasties of ancient China, but also a region with multi-ethnic presence [126]. The culture of the Changbai Mountains imbibed influences from various cultures and eventually included multicultural characteristics. Owing to the influence of modern times, war, and the wave of immigrants, the Changbai Mountains are considered a symbol of Jilin culture. Traditional villages as the symbols of cultural heritage and bearing the trace and spirit of the historical and cultural development of the Changbai Mountains, provide significant data for studying the regional CLC of the Changbai Mountains. Therefore, this study discusses the SD of traditional villages in the Changbai Mountains by considering the CL of traditional villages in Jilin Province, which embodies the culture of the Changbai Mountains the most. The cultural resources of traditional villages in the

Changbai Mountain region are mainly derived from the cultures of various ethnic groups. Organizing and analyzing the cultures of various ethnic groups provide support for the carrier of CL characteristics in the following chapters.

4.4 Results

4.4.1 Research Sample

The research sample of this thesis includes 11 state-level traditional villages in the eastern and central parts of Jilin Province, mostly, Liu River, Huifa River, Songhua Lake, and the Jiaohe River systems as the boundary to the eastern border of Jilin Province. These sample villages include provincial-level intangible cultural heritage, popular historical and cultural towns and villages in China, and famous scenic tourist villages, taking into account the regionality and typicality of traditional villages, as well as the completeness of data acquisition, specific village locations and basic overviews, as shown in Figure 4.3 and Table 4.2.

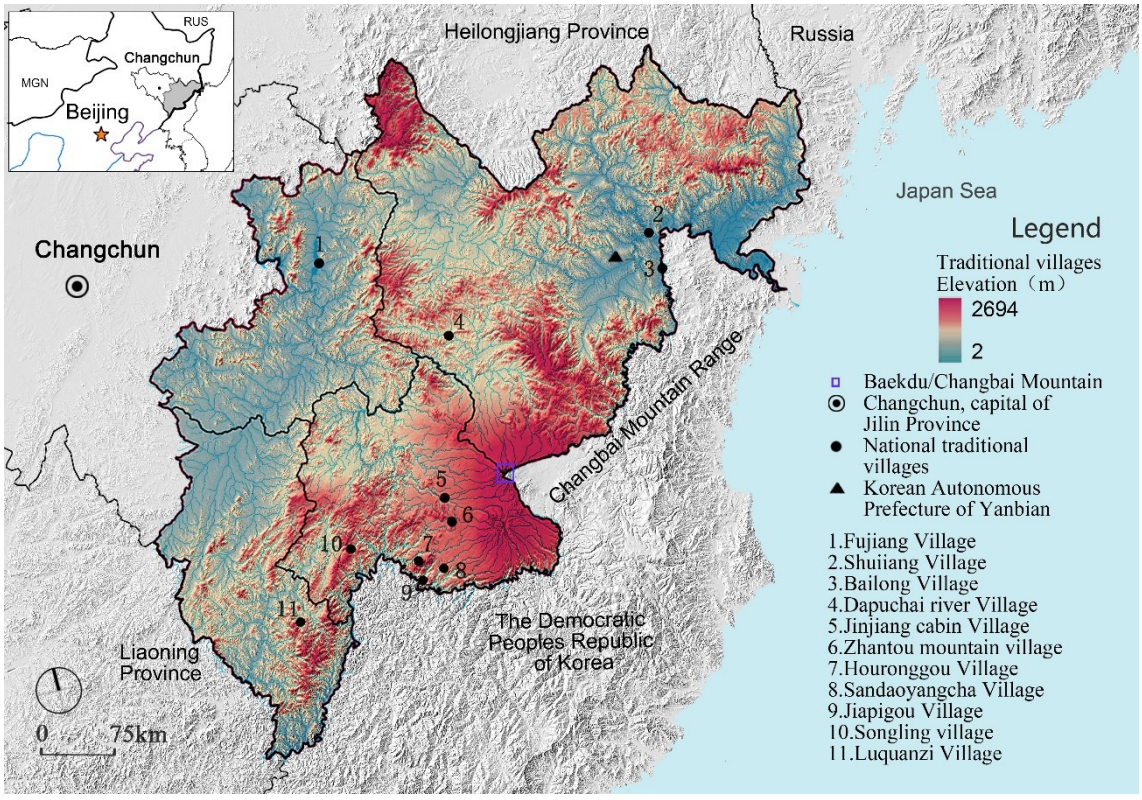

Figure 4.3 Geographical locations of the study samples.

As demonstrated in Figure 4.3, there are 10 villages located in the eastern part of Jilin Province and one in Jiaohe city in the central part of Jilin Province. Most traditional villages are close to the border between China and North Korea. The areas where these villages are mostly distributed are Jinjiang Cabin Village, Songling Village, Sandaoyangcha

Village, and Jiapigou Village located in the middle and low mountains of Baishan on the southwest slope of Tianchi Lake in Changbai Mountain. Next are Bailong Village, Shuinan Village, and Dapuchai Village in Yanbian Basin Valley at the northern foothills of the Changbai Mountains, Luquanzi Village in Tonghua City, and Fujiang Village of Jiaohe Valley in Jilin City at the western foothills of the Laoyeling Mountains.

Table 4.2. Overview of national tradition villages in the Changbai Mountain Region

County/ City	Village Names	Basic Survey
Tumen City	Bailong	Located on the banks of the Tumen River, the "100-year-old Korean Tribe of China" complex, which integrates local food and agricultural life, is known as the "First Village of Korean Agricultural Culture."
Tumen City	Shuinan	The village's original Korean traditional features are well preserved, and its farming culture, agricultural music, dance, and traditional sports are listed as part of the intangible cultural heritage of Jilin Province.
Dunhua City	Dapuchai River	Located on the north bank of Fule River, in the scenic area near the Zhenzhumen Hydropower Station, the original northeast traditional house with wooden logs on top of grass is preserved.
Fusong County	Jinjiang cabin	With a history of more than 300 years, it has the best protected Manchu wooden house community and is known as the "living fossil of Changbai Mountain wooden house culture." The intangible cultural heritage of this area includes wooden carving and building techniques that are unique to the Jilin Province.
Linjiang City	Songling	Located in the Huashan National Forest Park, Shandong Tun is famous for its cultural heritage of the Kanto wood. Its architectural layout maintains the image of an old-fashioned mountain village in Kanto.
Linjiang City	Jiapigou	Located in the hilly area on the south bank of Yalu River, it has a history of approximately 100 years of tobacco cultivation and the village pattern is well preserved.
Linjiang City	Huoronggou	It is located in a remote mountainous and hilly area with dense primeval forests, wooden buildings, and mud houses.
Linjiang City	Zhuantou Mountain	Founded during the Qing Dynasty, it is located in the dense forests and mountainous areas at mid-altitude and retains the wooden buildings and the original ecology of the Changbai Mountains.
Linjiang City	Sandaoyangcha	The amphibious transportation hub. It is also a typical Korean settlement left over from the "forced group immigration" during the second Sino–Japanese war.
Jiaohe City	Fujiang	The most beautiful traditional village in the country. The river system is developed with dense river networks. The village, with an average elevation of 260 meters, is located at the downstream stretches of a river in a mountainous area.
Tonghua County	Luquanzi	Folk villages with Manchu, Korean, and Han nationalities are also famous art sketching bases in the Changbai Mountain area.

4.4.2 Construction of identification index system for cultural landscape characteristics

The identification of the cultural landscape characteristics (CLC) is to recognize

the cultural features of traditional village cultural heritage landscape from multiple perspectives. The exploration of the characteristics of traditional villages has been ongoing [127,27]. Generally, the research of the characteristics is mostly based on value evaluation, which is conducted from the perspective of tourism [128,129], environment [130-132] and sociology [133,134], the evaluation objects are mostly directed at villages with a rich historical and cultural value, high reputation, or developed villages [128,135]. In terms of evaluation methods, it has experienced the stages of qualitative description and assessment [136], quantitative evaluation [137,138], and the combination of qualitative assessment and quantitative evaluation [139]. The evaluation results are mostly presented in the manner of the comprehensive value of the village to facilitate village selection, tourism development, etc. Based on previous studies, traditional evaluation methods tend to lead to the neglect of villages with unique value in one or several aspects.

The traditional villages of the Changbai Mountains include a variety of ethnic groups, and there are widespread differences in the cultural heritage, history, and scale of the villages. It is impractical to proceed with value mining following the general value evaluation standard. Only by constructing a regional value evaluation system to evaluate its multi-dimensional value and tap the potential unique value of the village to implement targeted protection can it be feasible. By exploring and summarizing the literature, this study deconstructs the characteristics of traditional village cultural heritage, that is, it analyzes the attributes and characteristics of traditional village CL, and deconstructs it into tangible CLC (including environmental, architectural characteristics) and Intangible CLC (including custom, dialect, minority, and belief characteristics). The traditional village CLC identification index system subdivided the attributes and characteristics of cultural landscapes into seven categories and fourteen indicators (Table 4.3). The seven categories are as follows: ①Environmental characteristics of villages: The selected indicators are the traditional village site selection and pattern reflecting the external geographical geomantic environment characteristics, as well as the plane form, spatial layout and street pattern reflecting the internal environmental characteristics of villages; ② Architectural characteristics are mainly reflected in the recognizable and iconic architectural landscape elements in traditional villages. The characteristics of traditional vernacular dwellings can be further refined into three levels of indicators such as the internal space, courtyard form, roof shape, heating method, building materials, and partial decoration of traditional dwellings；③The production mode mainly refers to the traditional production mode of the Changbai Mountains, such as forestry, fishing, and hunting; ④Traditional folklore involves the customs in traditional villages such as weddings, funerals, festivals, meals, and entertainment; ⑤Minority characteristics are extracted by identifying the cultural characteristics of the villages inhabited by the Korean, Manchu, and Han ethnic groups, which overlap with other identification indexes; ⑥Traditional arts are embodied in literature, opera, ballad, and dance; ⑦Belief characteristics: the belief objects of residents in traditional villages are used as identification indicators.

Table 4.3. Identification index system of CL characteristics in the Changbai Mountain traditional village

CL Category	Identification index		Specific explanation
Tangible Cultural landscape	Characteristics of village environment	Village Site Selection	Geographical and geomantic environment pattern
		Plane Form	Form of village groups
		Street Pattern	Network structure of the road
	Architectural feature	Courtyard Shape	The architectural pattern formed by living habits
		Building material	Adobe, Wood, Masonry, etc.
		Roof modeling	Gabled roof top, hill hard top, etc.
		Partial decoration	Windows, chimney, etc.
		Interior space	Internal pattern of dwellings
		Heating mode	Form of Kang
Intangible Cultural landscape	Production	Conventional skill	Conventional production technologies, Forest, Fishery, Rafting, Ginseng gathering, Hunting, etc.
	Custom	Life customs	Weddings and funerals, Festival, Dietary habit
	Ethnic minority	Ethnic composition	Han, Manchu, Korean
	Traditional art	Culture Literature Art	Legends, Local operas, Songs, Dances
	Religious	Religious	Shamanism

4.5 Summary

This chapter is the first stage of the main research of this thesis, and it also lays the foundation of the fifth chapter. In this stage, the history, geography, humanity, and social background of the Changbai Mountains were organized and analyzed by searching various literature records and detailed long-term research and investigation. In addition, through field studies and analysis of village-related literature resources, the basis for the analysis of the characteristics of the Changbai Mountain CL was obtained. Finally, 11 traditional villages were selected as research objects and the relevant identification index system was established.

Chapter Five

Recognition and Identification of the Cultural Landscape Characteristic

Introduction and Literature Review
Research Method
Results
Discussion
Summary
References

5.1 Introduction and Literature Review

The core of protecting the CL of traditional villages is to preserve and develop the cultural landscape characteristics (CLC) of traditional villages. For an effective basis for preservation and management, the CLC of the villages need to be clarified first. The cognitive perspectives and identification method is for CLC have been studied by several experts in related fields. From existing literature, it can be seen that research on CLC primarily focuses on cultural heritage [140], ecological characteristics [71], natural resource management and conservation [141,142,137], historical tradition and landscape gene [143], and tourism development [144,145].

The various research methods related to CLC are cross-disciplinary, extensive, and comprehensive. It involves research from the perspectives of space, terrain, and visualization, given that unique geographical characteristics form the banner of regional culture, supporting a region's landscape features, valuable habitats, and ecosystems as well as aesthetic and other cultural qualities [146]. Furthermore, the spatial layout of traditional villages is important for the vitality of villages and the preservation of local culture [147]. For example, Gulinck and Wagendorp used the fragmentation analysis method to determine the difference between the actual and reference landscape structure indicator yields [148]. For various ranges of conditions and characteristics, based on the regional characteristics of traditional villages, a systematic analysis of the formation factors of rural landscapes was carried out by Di and Modica [149]. Peilin explored the origin of CLC from the perspective of “the landscape gene method” in cultural geography theory and established a system for identifying CL [150].

As the carrier of living cultural heritage, traditional villages embody the regional CL features formed under the comprehensive effects of natural resources, history, architectural aesthetics, integration of ethnic groups and production methods, and the symbiosis between human beings and the environment. CLC has a significant link with sustainable development (SD). This chapter takes the case of the Changbai Mountain traditional villages to explore an approach of identifying CLC. Accordingly, we first developed a cultural landscape index system based on the pillar of SD, using space syntax, GIS spatial analysis, and multi-dimensional analysis to analyze the CL features of the Changbai Mountains under the dimension of regional culture. Finally, we identified the factors that describe the historical and intangible characteristics of CL for SD of traditional villages in the Changbai Mountain region. A quantitative analysis of the SD of the Changbai Mountain traditional village CL aims to determine the basis and index analysis method for the SD of the Changbai Mountain traditional village CL. The results provide evidence for deciding the balance point of SD to support the protection and revitalization of villages simultaneously.

5.2 Research Method

5.2.1 Analytic framework

It is an important method of human geography to research the significance of landscape based on the division of landscape space. Based on the use of rural land [151] and its evaluation [152], in this thesis, spatial classification includes three types of dimensions: *Ecology*, *Production,* and *Life* which are also three spatial scales through. They are coupled with several pillars of SD, such as environment (ecology), economy (production), and society (life), while peace and security are the other aspects of social life in regional development and the embodiment of comprehensive factors. Just as the Changbai Mountain region is located on the border between China and North Korea, traditional villages are composed of at least three ethnic groups (Korean, Manchu, and Han); hence, the peace and security in the region reflect the harmony of life classification. The existence of traditional villages is based on the content of spatial element identification, which is more specific. The author classifies its scales into three types of measures of relationships: large, medium, and small. Concurrently, spatial elements and evaluation factors mutually correspond, while evaluation elements constitute the characteristics of CL. Tangible CL includes village site selection, street layout, courtyard form, and architectural features. Intangible CL involves traditional skills, living customs, belief language, and ethnic composition.

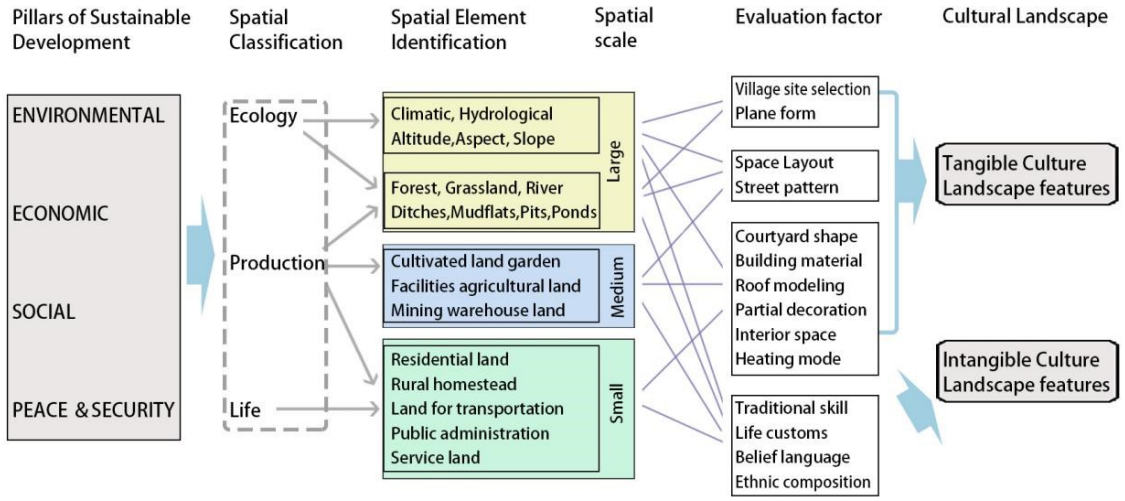

Figure 5.1. A framework for Sustainable Development and Cultural Landscape Characteristics

5.2.2 Application of cultural landscape metrics

This study is based on the pillar of SD, as shown in Figure 5.1. It establishes a CL index system, and uses spatial syntax, GIS spatial analysis, and other methods to conduct multi-dimensional analysis on village site selection, spatial form, street space, and residential features from large, medium, and small scales, and finally obtains the Changbai Mountain CL features under the dimension of SD. Sauer pointed out the dynamic role of culture, the natural environment is the material of cultural evolution, while the cultural landscape is the result of the presentation. The local residents' choice of the ecological environment (site selection), the formation of production mode (street pattern), and living customs (dwellings and interior space)) are all influenced by cultural factors. In addition, Sauer proposed cultural landscape includes: Factor (culture); Medium (natural landscape); Forms (Housing population communication). This also requires bringing the perspective of culture into the study of natural landscapes. Among them, the street space is a base map of space syntax that is analyzed based on the correction of Figure 5.3, corresponding remote sensing imagery and field investigation. In this study, Auto CAD and Depth map software are used to calculate the integration of morphological variables, which represents the aggregation or dispersion degree of one unit space and other spaces in the system. The study selected eight typical traditional villages to obtain their geometric analysis map of space syntax (see Figure 5.4). According to the pillars and goals of SD, combined with geographical, historical, and intangible culture factors, the characteristics of traditional village CL in the Changbai Mountain region are extracted, which include both common characteristics based on environment-economy and specific characteristics based on society-life.

5.2.3 Data

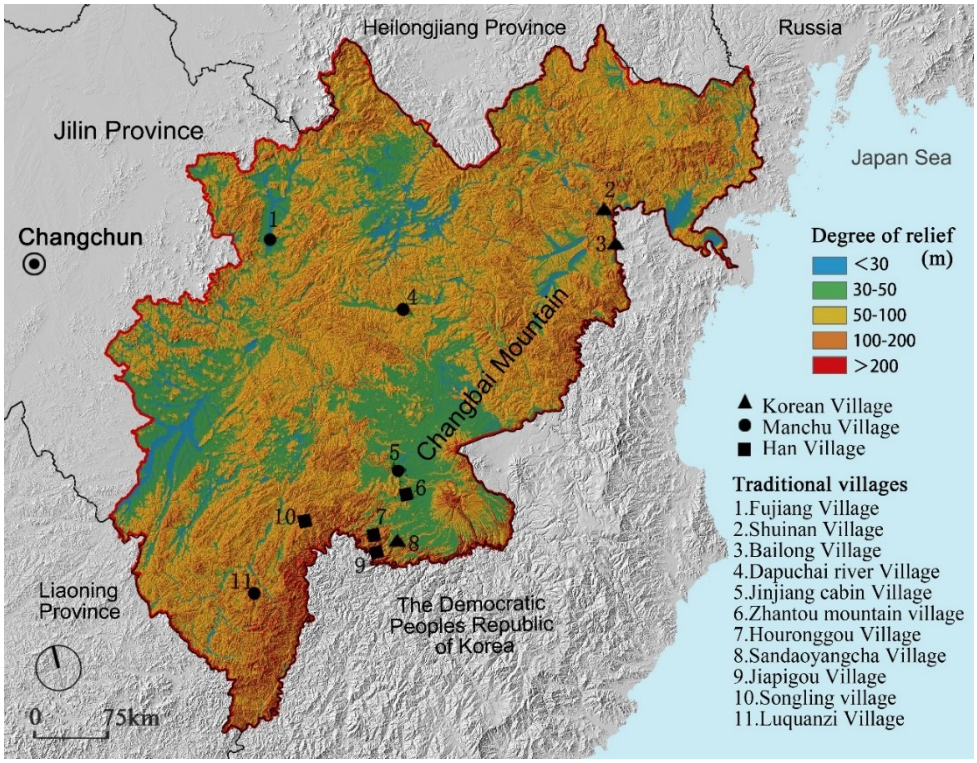

Figure 5.2. Degree of relief in the Changbai Mountain Area and distribution of 11 villages

According to the results of the previous chapter, 11 sample villages were selected, and the specific village locations are shown in Figure 5.2. The 30M elevation DEM data of the National Spatial Data Cloud (www.gscloud.cn) and the 1:500,000 map of Jilin Province have been corrected by actual investigations and combined with the related literature on the topography and geomorphology of the Changbai Mountain to use 16X16 grid data to analyze the topographic undulation of the study area. As shown in Figure 5.2, terrain undulations <30m are plains, 30–50m are platforms, 50–200m are hills, >200m are middle-low mountains. Based on topographic relief, the geomorphic condition and traditional village location, this chapter categorizes 11 traditional villages into four types: plains (such as Bailong Village, Shuinan Village and Hongqi Village), platforms (such as DapuChaihe village, Luhuan Village), low hills (such as Jiapigou Village, and Sandaoyangcha Village), and middle mountain-hills (such as Jinjiang cabin Village, Zhuantoushan Village and Songling Village). The traditional Korean villages are mainly distributed on the border of Yanbian Prefecture, namely the plains and terraces near the Tumen and the Yalu River basins. The traditional villages of Manchu are mainly distributed in the middle-low mountain areas of the Changbai Mountains.

5.2.4 Quantitative analysis of spatial form of villages

5.2.4.1 Axis model analysis

Space syntax is a mature and systematic method of spatial morphology analysis, which can clearly describe and simulate the spatial morphology relations and spatial behavior of the built environment [153]. The research object of space syntax is free space, and the basic characteristics of settlement morphology can be extracted by dividing large-scale space into a small-scale space [154]. The shape and street layout of traditional villages are formed through a long process. In this process, many factors are expected to have an impact on the form of the village. The space syntax explains the behavior and social activities of people in the network layout space through approximates of the flow of human activities with a straight line [155,156]. By analyzing the relationship between spatial patterns, and quantitatively describing the characteristics of various patterns of settlement spaces, the study evaluated the accessibility and integration degree of the village spaces. This chapter used the space syntax theory to analyze the spatial structure and patterns of eight traditional villages that represent the Changbai Mountain's cultural feature with the complete preservation of traditional village customs (see Figure 5.4). Through the analysis, the spatial attribute characteristics of each village are obtained, which provide a new way of thinking and basis for the analysis of the spatial CL of the village.

Firstly, eight village study areas were determined, according to the principle of space division to conduct space segmentation. The basic characteristics of the spatial form of traditional villages were extracted. Based on the axis method, the study then used the Depthmap software and the Axwoman spatial syntax plug-in in the ArcGIS software to obtain the quantitative parameter results. Finally, the spatial attributes of each element were evaluated by studying the location and interconnection of each element in the space.

Integration: The degree of integration reflects the degree of agglomeration or dispersion between a unit space and all other spaces in the system [157,158]. The larger the integration value, the more convenient the space in the system; otherwise, the space is in an inconvenient position. Similar to the spectrum in remote sensing image, space syntax uses color grading to indicate the integration value of spatial units to reflect the degree of aggregation or dispersion of a space relative to other spaces in the system. The calculation formula is as follow:

$$I = \frac{2(MD-1)}{n-2} \qquad (1)$$

In the formula, n is the total axis number or node number in the spatial system; MD is the average depth. The calculation formula of MD is as follows:

$$MD_i = \frac{\sum_{i=1}^{n} d_{ij}}{n-1}$$
$$D_n = \frac{2\{n[\log_2(((n+2)/3)-1)+1]\}}{(n-1)(n-2)} \qquad (2)$$

In addition, part of the data needs to be obtained through field research. For example, it is necessary to obtain information such as the spatial location, scale, function, construction time, and conservation situation of important spatial elements of traditional villages and their connecting paths through department visits and field surveys.

5.2.4.2 Data processing

This study obtained the geographical map data of the national traditional villages in the Changbai Mountains, and after verifying the selection based on the survey, it is used as the base map of the syntactic analysis. Subsequently, the base map was imported into AutoCAD software to vectorize the main roads and key nodes to construct the axis model. Finally, the axis model was imported into the Depthmap and Axwoman software for spatial syntax analysis to calculate the degree of integration and other morphological

variables.

5.3 Results

5.3.1 Tangible CL of traditional villages in the Changbai Mountains

5.3.1.1 Site Selection of Traditional Village Based on Environment

Owing to the topography of the Changbai Mountains, the temperature is relatively low in altitudes above 1,100 meters, which is suitable for forest land to grow into primitive forest land. In the low hills below 1,100 meters above sea level, the temperature is higher than on the mountains, the frost-free period is longer, annual rainfall is 500–700 mm, and the soil texture is dark brown earth and albic soil. On the gentle slopes and piedmont terraces of low mountains and hills, plenty of dry lands are distributed, and the rest are natural secondary forests and artificial forests, or grass hills, grass slopes, and inter-mountain basins and river valley flats below the low hills. The climate here is pleasant, with a frost-free period of about 130 days, and it has fertile meadow soil and cultivable swamp soil, as well as alluvial soil, abundant water sources, and convenient irrigation. It is a concentrated area of cultivated land in the Changbai Mountains. Influenced by the traditional village concept of using natural landscape to build human settlements according to local conditions, the Changbai Mountain area is mountainous and the water system is developed. Therefore, villages are mostly built around or near the mountains. The surrounding natural environment such as mountain topography, water systems, and cold climate are important factors for the formation and development of large-scale spatial pattern of villages.

According to Figures 5.2 and 5.3, the study categorizes the site selection of traditional villages in the Changbai Mountain region into mid-mountain hill gentle slope, near-river hill, near-river platform, and near-river plain types. Hill gentle slope villages in the mid-mountain are generally located on the hillside gentle slope zone of the mid-mountain, backed by mountains, surrounded by the most abundant natural forests and the best relative protection. This area has a high terrain, low temperature, and a great deal of precipitation. The annual average temperature is below 3 degrees Celsius, the average temperature of the hottest month is below 20 degrees Celsius, the average temperature of the coldest month is lower than minus 18 degrees Celsius, and the frost-free period is less than 120 days. Such as Jinjiang cabin village, Zhuantou Mountain, Huoronggou village, and Songlingtun **(Figure 5. 3)**. The main tree species are the Changbai Mountain larch, linden, spruce, undergrowth shrubs, herbaceous vegetation, moss distribution, etc. The villages are arranged along the massif trend, so the spatial form of the villages is relatively loose with fruit trees or cultivated land between the buildings; Such as Jinjiang cabin

village in zonal distribution along the road, in the virgin forest of towering old settlements north and west mountain forest vegetation can form windbreaks is well preserved, south trees being cut down so relatively broad, first: it is to get enough light, second: it is can use these open grow some crops to meet basic needs; Hilly villages near the river are surrounded by mountains and water, and the vegetation is relatively rich. There are few natural forests and more mixed shelfbelts, as well as fruit forests with both economic and ecological functions. For example, the Qidaogou River flows through the south of Sandaoyangcha village, while the water of Yalu River flows through the north of Jiapigou Village (Figure 5. 3). These villages surrounded by mountains or rivers on three sides are built for site selection. On the northwest side, there are mountains that form a barrier, shielding from the cold current in winter, while cool wind blows from the water surface in summer. Near-river platform villages and near-river plain villages are surrounded by mountains, and the streams from the mountains flow around the villages. For example, Tumen River flows from the east of Bailong Village, and the tributary of Fengwu Reservoir in Tumen River Basin flows from the west of Shuinan Village (Figure 5.3). The natural environment of these villages is mainly linear or dotted scattered shelterbelts around their surroundings and farmland, with relatively low vegetation density.

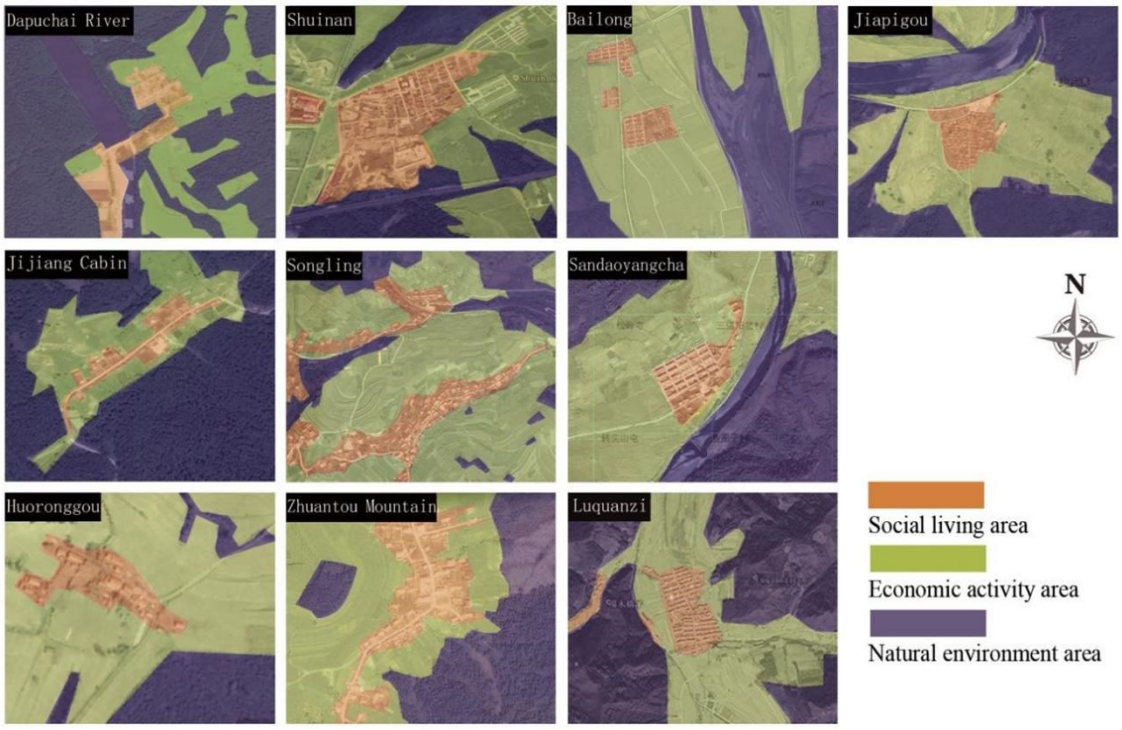

Figure 5.3. Three Scale Regions of Traditional Villages in the Changbai Mountains

5.3.1.2 Spatial Layout of Traditional Villages Based on Economic Activities

The three-dimensional distribution of heat resources determines the three-

dimensional structure of agriculture in the mountainous area of the Changbai Mountains, which is suitable for transition from thermophilic to cold-tolerant crops, and the varieties transition from mid-late maturity to extremely early maturity. According to the analysis of Figure 5.2, the economy corresponds to production space, i.e. middle scale space. Owing to the influence of the ocean and basin topography, the thermal resources in Yanji area are superior to those in neighboring areas. Influenced by the Sea of Japan, the valley plain of the Yanbian area is warm in winter and cool in summer. As can be seen from Figure 5.3, in the villages near the river plains, such as Bailong and Shuinan, most of the land is flat and fertile with mainly paddy fields, since sufficient sunlight is conducive to the growth and cultivation of crops. Water from the Tumen River provided security for the cash crop rice in Bailong Village. Corn and soybean are planted near the mountain. Near-river platform villages such as Dapuchai River Village and Luquanzi Village are planted with crops such as rice, corn, and soybean on the high land around the flood plain. The climate of Linjiang is unfavorable for the growth of food crops but is very conducive to the planting and growth of tobacco, with high yield per unit area; it is also conducive to the development of the livestock industry. Considering the gentle slope of the terrain and its proximity to water sources, the main cash crops in Jiapigou Village are tobacco and blueberries, of which tobacco has become a local brand industry. The cash crop in the Sandaoyangcha Village is rice. The Qidaogou and Sandaoyangcha rivers provide water for rice planting. In addition, animal husbandry, forestry, and prataculture are widespread. The mid-mountain Hilly Village is a dry field with corn and soybean as the main crops and also takes into account ginseng and fruit trees in forestry economy. For example, the main cash crops in Jinjiang Cabin Village are corn and ginseng.

5.3.1.3 Street Pattern of Traditional Villages Based on Economic–Society Activities

As an important part of traditional villages, Street Pattern is not only the link of transportation and the carrier of economic activities in traditional villages, but also an important place for residents' cultural life and the organizer of village spatial order. Street Pattern not only includes "dominant" cultural characteristics, but also "invisible" cultural features. The tangible CLC of traditional village streets can use some of the attributes of the street space itself, such as texture, structure, form, scale, courtyards, and buildings with regional or ethnic characteristics on both sides of the street, and the environment in the streets that can stimulate residents' sense of belonging. Facilities such as sketches and green landscapes are represented. The humanistic landscape features of streets and lanes are mainly reflected by the behaviors of people.

Based on the remote sensing map of traditional villages in the Changbai Mountains in 2018, the axis map in AutoCAD software was drawn, and using Axwoman and Depthmap for analysis, the axis maps of eight typical traditional villages were

obtained. As shown in Figure 5.4, there are three forms of spatial structures of villages in the Changbai Mountain region, which are symmetrical, parallel, and discrete. The higher the integration, the more orderly the settlement pattern, and the lower the integration, the more irregular the settlement pattern.

Parallel Structure (PS).

The villages of Shuinan and Bailong are parallel space structures. The street pattern is a zonal distribution along water systems, and the main street with the same trend as the water has the highest connectivity value. Bailong Village (Figure 4a) is a typical PS with streets and alleys as main axes in series to form settlements； Shuinan Village (Figure 4b) is a PS built along the south bank of the river. The axis with larger integration value in the Sandaoyangcha Village is arranged in the form of "田" (Figure 4c). The lowest integration on the southeast side is the public space for local festival parties and dances, which retains the complete production and living form of the Korean nationality.

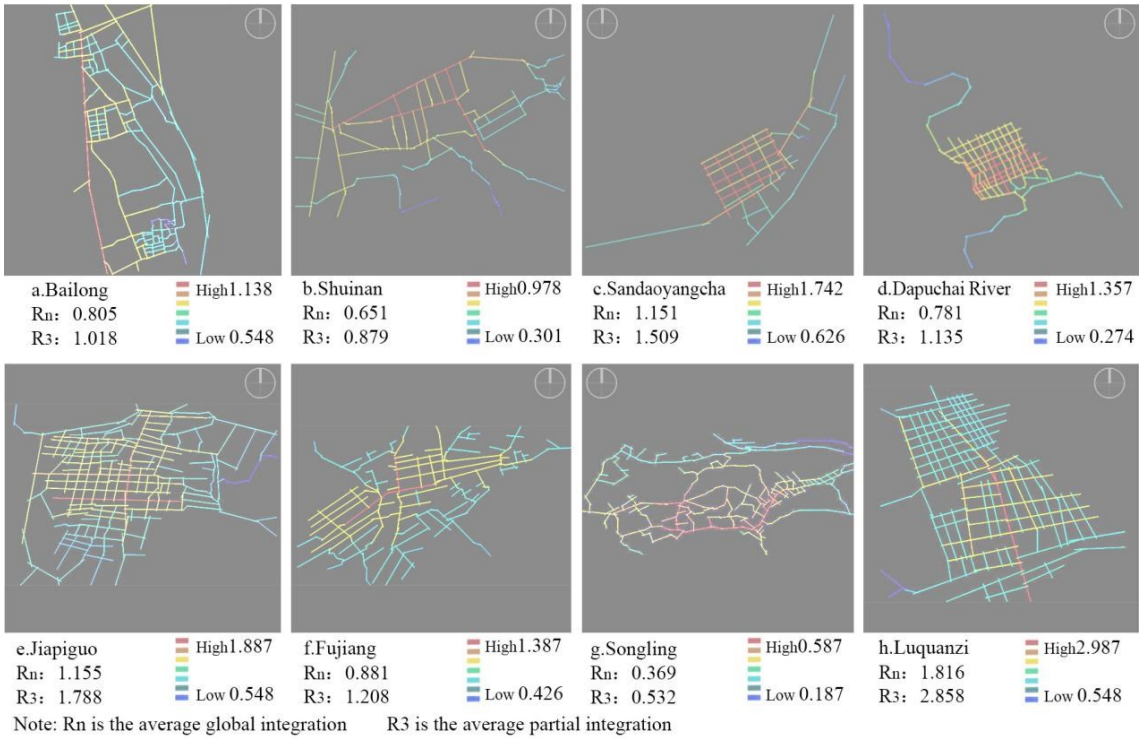

Figure 5.4. Axis Model Map of Settlement Form of Traditional Villages

Symmetrical Structure (SS).

The villages of Jiapigou, Luchuan, and Dapuchaihe are all SS. The street pattern is grid-shaped, with obvious village main roads and the central area of the whole village. The integration shows a decreasing trend from main roads to branch roads. Dapuchaihe Village (Figure 5.4d) is located in the upstream of the power station in the valley plain on the east bank of the Fuer River. The axis with a large integration is arranged in a "丰"form, the significant difference of extreme of integration is distinct, given that it is the natural village with the most complete traditional CL, and the surrounding forest farms are dense. The integration of Luquan Village (Figure 5.4h) with the north–south direction as the axis of symmetry and the center-to-edge direction decreased in turn, while Jiapigou Village (Figure 5.4e) is an "土"structure with a north–south main axis, and its overall spatial layout is square and spreads around along the axis. Fujiang Village (Figure 5.4f) has a "T" axis, which is symmetrical with the north–south axis to form two clusters arranged in the southwest and northeast directions. Fujiang Village was a fishing and pearl-fishing area set up by the government of the Qing Dynasty, and the morphology of the east–west main axis coincides with the Jiao River tributary, forming a partially symmetrical street pattern that faces mostly southeast.

Discrete Structure (DS).

Figures 3 and 5.4g demonstrate that Songling Village has the lowest integration and the southwest is connected in series by a zigzag continuous axis with the highest integration, which coincides with the Yada railways. For more sunshine, residential buildings are scattered along the east–west direction of southerly exposure. The integration in the northeast decreases successively, corresponding to the shape of the road around the mountain. In order to resist the cold wind and prevent mutual shielding, the buildings in Songling Village are arranged in a staggered layout. The affiliated structures in each independent courtyard has different orientations and maintains a certain distance from the main buildings, so as to highlight the interlaced form of structure.

5.3.2 Traditional Architecture Based on Social Security

5.3.2.1 The Changbai Mountain Original Cabin

The original log cabin is the most representative form of dwelling in the native construction in the Changbai Mountain area. It is one of the traditional civilian residences of Manchu, such as Jinjiang Cabin Village and Zhuantou Mountain Village. Formed in the forest farm distribution center of Jinjiang Cabin Village, there are abundant timber and convenient materials. Architectural framework is mainly by the whole log chisel and cross cut stack into metope (Figure 5.5 a), also known as "Mukeden" or "Log Cabin Construction" in architecture (Figure 5.5 b). Most of them will be applied inside and outside with yellow

mud to smooth [159]. The roofs in Jinjiang Cabin Village are made with an axe-split gray-black plank and of "fallen wood" of Korean pine. Since it is cold and long in winters, the wooden house is heated by Kang, and the horizontal chimney is connected to the Kang, so the chimney is separated from the building. Most chimneys are made of hollow tree trunks, a unique technique created by early woodworkers and hunters who lived in the mountains. Owing to the limited length of timber, the log cabins are often divided into two rooms (Figure 5.5 c). The three rooms need to be spliced together with wood. The plane of each room is rectangular. The door is directly in front of the house. The front face is a spacious kitchen with bedrooms on both sides. The main facilities of the bedroom are Kang and top of kitchen range, and the main furniture is the Kang cabinet and the Kang table, with limited decoration and elegant and concise shape. This is also the Manchu traditional architecture, which has gone through the process of “Majiazi,” “Diqiangzi,” and “Nuanqiangzi” to “Mukeden.” It is representative of the typical log cabin construction in the cold region, and is strongly related to the Manchu way of life and production, reflecting their simple and spirited personality. Simultaneously, villages dominated by Han nationals, such as Zhuantou Mountain Village, also retain similar wooden houses.

5.3.2.2 Korean vernacular dwellings

The majority of Korean immigrants to the Changbai Mountains are from Hamgyong in the 1880s, thereby preserving the characteristics of traditional Hamgyong dwellings. The houses of Korean nationals face almost to the south, and are mainly monomer houses, forming a rectangular semi-enclosed courtyard which is simply enclosed. In order to cope with the severe cold climate, the interiors were laid out in the form of full Kang. The construction structure has a wood-framed load-bearing, and the wall is usually a sandwich or hollow wall. The roofs of the traditional dwellings in Bailong and Shuinan villages are mostly made of two types: *Gable and Hip Roof* and *Overhanging Gable Roof* with smooth slope grade surface. *The Century-old House* in Bailong Village is representative of the Korean *Gable and Hip Roof* houses (Figure 5.5 d). The four corners of eaves and both ends of the ridges rise upward, and the entire building has distinct colors. The Sandaoyangcha Village building roof multi-purpose blue is the use of modern materials for the interpretation of the traditional roof case. The kitchen and the living room together advocate indoor activity, and there is a compound and astringent living space characteristic. The indoor space with permeability and flexibility is separated by sliding doors pasted with white paper. Moreover, there is no significant difference in function and form for the doors and windows, and the indoor furnishings are relatively simple and elegant.

5.3.2.3 Han Nationality's courtyard dwellings

Han residents are mostly immigrants from the *inside Shanhaiguan Pass*, engaged in farming and influenced by Manchu architecture and geological climate. The typical dwellings of the Han nationality are courtyard buildings facing the south, and the building materials are mostly brick joisted or civil structures. Songling Village and Turnhead Mountain Village have more three-sided courtyards. The building layout includes a tall main building with a roof truss facing south. The slightly smaller wing-rooms are located on the east and west sides of the main building and are used as storehouses. There are more types of constructions in the courtyard, which are also made of wood, including corn buildings, livestock sheds, and toilets. Although the inhabitants of Songlingtun are mainly Han, the courtyard form has obvious Manchu characteristics, and the main buildings are made of brick and tile and other materials. The walls are mainly adobe and grass-plait. The east, west, and north sides of the outer wall have solid walls up to half-a-meter in thickness built of adobe, and the south side is decorated with wood, which is both efficient and economical in thermal performance.

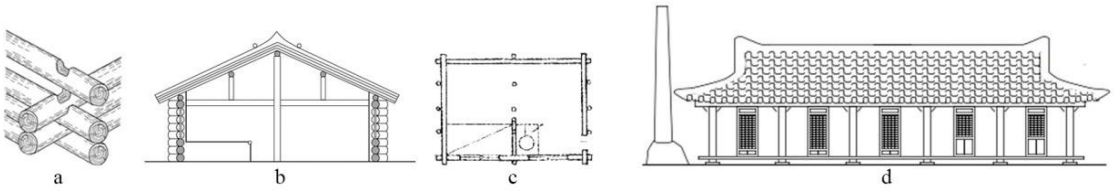

Figure 5.5. Schematic Diagram of Typical Dwellings in Traditional Villages. a) Stacking structure of log cabin; b) Section drawing of a typical log cabin; c) Plan of typical log cabin; d) Elevation of Th*e Century-old House* in Bailong Village

5.3.3 Intangible CL of traditional villages in the Changbai Mountains

The intangible CL of the Changbai Mountains is the crystallization of the wisdom of generations of people, and it is formed by the integration of the environment, history, and national conditions. The characteristic of the intangible CL has a long-standing history; a clear cultural heritage; a living culture inherit; a distinct regional characteristic. In this study, mainly based on the classification of production perspectives, the intangible CL explored by the author include: ginseng gat hering, traditional forestry activities, hunting, fishing, and faith. The diversity of the intangible CL unfolds around each mode of economic activity.

5.3.3.1 Ginseng gathering

The Changbai Mountains are considered as one of the birthplaces of ginseng. Ginseng mostly grows in the hillside broad-leaved Korean pine forest or broad-leaved

mixed forest at an altitude of 200–1,000 meters and a canopy density of 0.7–0.8. As early as the Southern and Northern Dynasties, there were records of ginseng gathering. During the Ming and Qing dynasties, it was harvested in large quantities. Considering the long-standing history, a whole set of mountain rules and ginseng collecting customs have been formed, including worship belief, ethics, environmental awareness, value recognition, conventional skills, special language, behavior rules, various taboos, ginseng digging techniques, and wild survival skills. This is the source of the custom about collecting ginseng. Ginseng collection can be roughly divided into three stages. The ginseng gatherers are a strict organization and are grouped into teams (three to five people) or singles. After 1949, the Tonghua area ginseng industry developed rapidly. Fusong County was the main area for ginseng purchase at the end of the last century. In order to protect forestry resources, ginseng planting techniques were promoted in gullies, dry meadows, and farmland on a large scale. Currently, a substantial portion of ginseng available on the market is cultured.

5.3.3.2 Traditional forestry activities

Traditional forestry activities are divided into two categories: logging and rafting. The logging tradition originated from the woodworkers in the mountains in the late Qing Dynasty and the beginning of the Republic of China. The company that manages timber has contracted the logging task to the gangmaster. Gangmaster and recruitment are divided into two categories: lumberer with core technology (硬手） and an assistant (打下脚). The lumberer cuts trees, while the assistant repairs roads and branches, up the mountain at the start of the winter and down in the spring. A ballad is sung when lifting or transporting wood. The carpenter's leader, Barzitou (also called Haozitou), "leads the song" and the others "join the song," including "Shouting to mountain" (lumbering wood) and "plucking forest" (Hauling timber down the mountain). Considering that it is a labor-intensive task with accompanying danger, the forest chant has the characteristics of being loud and sonorous, extensive, heroic momentum. In June 2008, the Changbai Mountain Forest Haozi, as a kind of traditional music, was included in the second batch of national intangible cultural heritage list by the Ministry of Culture.


a


b

Figure 5.6. The present situation of Intangible CL of Traditional Villages. a) Bundle rafting in Qidaogou River; b) The Lantern Festival of River in Fujiang Village（2017.09）http://m.sohu.com/a/169671632_733377/

Discharge is a way of transporting wood by river flow. In the early Qing Dynasty, Jilin Wula set up a shipyard and navy battalion. Most of the high-quality wood ships needed from the Changbai Mountains, which was discharged to Jilin by the Songhua River. At the end of the Qing Dynasty, the Yalu and Hunjiang rivers also released the Changbai Mountain timber to Dandong, and shipped it to the customs for sale inside the Shanhaiguan Pass. There are generally two types of discharge: loose and horizontal. Loose discharge involves placing the logs one by one in the river, and then standing on a big log holding a long pole and floating down behind the group of logs. Horizontal discharge suggests that the releaser cuts round holes at both ends of the wood, and a dozen or so pieces of hardwood are used to string into a wooden row. Under the control of the concept of nature worship, there are many conventions commonly known as taboos. At present, the transportation method of release continues to be used on the Yalu and Qidaogou rivers (Figure 6a). In addition, some cultural groups are also exploring the release culture and putting it on the stage in the form of entertainment performances, so that people can experience the charm of the release culture. Folklore regarding forestry activities also includes the form of festivals. The House Repair Festival is a grand festival in the Cabin Village of the Changbai Mountains. It is held in May and June, with the main activities involving changing wooden tiles and plastering walls.

5.3.3.3 Hunting

The Changbai Mountain area is home to many beasts, birds, deer, mink, roe deer, etc., and there are multitudinous modes of hunting. As a natural hunting ground, the hunting customs have been formed since ancient times. There are two main types of hunting: individual and group. The bulk of the spring hunt is the catch of wild beasts and small animals. There is no hunting in summer. There are many wild animals in autumn and they are easy to catch. The collective hunting of the Manchus is mostly organized by clans. There are various hunting methods and tools, such as nets, baits, traps, and guns. In addition to the above hunting methods, the Manchu people usually use hawks to catch prey, commonly known as "Releasing Hawks." There are many varieties of domesticated falcons, the most famous of which is xongkoro (Falco rusticolus). Various cultures and arts have been formed in long-term hunting activities, such as the folk songs and dances "Hunting Dance," "Mink Hunting Dance," and "Mohe Dance."

5.3.3.4 Fishing

The Songhua, Tumen, and Yalu rivers, as well as the lakes in the Changbai Mountain region are rich in fish resources. Fishermen living along the river have created various fishing tools during their well-established fishing practice. There are mainly hooks, pots, gill nets (vertical nets), stretch nets, and a fishing tool fixed in the water or on a certain water surface during the freezing period. The most common fishing technique is pulling the net, that is, the fishing gear that is drawn by human and animal power. This is the fishing gear used in static waters in the bright water period. The net length is several hundred meters and the net height is 2–10 meters. River trawling began in the early Qing Dynasty (1665) when the net was transferred from what is now Dunhua to the Wula River for fishing. The fishing season is spring and autumn, and the peak season is after the ice sheets of rivers are melting away. However, as a royal tribute in the Qing Dynasty, sturgeon was caught in two peak production seasons in summer and winter, and the scale of winter fishing was larger. In addition, the belief in the fishing and hunting culture is reflected in the fishermen's worship of the god of water, and even larger fishing boats offered a memorial tablet for the goddess of water. There are fish temples, water temples, and other places for people to worship near the Changbai Mountain rivers. The Lantern Festival of the River is an artistic expression of offering sacrifices to the god of water (Figure. 6b). The Fujiang and Dapuchai River villages were among the early villages to mainly engage in pearl collection and fishing. Long-term fishing activities formed customs and developed into operas, such as "Wind and Rain Returning to the Boat" and "Fishing and firewood cultivation." The song and dance forms accompanying the sacrifice are various, such as grasping the drum and dancing the waist bell, and dancing the bobo tune, which form the precious cultural heritage of the Changbai Mountains. Labor songs and ballads that reflect the traditional skills of the Changbai Mountains are still popular (Table 5.1).

5.3.3.5 The faith

The various ethnic groups in the Changbai Mountains have had the conventional custom of worshiping mountains since ancient times. The Jurchens regard the Changbai Mountains as the "place of rise and fall." During Kangxi's reign during the Qing Dynasty (1677), the official sacrifice to the Changbai Mountains began. The Shaman culture that originated from the Changbai Mountains involves the worship of natural objects such as mountains, waters, wind, and thunder. From time immemorial, all ethnic groups in and around the mountain area have regarded the Changbai Mountains as sacred, believing that it has magical powers and will protect and bless the surrounding mountain people. Therefore, they positively worshiped and willingly gave the Changbai Mountains a mysterious and magical color. Manchu traditional folk belief is Shamanism [160]. The Changbai Mountains have been regarded as sacred mountain worship for thousands of years, as the birthplace of Manchu. With the development of forestry activities such as

ginseng gathering and hunting, people mainly offered sacrifices to the tiger as the image of the mountain god and human's god of "head." When people enter the mountain, they often take a wooden tiger in their body to seek blessings for their safety, and their heads are regarded as the leader of the industry, caring for people to seek wealth and profit. In the Man River area, the Manchus built a mountain temple using logs, in which the memorial tablet "Changbai Mountain Gods" was enshrined, and the shrine of sacrifice was also built in Luquanzi Village. They worship their ancestors as gods and have many sacrificial activities, among which ancestor worship is the most important.

Table 5.1. Intangible Cultural Heritage Remained from Economic Activities of Traditional Villages in the Changbai Mountains

Economic Activities	Logging	Rafting	Pick ginseng	Fishing	Hunting
CL	Forest culture			Fishing-Hunting culture	
Quantity	**10**	**6**	**10**	**2**	**3**
Names of labor songs and ballads	The song of the logging workers, the busy head boat, This kind of wooden handle is enough, Pick and hang, Shoulder song, Wooden song, Bend over song, Raise a wooden horn, Unloading number, Song of Trees and Dunes	The platoon leader is the 8th man, Rafting song, They were afraid to blow up the platoon, Bless your old head, To sha river, Old Evil River, Unpacking	Chunni digs ginseng, It is hard to climb the mountain, I'm ashamed to go home, Don't go up the mountain after crossing the kanto, We dug up ginseng to make annual goods, The backer eats the mountain, Pull the red line to find the child, Three Ya and Five Leaves, Songs of Digging Ginseng, Niu Niu Happens to Ginseng Monkey	Song of driving the sea, The songs in the South Sea are the best.	Large pedal, go hunting, The song of hunting wolves
Inclusion area	Jiaohe, Yanji, Changbai, Fusong, Tonghua, Lan Shu and Baishan city	Huinan county, baishan city Tonghua County, Huadian County and Changbai County	Tonghua County, baishan city	Hunchun county	Dunhua City and Tonghua County

5.4 Discussion

The Changbai Mountains form the ecological barrier of the three northeastern provinces in China. The severe cold climate, vast forests, and abundant water systems have created a production and lifestyle that combines forestry, fishing, hunting, gathering, and farming in the Changbai Mountains, which is different from the Central Plains region. This chapter constructed the CL system of traditional villages based on ecological space (large scale), production space (middle scale), and living space (small scale), which reflects the elements of sustainable development to varying degrees: economy, society, environment, and peace and security (Figure 5.7). Subsequently, it analyzed the CL evaluation factors of the traditional villages in the Changbai Mountain region, such as the characteristics of the settlement, the space characteristics of the courtyard, the customs, and the religion.

Therefore, the CL features with regional characteristics of the traditional villages in the Changbai Mountains are deconstructed.

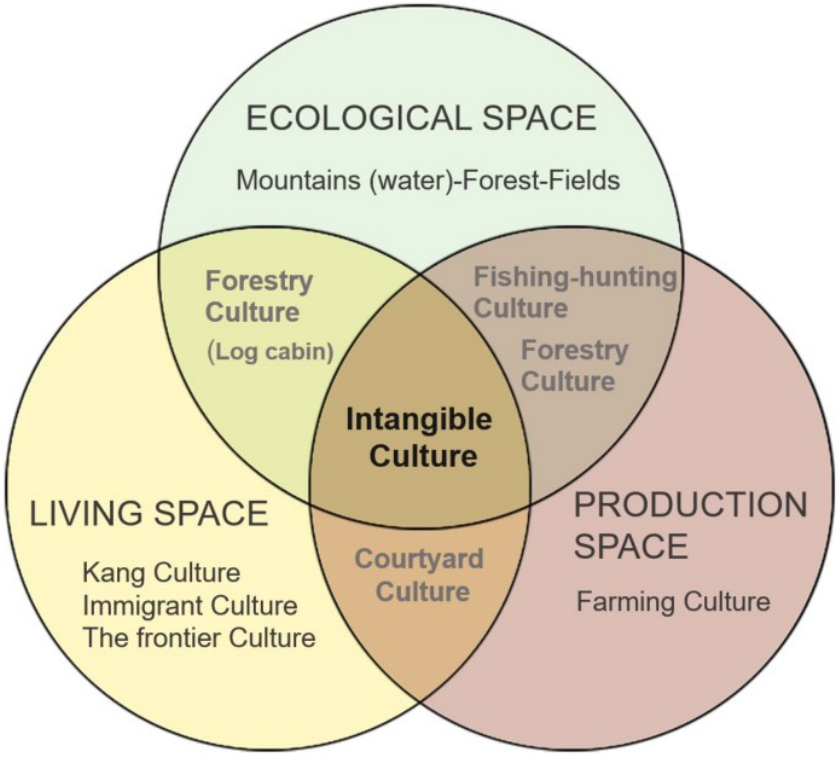

Figure 5.7. " Production-living-ecological " Space and Analysis of Cultural Landscape Characteristics of the Changbai Mountain Traditional Villages

5.4.1 Environment and Economy-oriented: the village pattern of "Mountain (water) - Forest–Field"

The village focuses on the survival and reproduction of human beings, which further develops into the interlacing relationship between human beings and nature, and subsequently forms the interlacing relationship between human beings and villages as culture. The traditional agricultural and forestry production system unique to the Changbai Mountain region, including the ecosystem of basic elements such as forests, farmland, and villages, is a landscape formed by the interaction between humans and nature. It can not only provide local residents with adequate food and clothing, social stability, but also ensure biodiversity, maintain environmental stability, and form a sustainable life-production-ecosystem. Hilly villages with gentle slopes, such as the Jinjiang Cabin Village and Zhuantou Mountain Village, are basically directly surrounded by mountains and forests. The farmland covers a small area and is mainly distributed

irregularly on the gentle slopes of the mountains. Villages, farmland, and vegetation are integrated in the landscape. Hilly or terraced valley-type villages such as Dapuchaihe Village and Bailong Village are surrounded by farmland, and the periphery of the farmland is surrounded by forests or rivers. Generally, the human settlement environment pattern of "Mountain (water) - Forest–Field" and the overall boundary of villages are blurred with farmland and vegetation. The living space of villages has a large contact surface with the production space of farmland and the ecological space of mountain vegetation, which provides the most convenient way for the development of farming culture and reflects a primitive development form of settlements. For example, the site selection and layout of Korean villages are mainly near the river plain and the river platform. From the vertical analysis, the overall height difference between the village and the surrounding farmland and vegetation is relatively marginal. From low courtyard fences, low drooping thatching, towering chimneys to tall macrophanerophytes, a concise and rhythmic elevation is formed in the combination of free and scattered courtyard groups. The traditional villages of Manchu are generally located in the gentle slope area or hilly area, which has a significant relationship with the Manchu ancestors' life-style of gathering, fishing, and hunting.

5.4.2 Economy & Society-oriented: Northeast courtyard culture

The traditional Chinese residence incarnate that the family is the epitome of the social structure, and the courtyard form reflect both socio-cultural and economic characteristics. Traditional villages are located in cold climates and have similar courtyard features. Most of them are spacious compound houses facing the south. Under the influence of ethnic customs, the courtyards of all ethnic groups have both similarities and differences（Figure 5.8）

Being engaged in farming and influenced by Manchu architecture, Han people's dwellings are typical of symmetrical courtyard-type buildings facing the south (Figure 5.8a). The main building is in the middle of the courtyard. Livestock sheds and woodpile are arranged on both sides of other ancillary living facilities. The vegetable plot area in the production space accounts for nearly 20% of the courtyard space, thus forming an economic-living compound courtyard. Manchu courtyards are mostly located in forest areas. In addition to the main and wing rooms, there are ancillary facilities such as corn building, woodpile, and millstone (Figure 5.8b), which are loosely arranged. The courtyard walls are mostly made of wood and are relatively short. Korean courtyards with farming as the main function are more diverse, divided into courtyard entrance, land in front of the house and land behind the house (Figure 5.8c). The utilization rate of land in front of the house is the highest. It is used for planting daily crops or processing agricultural products. Korean nationals are proficient in singing and dancing. The open space in front of the

house is also used for leisure activities and placing agricultural machinery.

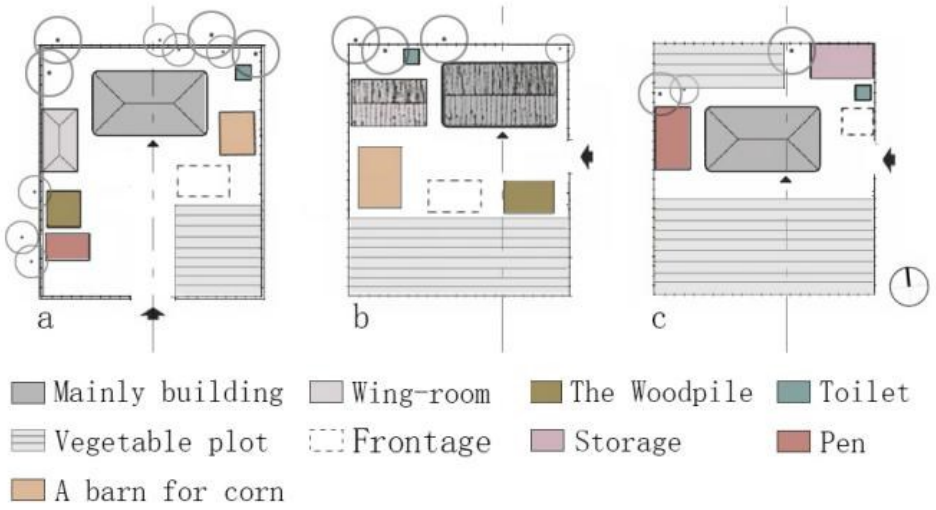

Figure 5.8. The Courtyard of the Changbai Mountains. a) Han people's Courtyard: Songling Village; b) Manchu's Courtyard: Luquanzi Village; c) Korean Courtyard

Overall, in order to ensure illumination, the buildings are not shielded from each other, and the open space in front of the courtyards is generally large, considering the cold climate in the courtyards of various nationalities. The living, production, and ecological space of the courtyard are more compatible, and the vegetable plot with economic function accounts for at least 25–33% of the whole courtyard space, and the largest is generally about 70%. As social and economic activities are often combined, the courtyard space shows a trend of multi-function.

5.4.3 Economy& Society-oriented Kang culture

In order to adapt to the harsh winters lasting more than half a year, residents in the eastern part of Jilin pay special attention to keeping themselves warm and cool, preventing wind and snow, and receiving sunlight during the building process. As an indoor facility for efficient utilization of energy, Kang has been the heating form for local residents to cope with the cold climate and long winters in the Changbai Mountains since ancient times. The Kang culture reflects the cultural characteristics and living styles of different ethnic houses living in cold regions. The traditional villages in the Changbai Mountain region have three types of fire kang, namely, Manchu "Wan Zi Kang," Han "Yi Zi Kang," and Korean-Chinese full-paved Kang. The function of kang is similar between the Han and Manchu nationalities, where it is higher. The interior space of Korean nationalities

is mainly arranged around kang which is close to the ground. The living habit of sitting on the ground has evolved up to now, forming the heating form which is different from other areas. The Kang culture is a cultural product that condenses production, life, and ecology. It is a common CLC of all nationalities in the Changbai Mountains.

5.4.4 Environment-oriented: Forestry, Farming, and Fishing–Hunting Culture

Forestry culture is the sum of material, spiritual, and system cultures built by people in the long-term production and living practice of forestry industry relying on natural and artificial forests, and related ecosystems [161]. Ginseng and forestry culture are representatives of forestry culture in the Changbai Mountain area. It has been more than 1,700 years since the appearance of ginseng in the Changbai Mountains. In the long-term production practice, the comprehensive cultivation techniques, breeding, and ginseng collection customs of the Changbai Mountain ginseng have formed a unique intangible heritage. The culture of collecting ginseng is mainly concentrated in hilly and mountainous villages such as the Dapuchai River village and Zhuantou Mountain Village and evolved into folk songs and ballads (Table 5.1). The Changbai Mountains have a long history of forestry activities. Forestry began to be developed on a large scale in the Xianfeng period of the Qing Dynasty. Its traditional village construction was generally accompanied by the gradual development of forestry activities in the late Qing Dynasty and early Republic of China. For example, the Changbai Mountain forest ballads that arose in the process of logging and transporting wood have been listed as national intangible cultural heritage by the Ministry of Culture (Table 5.1). In addition, the use of wooden structure techniques, wooden roofs, wooden chimneys, Kang cabinets and Kang tables on the heated Kang are typical products that represent the wood culture. Simultaneously, with the formation of nature reserves, comprehensive utilization of forestry, forest-based development, forest conservation construction, and cultural tourism policies, the unique forest landscape resources in the Changbai Mountain region, which are integrated with traditional villages, have become an organic part of recreational tourism culture, providing a material basis for the protection of traditional villages and the SD of cultural tourism in the Changbai Mountain region. Moreover, the farming culture of villages built around mountains in the Changbai Mountain area is mainly based on corn, rice, soybean, and fruit trees.

Abundant water resources are the material conditions for the Changbai Mountains to sustain a long history of the fishing–hunting culture. These water system ecosystems are the key factors for the SD of the CL of traditional villages in the Changbai Mountain region. Therefore, the formation of fishing and hunting culture mainly reflects the derivation of traditional villages and the adaptability of water system, the dependence of villagers' economic activities and natural resources. The fishing and hunting culture in the Changbai Mountain area is mainly reflected in folk winter fishing and hunting customs.

In recent years, with the diversified development of rural economy, the Changbai Mountain area, represented by Manchu folk customs, has gradually resumed traditional fishing and hunting activities, providing a platform for the sustainable development of regional CL.

5.4.5 Peace＆ Security-oriented Immigrant, Frontier culture

The regional culture brought by the immigration of traditional villages merges with the local culture, thus forming multi-cultural features, which are also the personalized landscape features of some villages. The formation of traditional villages in the Changbai Mountains was mainly influenced by two waves of immigrants in modern history. The policy of "Enriching the border by immigrants" and the migration tide of "Braving the journey to the Northeast" in the late Qing Dynasty, the Changbai Mountain region was deeply influenced by the Han culture and customs. The regional culture in the Hunchun and Huinan regions was more inclined toward the Han culture. During the Second Sino–Japanese War, immigrants from the Linjiang region mostly came from Shandong such as Songling Village that was influenced by the Qilu culture, which laid the foundation for the multi-cultural landscape characteristics of the Changbai Mountain region. Meanwhile, Koreans moved across the river to the northeast. The early immigrants were mainly people from the Hamgyong Province. Considering the similar climate, most of them were distributed in the Yanji region, which formed the characteristics of primitive Korean villages that introduced paddy field cultivation.

The Changbai Mountains form a boundary between China and North Korea. It has a wide range of administrative divisions in China. At present, cross-border and border tourism relying on traditional villages has become advantageous. Its special tourism resources and natural environment, especially Tumen and the traditional villages in Baishan region are very close to the border, further strengthening the sustainability of the CL features of harmonious coexistence of multi-ethnic groups in the Changbai Mountain region.

5.5 Summary

In this chapter, based on the concept of SD, the author analyzed each CL evaluation factor of traditional villages, and combined the geographical, historical, and intangible cultural factors to extract the characteristics of sustainable CL of traditional villages in the Changbai Mountain region. The main conclusions are as follows:

The CL of traditional villages in the Changbai Mountain area has diversified

characteristics, which is based on the common features of environment–economy and the individual features of society-life as well. In line with the laws and purposes of social–environmental–sustainable development, the common culture includes forestry culture with ginseng, wood, and forestry recreation as the main part, farming culture with rice and corn as the main part, fishing–hunting culture with Winter Fishing and River Lantern Festival as the representative, northeast courtyard culture with organic combination of life, production, and ecology, Kang culture with living space as the main part. Immigrant and frontier culture are its local characteristics.

- The diversified CL features of traditional villages in the Changbai Mountain area are the soul of regional culture, but it relies heavily on the natural environment; so it is imperative to protect the natural environment.
- Intangible CL and economic activities rely on each other, such as the development of cultural industries—Festivals.
- Unique settlement patterns and dwellings are the core of attracting cultural tourism; so protecting and repairing traditional village furniture is the key factor.
- The geographical location and political significance of the Changbai Mountains are the reasons why traditional villages form frontier and immigrant CL. The common prosperity and development of multi-ethnic groups ensures peace and security.

This Chapter used ArcGIS spatial analysis method, combined with Changbai Mountain regional topography, water system characteristics, and topographic relief calculation, traditional villages in Changbai Mountain region can be divided into mid-mountain hill gentle slope type, near-river hill type, near-river platform type and near-river plain type. The author used the concept of SD and space syntax theory, GIS spatial analysis method to reach the conclusion that the CL represented by street space and residential features has diversity, and the traces left by early forestry activities are obvious.

At present, there is vast research on cultural heritage using the concept of SD, but there is a lack of comprehensive study using village ecology (large scale), production (medium scale), and life (small scale) on CL. This study combined the four pillars of the SD concept with the corresponding aspects of CL, which provided a preliminary research foundation for the protection and development of village CL and the construction of ecological civilization.

Chapter Six

Statistical Analysis on Cultural Landscape Characteristic by A-IPA approach

Introduction and Literature Review
Methods
Survey
Verification of Construct Validity
Results
Summary
References

6.1 Introduction and Literature Review

This chapter is a further research based on the results of the previous chapter to provide a decision-making basis for the sustainability strategy for the CL and cultural revival of traditional villages in next chapter.

Traditional villages refer to villages with material as well as intangible cultural heritage, with high historical, cultural, scientific, artistic, social, and economic value. However, with multiple challenges such as agricultural modernization, urbanization, and development of rural tourism, and their impacts, traditional villages are constantly being destroyed by construction, development, and tourism'. Presently, the disappearance of the heterogeneity of the CL is becoming a common problem, and many traditional villages face inevitable destruction or even disappearance. Therefore, the formulation of optimization strategies for the SD of traditional villages is necessary to realize rural revitalization. Present research on rural revitalization focuses on land utilization, infrastructure development, and the establishment of public services, countermeasures against the negative impacts of tourism, enterprise resources, education, stewardship of cultural resources, and related fields. However, not much research has been undertaken that examines stakeholders' perceptions of CL in the context of SD by using an interdisciplinary approach that combines geographical and managerial factors. In this study, case-based research methods were used, along with the importance-performance analysis (IPA) method and structural equation model (SEM), combined with questionnaires targeting stakeholders, with 11 traditional villages in Changbai Mountain as case studies. The traditional IPA model has a standard error so that the result is not sufficiently accurate[162]. In addition, the modified IPA does not include the influence of SD on each indicator. Therefore, an adjusted IPA grid based on the SEM was sequentially established to obtain more robust and reliable results.

The objectives of this study are as follows: (1) Revealing the CL of traditional villages and providing a basis for future development that is conducive to the SD of traditional villages. (2) Extracting the characteristics of the rural CL through patterns of life, production, and ecology of traditional villages from the point of view of the four pillars of SD and establishing an evaluation index system. (3) Providing a decision-making basis for an accurate strategy through exploiting an adjusted IPA approach that combines the elements of SD.

6.1.1 Importance-Performance Analysis in the Context of Characteristics of Cultural Landscape

The IPA method was proposed by John C. James in 1977 [114]. IPA is a technique for finite-ordering of the relative attributes of a pending element by means of measures of importance and performance. Currently, it has approximately four application modes [119]. It has been widely used in economics [163,164], management [165], tourism [115,166], education [167–169], health care [41,42], and other fields [172], and its effectiveness has been repeatedly verified. This method has also been applied to measuring the destination

competitiveness of landscape by Mustafa, Ji, Shao and Du used the Asymmetric Impact-Performance Analysis technique to study the policy of improvement of historical urban landscapes based on citizen satisfaction, and proposed involving communities to prioritize actions in urban conservation and regeneration [173,174]. This interpretative and evaluative method could inevitably transform the way that the author treat the CL. Simultaneously, the development strategy for the landscape can be proposed by applying the analysis of IPA to the study of man-earth relationships [116].

In most cases, the IPA method was utilized for the comprehensive assessment of landscapes [175,176]. Among them, Zhang, Park and Lin [175] applied the IPA method to the importance and performance analysis of the status quo that should be maintained for the sustainability of the famous ancient villages in China. Kim and Choi [177] identified the relationship between agriculture, fisheries, and landscape heritage to formulate the advantages and disadvantages of regional landscape characteristics. In addition, IPA can also objectively evaluate and analyze the complex characteristics of regional landscapes and cultures. Varjú, Suvák, and Dombi [178] considered that homogenous landscapes can be determined by IPA, and that the most suitable development scenarios can be found in certain areas. However, questionnaire respondents were very widespread and not limited to local stakeholders, which may not bring about the expected effectiveness from the strategy for SD. Additionally, most of the survey indicators were identified from experience and by experts, which may lack the thoroughness that would result from the systematic combing of regional CLC. The purpose of this paper is to suggest strategies for the SD of CL based on the CLC of traditional villages, and the economic benefits and experience of stakeholders. The indicator analyzed in this study is the carrier of CLC from our use geographical methods. Furthermore, the targets of the questionnaire were stakeholders in the Changbai Mountain area. This process of investigation and exploration was more targeted, and hence, the results of the responses were more direct and effective. In order to revive traditional villages, a more adjusted IPA approach combined with the weight of each pillar of S, and an IPA of CLC carriers are needed, to arrive at a balanced and objective development strategy.

6.1.2 Modified Importance-Performance Analysis Method

Although several new methods introduced by scholars have contributed immensely to developing IPA and landscape research, there are many problems that require investigation and modification prior to their adoption. There are two statistical assumptions in the IPA method because of its interpretability features: importance and performance evaluation must be independent of each other, and the performance evaluation of each factor must be linearly related to the overall performance evaluation. However, there is a correlation or a cause-effect relation that exists between the importance and performance in many investigations [179–183]. The TIPA method based on the above literature, has limitations [184]. First, the evaluation of importance is inevitably influenced by the performance evaluation of the respondents. Second, this correlation directly affects the importance of the survey object of the evaluation when a single element is related to the overall performance in a non-linear or normal distribution [184]. Therefore, it is difficult for

the TIPA to meet the above assumptions. Moreover, the questionnaire of IPA requires interviewees to make two judgments on each topic; the interview quality may decline when the number of questions is multitudinous, and the interview time increases exponentially. Matzler et al. [185,186] identified an error in the TIPA model through empirical research. Lee [184] regards that a MIPA model retains the merits of the traditional model, and overcomes its limitations. Tarrant and Smith studies the standard deviations of the mean of the product fundamental for the MIPA method [162].

However, explicit importance (EI) [180,185] differs from the satisfaction of the attribute under investigation; performance attribute of the factor is the independent variable and overall satisfaction is the dependent variable, and they are functionally related. Data transformation should be performed for conformance to linearity, normality, and homoscedasticity [187]. To reduce the impact of subjectivity on the questionnaire results, Noriaki et al. [188] proposed a qualitative analysis of the Kano Model and adopted a partial correlation analysis instead of multiple regression analysis to avoid the impact of multiple collinearity; Several scholars stimulate further discussion; this model eliminates the above demerits and provides precise information [189]. Lucienne and Yolanda [110] identified domains for IPA-model through using exploratory factor analysis, verify model fit with confirmatory factor analysis and structural equation model. In addition, George [190] applied the structural equation model to assist putting forward MIPA methods; he built regression equations with 28 potential variables and obtained regression weights for each of the four dimensions. This is an IPA analysis of the revision of the dimensions; for our study, a more detailed and precise basis for strategy formulation is needed rather than an MIPA analysis from the perspective of domain and dimension.

For a detailed and precise basis for strategy formulation, the author made some improvements to the IPA method to avoid EI of responses to the questionnaire which is often misleading, and analyzed each variable on the basis of dimension.

In summary, CL is the key factor for the SD of traditional villages. The cultural component is closely associated with the sustainable use of tangible and intangible resources of the Changbai Mountain. The IPA method was chosen for this study because it assesses stakeholder cognition of CL feature carriers more accurately. The research focuses on redefining the quantitative value of “Importance” and “Performance” within the IPA model. TIPA only uses the explicit average value for importance. To reflect importance more accurately, many researchers have applied regression or partial correlation recalculation to implicit importance by MIPA [180]. However, these two methods do not help orient the development policy to be more consistent with the goal of SD. Therefore, we try to establish an indicator system based on the environment, economy, society, and peace and security, and then apply the measurement model of the structural equation to integrate the four pillars of SD into each indicator. This method will enable the author to determine more exact strategies, and provide better directions for the SD of rural areas.

6.2 Research Method

6.2.1 Research framework and methodology

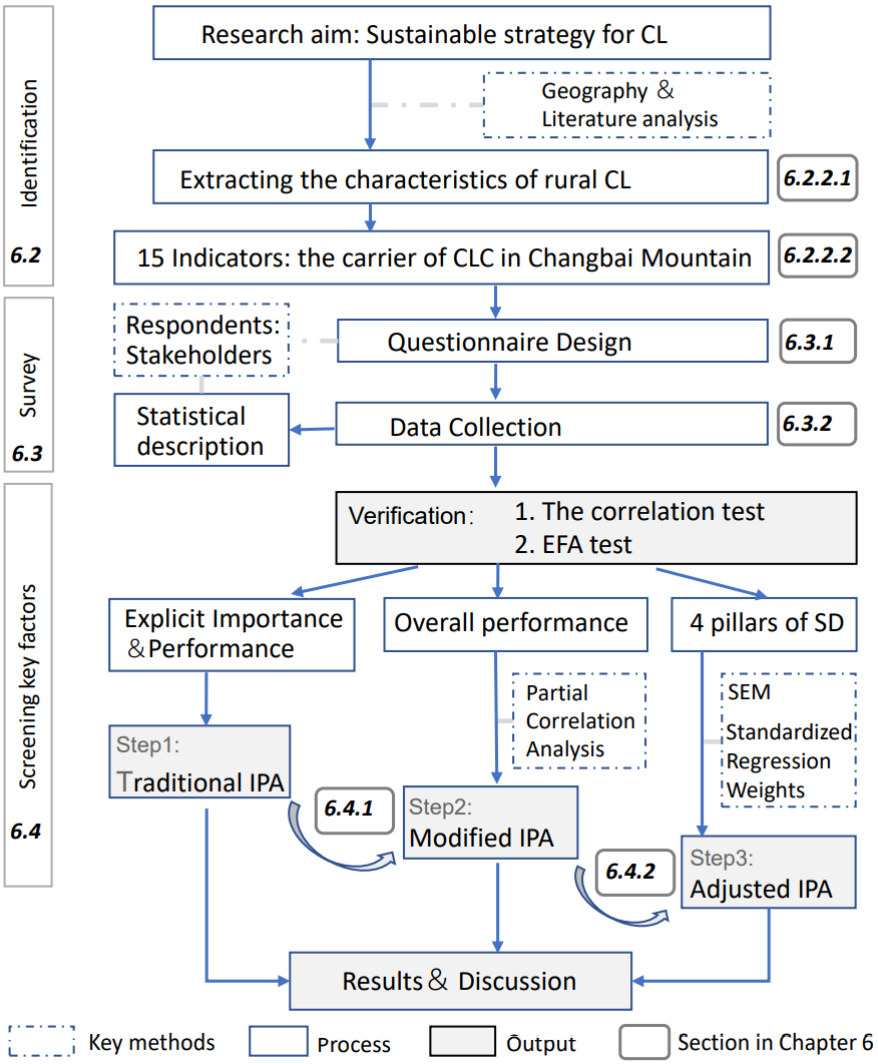

Figure 6.1. Research design

Based on the characteristics of the CL of Changbai Mountain, it is first extracted the corresponding evaluation index and established an index system based on SD. This research directly adopted 15 carriers of CLC based on the four pillars of SD and verified the construct validity of the questionnaire by performing exploratory factor analysis (EFA). A total of three IPA models were established: the traditional IPA (TIPA), modified IPA (MIPA), and adjusted IPA (AIPA) models, as shown in Figure 6.1. In step 2, the MIPA map was plotted by calculating the coefficient of partial correlation. In step 3, a method to optimize the standardized regression weights of the first SEM with the results of IPA is proposed, based on the results of step 2. The second SEM is designed to determine the degree of influence of the SD criteria and apply them to normalize the unweighted mean in the IPA. In other words, the aim of this study is to make sustainability strategies more

accurate by modifying the relationships between indicators considering their relative impacts.

6.2.2 Evaluation indicator identification

6.2.2.1 Extracting the characteristics of the cultural landscape

The CL characteristics referred to herein are lucubrated and extended in-depth, based on our previous study . The theoretical basis is the relationship between SD and CL. Spatial syntax, GIS spatial analysis, and other methods were used to conduct a multi-dimensional analysis of preliminary geographic data, such as village site selection, spatial form, street space, and residential features from large, medium, and small scale maps obtain the CL features of the Changbai Mountain under the dimension of SD. Among them, the division of street space is based on modified space syntax analysis data, corresponding remote sensing imagery, and field investigation. Simultaneously, residential characteristics including skills, knowledge, customs, values, and religion in traditional villages were thoroughly investigated to recognize cultural asset factors. The goals and pillars of SD, combined with geographical, historical, and intangible cultural factors, were used to extract the characteristics of traditional village CL in the Changbai Mountain region, which include both common characteristics based on environmental economy and representative characteristics based on social life (Table 6.1). It is proposed that the traditional villages in Changbai Mountain must have diverse CL characteristics, along with SD for each village.

Table 6.1. Summary of CL characteristics of traditional villages in Changbai Mountain.

Village	Forestry Culture ▲	Fishing - Hunting Culture	Farming Culture ▲	Courtyard Culture ▲	Kang Culture ▲	Frontier Culture	Immigration Culture
Bailong	*	*	√	√	√		√
Shuinan	*	*	√	√	√	√	√
Dapuchai River	*	√	*	√	√		
Jinjiang cabin	√	*	*	√	√		
Songling	√	*	*	√	√		√
Jiapigou	*	*	√	√	√	√	
Huoronggou	√	*	*	√	√		
Zhuantou Mountain	√	*	*	√	√		
Sandaoyangcha	*	*	√	√	√		√
Fujiang	*	√	*	√	√		
Luquanzi	√	*	*	√	√		

Note: Representative CL characteristics: √; Non-major CL characteristics: *; Common CL characteristics: ▲

6.2.2.2 Construction of model and evaluation index of cultural landscape

Recognizing the CLC correctly is the key in establishing administrative rules [192]. As mentioned previously, the CL of traditional villages in Changbai Mountain have evident heterogeneity and diversity, as shown in Table 6.1. The author constructed CL resources to be used as survey indicators based on the indicators of SD and related reference yearbooks, possibly the carriers for SD of CL in traditional villages [193–195]. The construction model is shown in Figure 6.2. The position of each CL resource in the SD system and the relationship between the inclusion and mutual penetration of each resource are reflected in this figure. This is followed by the segmentation of CL carriers based on the relevance of their development to sustainability [196]. In this study, all CL carriers relied on the CL characteristics of traditional villages in Changbai Mountain, such as classification standards of environmental resources [197], classification of ancient village resources and evaluation systems [198], and related literature. Moreover, the evaluation system also integrates the classification criteria of the tourism resources because many villages which are used as case studies are famous tourist resorts[199,200]. A total of 15 representative CL carriers were identified as evaluation indicators, as shown in Table 6.2. Through the design and testing of the questionnaire, these 15 indicators were further combined with SD dimensions to form an indicator evaluation system suitable for SEM.

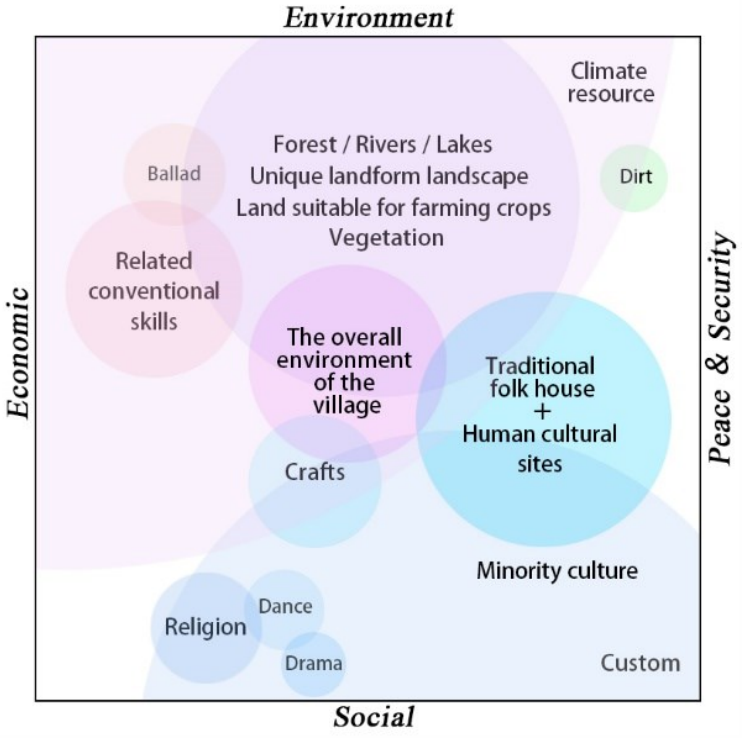

Figure 6.2 Basic types of CL resources within the SD framework. Environment, economy, society, and peace & security are not only four pillars of SD, but also represent the four dimensions mentioned below.

Table 6.2 Representative CL carriers of Changbai Mountain traditional villages based on CL characteristics and criteria of each category.

CL	Characteristics of CL	Characteristics of landscape	Basic types of rural resources	Carriers representing the CLC of traditional villages in Changbai Mountain	Index Order
Tangible Cultural landscape	Forestry culture Farming culture Fishing-Hunting Culture	Ecological Environment landscape	Rivers, Lakes, Reservoirs	Unspoiled rivers, lakes	1
			Land with geological resource	Landscape with unique landform	2
			Biological resource	Representative diet	3
			Crop resource	Locally popular crop	4
			Climate resources	Local green vegetation	5
				Local climate	6
				Local air quality	7
	Northeast courtyard Culture & Kang culture	Other natural landscapes	The overall environment of the village	Cleanliness of the village	8
				The overall style of the village	9
Intangible Cultural landscape	Immigration & Frontier culture	Historical heritage landscape	Traditional folk house	Historic buildings, representative houses	10
			Human cultural sites	Degree of conservation of cultural heritage and monuments	11
		Local cultural landscape	Custom, Drama, Dance, Ballad, Religion	Folk cultural events and festivals with local characteristics	12
				Local crafts	13
		Other human landscape	Minority culture	Degree of integration of local minorities	14
				The popularity of cross-border tourism	15

6.3 Survey

6.3.1 Questionnaire design: importance-performance evaluation questionnaire

The questionnaire is divided into three parts: ① The demographic characteristics of the respondents mainly include age, sex, ethnicity, profession, education background and main place of residence. ②The respondents' perception of the importance and satisfaction of CL carriers. ③Their assessment on the influence of environment, economy,

society, or peace and security in CL.

Table 6.3 Smaple of the Questionnaire

Part Questions	Q	Index	Level 1	Level 2	Level 3	Level 4	Level 5
② Evaluation of the CL of traditional villages in the Changbai Mountain area	8.(2) 9.(10)	Landscape with unique landform Historic buildings, representative houses	very unimportant very dissatisfied	unimportant unsatisfied	generally important normal value	important satisfactory	very important very satisfied
③ The influence degree of SD factor on CL	10. (2)	economy	no influence	influence but unsure of severity	a major influence	enormous influence	
Score			**1**	**2**	**3**	**4**	**5**

Note: See Appendix Ⅰ for detailed questionnaire

This study used the five-point Likert scale for the questionnaire survey to obtain the perception of respondents, on the CL carrier. The respondents rate the importance of 15 CLC indices on a scale of 1 to 5, as very unimportant, unimportant, generally important, important and very important five levels, with 1 signifying very unimportant and 5 signifying very important, as shown in Table 6.3. This paper invited respondents to rate the current status and overall satisfaction with the CLC carriers in their villages, and fill in one of the following indicators: 1(very dissatisfied), 2: (unsatisfied), 3(normal value), 4(satisfactory), or 5(very satisfied). From the research data thus obtained, the IP evaluations of various stakeholders on various CL carriers were investigated. Basic information on the subjects under investigation were also gathered.

To effect a more meaningful data transformation, respondents' perceptions on the degree of SD of CL were also surveyed, and respondents were also asked to choose what they considered to be the most significant factor of SD, such as environment, economy, society, or peace and security. They provided one of the following four scores on the paired comparative questionnaire: 1 (no influence), 2 (influence but unsure of severity), 3 (a major influence), and 4 (enormous influence). A measurement model was generated based on the answers by collecting and encoding this data.

6.3.2 Data collection

6.3.2.1 Initial questionnaire survey

Before conducting a large-scale formal questionnaire survey, a small-scale pre-survey is required to further modify the content of the questionnaire to avoid duplication of semantic context and unclear expressions that make it difficult for the respondents to understand. The pre-survey method was to randomly select 60 residents of different ages in the Changbai Mountain area to collect 56 copies of the questionnaire and 51 valid questionnaires. The reliability and validity of the questionnaire are 0.81 and 0.801, indicating that the questionnaire question items designed according to the indicators

basically meet the requirements and do not need to make major adjustments.

6.3.2.2 Formal questionnaire survey

The questionnaire survey was distributed on WeChat and other online platforms from March to June 2020. It targeted four main types of stakeholders of the sample villages in the Changbai Mountain area: community residents who are mostly farmers, students and freelancers; village managers, and cultural activity organizers who are represented by the civil servant and the staff of company; and tourists who are represented by educate, medicate, researchers. Local residents account for at least 70% of the respondents, as shown in Table 4. The author contacted some officials in the Changbai Mountain area two years prior to the survey. Therefore, most of the questionnaires in this survey were spread by WeChat, which is beneficial to the refinement and validation of the survey and to ensure the authenticity of the data. Village managers include relevant personnel from the government departments of the village. In China, members of government departments not only include the secretary of the village committee and the village chief, but also relevant officials of the township and town directly under it. Organizers of cultural activities include tourism managers, producers, and investors of cultural activities, and relevant personnel in tourist attractions and scenic spots; tourists refer to out-of-town tourists who are randomly selected from different nationalities; community residents refer to the permanent residents of the villages. Most respondents were from Tonghua, Baishan, and Yanbian, which include most traditional villages. Table 6.4 illustrates the demographic information on valid respondents, where the ethnic composition and location of the investigator reflects the favorable additivity characteristic.

Table 6.4. Overall survey of socio-demographic characteristics.

Factor	Category	Frequency	Percent
Gender	Male	192	48.6
	Female	203	51.4
Age	≤20	5	1.3
	21-30	74	18.7
	31-40	76	29.2
	41-50	96	24.3
	51-60	72	18.2
	≥60	72	18.2
Nation	Han	224	56.7
	Manchu	74	18.7
	Koreans	65	16.5
	Other ethnic minorities	32	8.1
Education	High school and below	253	64.1
	College and bachelor's degree	105	26.6
	Master's degree or above	37	9.7
Profession	Farmer	219	57.3
	Civil servant	41	10.4
	Company employee	30	7.6

	Education, medical, research	56	14.2
	Freelance	35	8.9
	Student	10	2.5
	Jilin	58	14.7
	Tonghua	89	22.5
	Baishan	103	26.1
	Yanbian	94	23.8
	Other parts of Jilin Province	16	4.1
IP of Investigator	Outside Jilin Province	35	8.9
The total number of samples used for SPSS analysis		395	100

A total of 428 copies of the questionnaire were collected; 33 invalid questionnaires were eliminated, 395 copies were recovered, and 92.29% of the responses were valid. Cronbach's alpha was 0.823; the p-value was infinitely close to 0; the Kaiser–Meyer–Oklin value was 0.809, exceeding the recommended value of 0.5; and Bartlett's test of sphericity was 5573.58, which reached statistical significance. The questionnaire reflected high reliability and validity, and was suitable for factor analysis. The proportion of total variance explained was greater than 60% at 63.501, which indicates good questionnaire structure validity. Reliability and internal consistency were demonstrated through data analysis, by calculating the total variance. Based on the above, the importance of the 15 indicators, and the range of the average performance were determined, and three IPA maps were drawn.

6.4 Verification of Construct Validity

The premise of applying the optimized IPA method is that the TIPA analysis method cannot satisfy the above-mentioned hypothesis (section 6.1). It is analyzed the difference between the results of TIPA and MIPA. The changes made in the optimized IPA based on the formation of four pillars of SD, influence consequently the decisions. The SPSS 24.0 was used first to test the correlation between the performance and importance of the CLC carriers of the traditional villages of the Changbai Mountain, to verify whether the EI and performance are completely independent and linearly correlated. The dataset was imported into SPSS 24.0 for EFA, to verify that the data consisted of the four principal components; to verify that each dimension of the variable corresponds to the four pillars of SD, AMOS 25.0 was used to establish a path evaluation model, to verify whether the SEM can be used to establish an indicator system based on SD.

6.4.1 Traditional importance-performance analysis to adjusted importance-performance analysis

To avoid the error resulting from the correlation between EI and performance, many scholars have suggested replacing EI with implicit importance; the more widely used method is the use of the multiple regression coefficient of the multiple regression model to calculate individual satisfaction and overall satisfaction, as a measure of implicit importance [180]. However, some scholars have pointed out that this method ignores the

correlation between satisfaction factors, and that if it was directly brought into the multiple regression model, multicollinearity would be generated [185]. To avoid the above problems, partial correlation between single performance and overall performance is used as the extended importance score because, the coefficient of partial correlation excludes the impact of other performance variables on the correlation between the specified variable and overall performance, and only reflects the net correlation between the variable and overall performance [179]. The recursive method or correlation matrix inversion can be used in SPSS software to calculate the partial correlation coefficient. The partial correlation formula applied in this study is as follows:

$$r_{xy,z} = \frac{r_{xy,z_1} - r_{yz_1,z_2} r_{yz_2,z_1}}{\sqrt{(1-r^2_{xz_1,z_2})(1-r^2_{yz_2,z_1})}} \quad (1)$$

In the formula, $r_{xy,z}$ is the partial correlation coefficient between x and y; z is the control variable that takes the values Z_1, Z_2, Z_3… …Z_6. This method was used to compare TIPA and MIPA methods based on practical research and analyze their differences.

6.4.2 Creative adjusted importance-performance analysis through structural equation model (SEM) based on SD

According to the verification results of the 15 indicators and the definition of each indicator, the corresponding dimensions based on four pillars of SD were listed. SEM path coefficient analysis was used to determine the sub-target layer and index layer of the CLC of traditional villages in Changbai Mountain. A three-level-measurement index system was established. The evaluation criteria of the fitting index were tested, and it was verified that the model has statistical significance.

(1) After setting latent variables and indicators, such as Environment, Economy, Society, Peace and Security are exogenous latent variables. Measurement models of "concept" (target layer) were set up as importance and performance, respectively, and the load of each index was calculated. As mentioned above, the indicators of importance and performance are measurable variables. According to the relationship of each variable, two measurement equations were established in AMOS 25.0 to describe the relationship between latent variables and indicators. The measurement equation can be written as follows:

$$\chi = \Lambda_x \xi + \delta \quad (2)$$

where χ is a vector composed of exogenous indicators； these are secondary factors such as unspoiled rivers, lakes, landscapes with unique landforms, representative diet, popular local crop, etc.；

$\xi$is a vector composed of exogenous latent variables； these are first level factors such as environment, economy, society, peace & security, etc.;

Λ_x refers to the relationship between the exogenous index and the exogenous variable as the factor load matrix of the exogenous index on the exogenous latent variable;

δ stands for the unexplained part of the equation, that measures the residual term of equation (2).

（2）This part reflects the innovation of A-IPA different from previous M-IPA. To better judge the impact of the four pillars of SD on the 15 indicators, a measurement model based on the four indicators namely environment, economy, society, and peace & security, was established and included in the questionnaire survey. According to the path coefficients of the four variables, normalization was carried out to determine the weight. Importance and performance path coefficients are respectively multiplied by the mean of each indicator according to the results of M-IPA in the previous step. This weight profoundly affects the indicator distribution of the final A-IPA graph. The two measurement models for the performance and importance of the CLC are

$$\text{A-Performance} = X_1 \times \beta_1,\ X_2 \times \beta_2,\ X_3 \times \beta_3, \ldots \ldots,\ X_{15} \times \beta_{15} \quad (3)$$

$$\text{A-Importance} = Y_1 \times \eta_1 \times W_1,\ Y_2 \times \eta_2 \times W_1, \ldots \ldots,\ Y_{15} \times \eta_{15} \times W_4 \quad (4)$$

In the formula，X represents the path coefficient/ factor loadings of the three-level index for performance, β is the mean of performance, Y represents the path coefficient/ factor loadings of the three-level index for importance, η represents implicit importance, and W stands for the four weights of the four pillars of SD. The adjusted AIPA was redrawn with the new values, based on the sustainable development of four pillars.

The overall average of the EI, performance, implicit importance, implicit importance of weights, etc., were calculated separately, and the exact intersection of the above two values (of the horizontal and vertical axes) in the IPA chart was found; based on the intersection, the area under the graph was divided into four quadrants. Based on the importance of each indicator, and the average value of performance, they were positioned in one of the four quadrants. The results are shown in Figure 6.5–6.7. Finally, the promotion strategies for SD were proposed according to the characteristics of each indicator in the four quadrants.

6.5 Results

6.5.1 Correlation analysis of importance and performance

The Pearson correlation coefficient was used as the basis for judging the relationship between EI and performance, as shown in Table 6.5. For a confidence interval of 95%, 14 of the 15 evaluation indicators reflected a statistically significant correlation between EI and performance. Popular local crops, historic buildings, representative houses, the degree of conservation of cultural heritage and monuments, and local crafts are highly correlated, but not linearly related. This indicates that the respondents' perception of the

importance of performance evaluation is not uniform, and the change in the performance of a certain indicator will not bring about a change in the overall performance. Therefore, it is difficult to guarantee that importance and performance are completely independent. The TIPA method needs to be improved and adjusted.

Table 6.5. Correlation test of importance and performance.

Order	Index	Pearson Correlation	*P-value*
1	Unspoiled rivers, lakes	.211**	0.000
2	Landscape with unique landforms	.198**	0.000
3	Representative diet	.178**	0.000
4	Locally popular crop	.363**	0.000
5	Local green vegetation	.143**	0.004
6	Local climate	.201**	0.000
7	Local air quality	.131**	0.009
8	Cleanliness of the village	.139**	0.006
9	Overall style of the village	.132**	0.009
10	Historic buildings, representative houses	.481**	0.000
11	Degree of conservation of cultural heritage and monuments	.335**	0.000
12	Folk cultural events and festivals with local characteristics	.120*	0.017
13	Local crafts	.410**	0.000
14	Degree of integration of local minorities	.108*	0.033
15	Popularity of cross-border tourism	.071	0.159

Note：*. Correlation is significant at the 0.05 level (2-tailed)

6.5.2 Exploratory factors and fit tests

First, the author applied SPSS 24.0 to verify an EFA of variables, arriving at the factor load matrix after orthogonal rotation. Table 6 shows that there are four principal components of EI and performance. We imported the data to AMOS 25.0 to establish the path evaluation model. The CMIN/DF of EI and performance are 2.811 and 1.552, respectively; GFI are 0.916 and 0.958, respectively. The results indicate good reliability of forecast and goodness of fit. The data from preliminary analysis were further processed using the SEM. Simultaneously, according to the definition and classification of each dimension, as seen in Table 3, the notations for each indicator were replaced, and these notations appear in each subsequent IPA model to facilitate their comparison and discussion.

Table 6.6. Factor loading matrix after orthogonal rotation.

Order	Notation	EI Extract Components				Performance Extract Components			
		1	2	3	4	1	2	3	4
1	*ENV.1*	0.670				0.727			
2	*ENV.2*	0.648				0.769			
3	*ENV.3*	0.729				0.762			

4	*ECO.1*		0.756				0.876			
5	*ENV.4*	0.650				0.680				
6	*ENV.5*	0.698				0.813				
7	*ENV.6*	0.677				0.790				
8	*ENV.7*	0.831				0.870				
9	*ENV.8*	0.765				0.721				
10	*SOC.1*				0.865					0.824
11	*SOC.2*				0.872					0.873
12	*ECO.2*		0.772				0.701			
13	*ECO.3*		0.808				0.877			
14	*P&S.1*			0.838				0.894		
15	*P&S.2*			0.901				0.896		

Note: Dimensions: 1: Environment (ENV); 2: Economic (ECO); 3: Society (SOC); 4: Peace & Security (P&S).

6.5.3 Comparative analysis of traditional importance-performance analysis and modified importance-performance analysis

The questionnaire results showed that the mean value of overall performance was 4.25, and the standard deviation was 1.011. As shown in Table 6.7, the mean of performance of all indicators was 4.082, and the mean of EI was 4.221. A total of 7 indicators had higher EI than average. As can be seen from the EI-P column, the average of the EI of only two factors is less than the corresponding performance average, indicating that in general, most of the 15 elements do not meet the expectations of stakeholders.

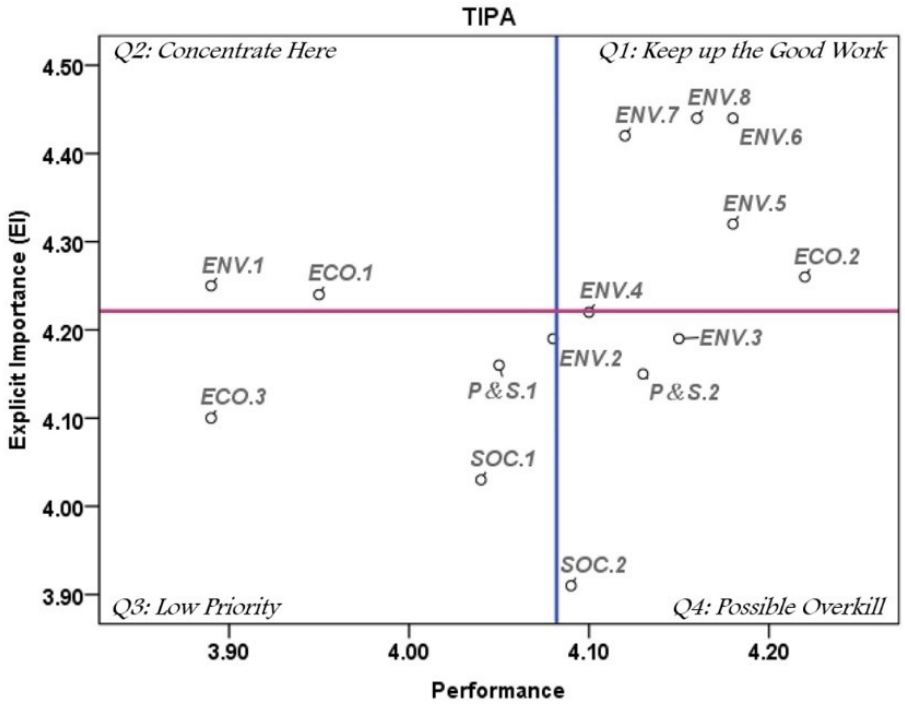

Figure 6.3. TIPA quadrant diagram.

Table 6.7. Explicit importance, performance, and implicit importance.

Notation	Explicit Importance (EI)			Performance			Implicit	EI-P
	Mean	Std. D	Std. E of M	Mean	Std. D	Std. E of M	Importance	
ENV.1	4.25	1.136	0.057	3.89	1.412	0.071	0.150	0.36
ENV.2	4.19	1.261	0.063	4.08	1.173	0.059	0.178	0.11
ENV.3	4.19	1.135	0.057	4.15	1.224	0.062	0.158	0.04
ECO.1	4.24	1.305	0.066	3.95	1.317	0.066	0.188	0.29
ENV.4	4.22	1.275	0.064	4.1	1.207	0.061	0.062	0.12
ENV.5	4.32	1.173	0.059	4.18	1.157	0.058	0.194	0.14
ENV.6	4.44	1.093	0.055	4.18	1.203	0.061	0.073	0.26
ENV.7	4.42	1.134	0.057	4.12	1.186	0.06	0.185	0.30
ENV.8	4.44	1.077	0.054	4.16	1.173	0.059	0.155	0.28
SOC.1	4.03	1.162	0.058	4.04	1.197	0.06	0.130	-0.01
SOC.2	3.91	1.204	0.061	4.09	1.247	0.063	0.098	-0.18
ECO.2	4.26	1.269	0.064	4.22	1.022	0.051	0.135	0.04
ECO.3	4.1	1.336	0.067	3.89	1.313	0.066	0.190	0.21
P&S.1	4.16	1.369	0.069	4.05	1.268	0.064	0.080	0.11
P&S.2	4.15	1.327	0.067	4.13	1.254	0.063	0.052	0.02

The TIPA map takes EI of respondents as the vertical axis, and performance as the horizontal axis, and forms the four quadrants according to the mean of each dimension. As shown in Figure 6.3, in the first quadrant, "Keep up the good work" contains five indicators: ENV.8, ENV.7, ENV.6, ENV.5 and ECO.2; in the second quadrant, the indicators of "Concentrate Here" are ENV.1 and ECO.1; in the third quadrant, "Low Priority" contains ECO.3, SOC.1, P&S.1, and ENV.2; in the fourth quadrant, "Possible Overkill" contain ENV.3, ENV.4, P&S.2, and SOC.2.

The TIPA model indicated that the performance of the ecological landscape is obviously better than that of the historical landscape. The importance and performance of the five indicators are higher, mainly based on the local natural environment and diverse ethnic culture. The scores representing the respondents' satisfaction, are concentrated in the factors namely ecological environment, immigration, and frontier culture landscape. The issues in need of improvement are mainly concentrated in the local popular crop, and management of spoiled rivers and lakes. However, some indicators are considered of low importance, such as human cultural sites and traditional folk houses. The modified IPA (MIPA) results indicate that "Concentrate Here" & "Keep up the good work are mainly composed of tangible CL factors, as shown in Figure 6.4. The third and fourth quadrants are mainly based on intangible CL factors. In general, the economy and the natural environment have high importance. At the same time, the quadrant with low performance is also mainly concentrated on these two aspects. Meanwhile, the historical heritage landscape and integration of local minorities, which represent social attributes, have low performance and importance.

For the TIPA model, the distribution of indicators is obviously different from MIPA, although it also adopts the mean as the horizontal and vertical axes. From the TIPA model, we know that the optimal strategy for traditional villages in Changbai Mountain should be to focus on improving the overall living environment of the villages, and the management of the spoiled rivers. As shown in Figure 6.4, two factors, ENV.6 and ENV.4, have changed from the original in terms of the EI evaluation, being higher than the average level in the extended importance evaluation, and lower than the corresponding level in terms of the importance dimension of the indicators after the modification. In addition, the EI values of two indices namely ECO.3 and ENV.2 are lower than the average level of importance, but the implicit importance values are higher than the corresponding average level. With regard to the issues of "improving the environment of villages and spoiled rivers" pointed out by the analysis results of TIPA, the MIPA map shows that stakeholders not only weakened the requirements for ENV.4 and climate but also emphasized that the economic and natural landscape as well as conservation of landscape and the heterogeneity of local handicraft industry and national culture be paid more attention. Among them, ENV.7, ENV.5, ENV.8, ECO.1, and ENV.1 are above the horizontal axis in Figure 6.4; they are also the indicators of the first and second quadrants of Figure 6.3. Thus, it can be seen that the above indicators are still relatively recognized in terms of both EI and implicit importance.

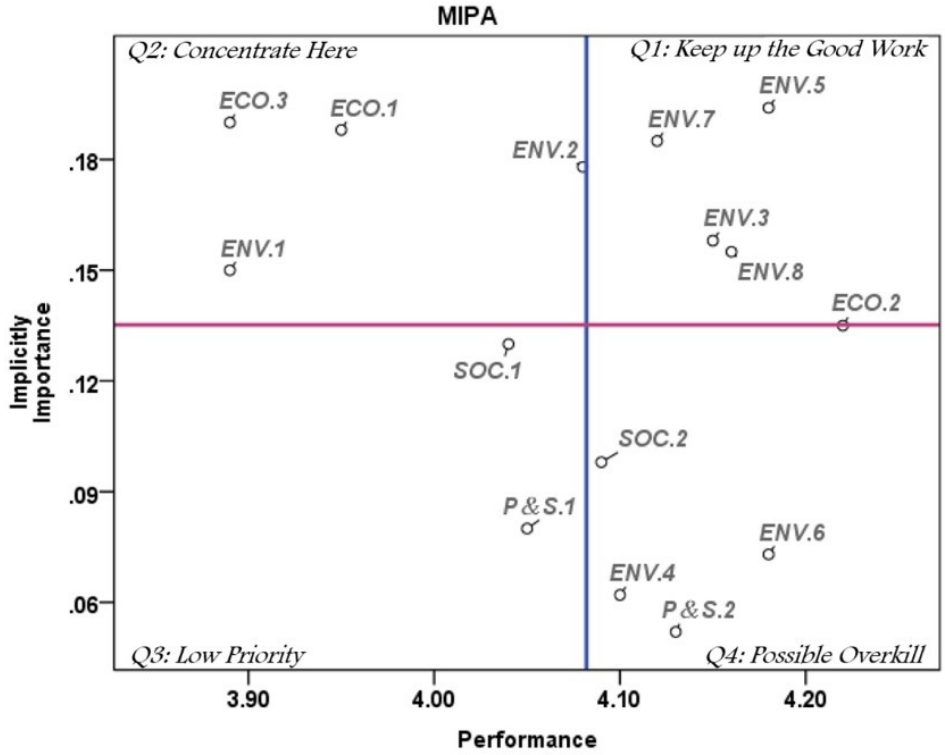

Figure 6.4. MIPA quadrant diagram.

As shown in the MIPA model, there are three indicators in the first quadrant which is one less than the TIPA. These indicators are ECO.3, ECO.1, ENV.2, and ENV.1,

where ECO.3 is transferred to the second quadrant from the indices with the third-lowest mean of importance in the TIPA model. The TIPA model points out that the improvement must focus on the environment of the village, whereas the improvement of MIPA focuses on highlighting that the characteristics, national culture and ecological economy of the traditional villages in Changbai Mountain, need to be improved; it also suggests that the landforms and rivers that represent the characteristic regional landscape need to be paid attention to. In the fourth quadrant, "Possible Overkill" contains four indicators which are in their order of importance: SOC.2, ENV.6, ENV.4, and P&S.2. Under the current situation, stakeholders have low requirements for historical heritage landscapes, and minority cultures getting more representation in the social dimension, and their satisfaction is average or above. Therefore, managers can focus more on other aspects. Increased awareness on environmental protection and distinctive national cultures need to be cultivated.

There is a clear distinction between the two IPA maps. The degree of satisfaction was correlated with the EI, for the indexes whose distribution had great changes. This result indicates that TIPA cannot overcome the problem of correlation between importance and performance, and the assumptions of the method cannot be satisfied; so, the results of the analysis inevitably produce more errors. Adopting the MIPA method can more objectively reflect actual problems, and accurately allocate resources to key elements. However, to make a more accurate and precise analysis, the author developed an adjusted IPA (AIPA) model based on the above research.

6.5.4 Results of adjusted importance-performance analysis (AIPA) model

The partial correlation coefficient reflects the net correlation between two variables while satisfying the premises and assumptions of the IPA method. However, the data structure was still not persuasive because the EI only requires interviewees to answer performance questions that avoid the dimensional load of importance data. Hence, further adjustment of the IPA model was undertaken on the basis of these results by adding the SEM analysis.

As verified by the detailed analysis in section 6.5.2, there is a compliance of CFI, NFI index, etc. with inspection standards, and the output of the model is significant, as shown in Table 6.8. The factor loadings of each index are shown in Figure 6.5–6.7. According to equations (3) and (4), the performance and the implicit importance of adjustment are calculated. The final AIPA model was plotted based on this data, as shown in Figure 6.8. The AIPA model indicated that the relative positions of all MIPA indicators were changed dramatically by combining path coefficients and weights, both horizontally and vertically.

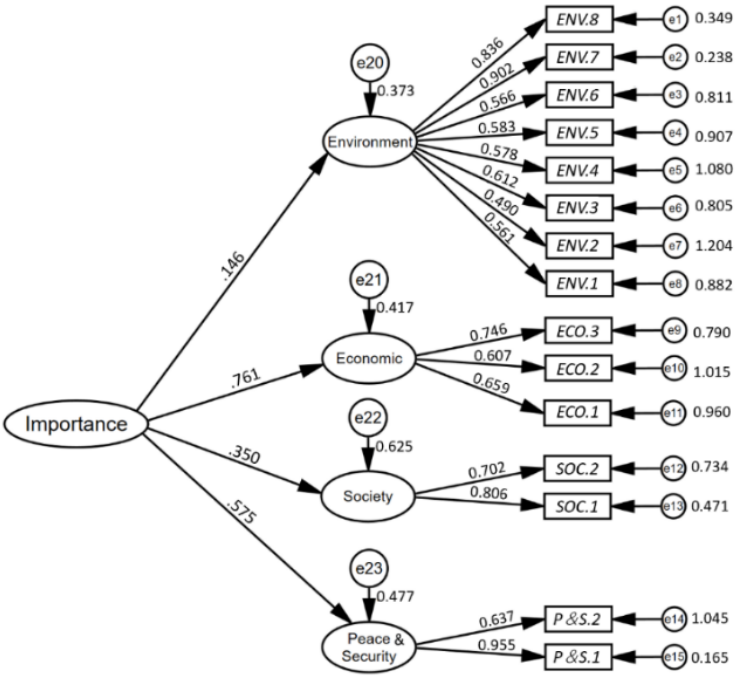

Figure 6.5. Measurement equation model of EI.

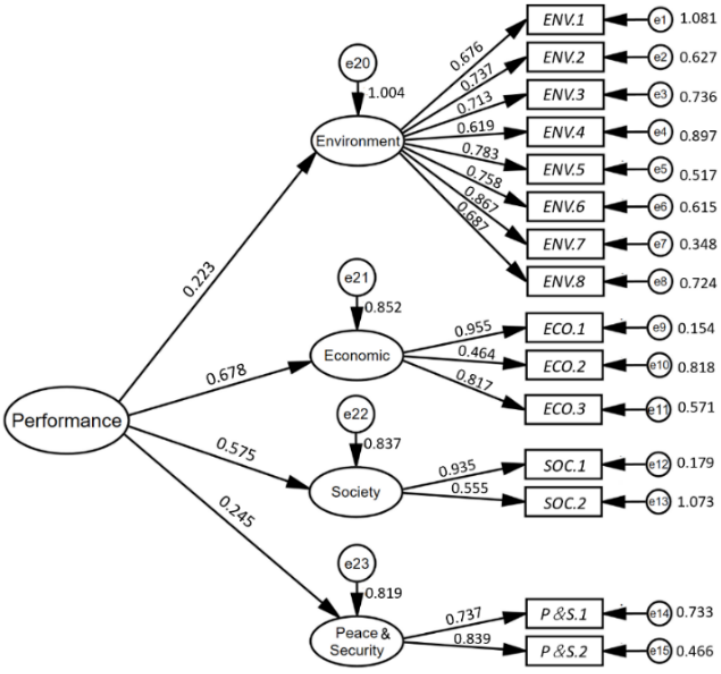

Figure 6.6. Measurement equation model of performance.

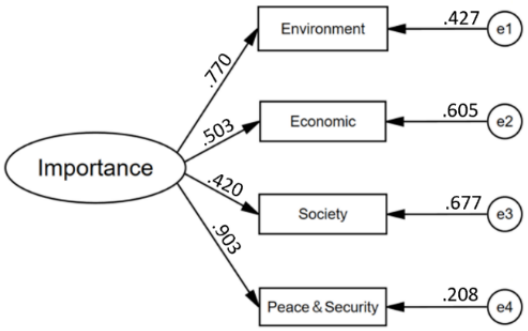

Figure 6.7. Measurement equation model of importance based on four pillars of SD.

Table 6.8. Measurement equation model of fit indices.

Fit Indices	CMIN/DF	RMSEA	RMR	GFI	AGFI	CFI	IFI Delta2
Explicit Importance	2.766	0.067	0.075	0.916	0.882	0.921	0.920
Performance	1.545	0.037	0.052	0.957	0.941	0.981	0.981
4 pillars of SD	.319	0.000	0.008	0.999	0.996	1.000	1.003

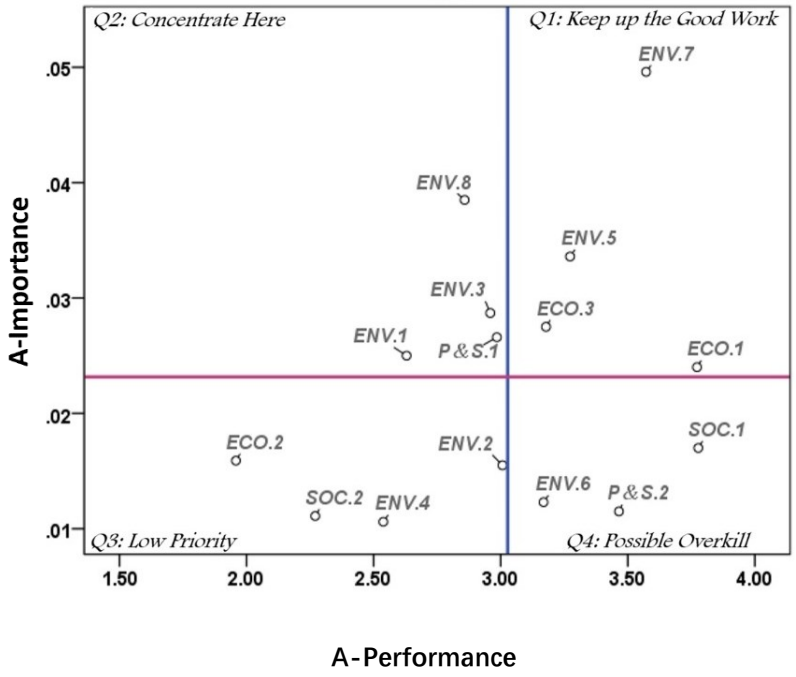

Figure 6.8. Adjusted IPA map with implicit important and four pillars of SD.

According to Figure 6.7, the changes in some indicators were very distinct. The weights after normalization are, environment: 29.7%; economy: 19.4%; society: 16.2%; peace & security: 34.8%. Therefore, higher weighted indicators of peace & security and environment namely P&S1, ENV.8, ENV.3, ENV1, are promoted to the second quadrant—compared with the MIPA map, only ENV.1 remains unchanged.

As a suitable illustration of the four quadrants, the AIPA map shows that the distribution of the four dimensions is more dispersed. Thus, as a corrective action, the local government should divide the functions presently under environmental governance and provide suitable cultural activities for ethnic minorities.

The results of the AIPA matrix obtained from the analysis illustrate the following points: (1) The indicators in quadrant 1 have both high satisfaction and importance, which means that the environmental and economic indicators contained in this section need to maintain current trends. These factors include cleanliness of the village, local climate, local crafts, and popular local crops. (2) The indicators in quadrant 2 that stakeholders stressed the importance of were high in value, and considered underperforming, which means that there is a need to improve the management of these indicators and strengthen policy preference, to achieve a high level for the indicators. These indicators include the overall style of the village, representative diet, unspoiled rivers, and the degree of integration of local minorities. (3) The indicators in quadrant 3 were considered to be established and not highly performant, including unique-landform landscape, local green vegetation, folk cultural events, festivals with local characteristics, and the degree of conservation of cultural heritage and monuments. However, all kinds of traditional folk activities and natural resources that represent local cultural characteristics will receive increasing attention due to the vigorous development of the cultural industry. (4) Only three indicators appear in quadrant 4, which is the least among the four quadrants. These are significant only for local stakeholders, perform strongly, and are of low importance, which means that limited resources may be wasted. These factors include historic buildings, representative houses, local air quality, and the popularity of cross-border tourism.

6.6 Summary

As mentioned above, although exploratory in nature, this study offers useful insights into the actual operation, and theoretical aspects of the IPA method. First, the research is conducive to acceptance by local people with regard to their preferences in the perspective of SD. In view of the drawbacks of the current TIPA and MIPA methods, this paper proposes the use of EFA and SEM to develop the CLC carrier index evaluation model to determine the load of each indicator of importance and performance, and the SD-based measurement model to further determine the weight of the sustainability of each indicator in importance.

This can solve the incongruous and uncertainty problem in the sustainable planning strategy, and the case study proves the feasibility of the IPA method combined with the influence of the structural equation. Second, the AIPA approach strengthens the perspective that by introducing the pillars of SD into the IPA method, the AIPA matrix can be divided into two corrective and preventive directions. This provides a basis for the future use of the IPA method in a comprehensive way based on an administrative angle.

Chapter Seven

The Sustainability Strategy Suggestion Based on the Result of A-IPA

This chapter comprises rational and feasible suggestions and management principles for the development of strategies to combat the disadvantages that may threaten the SD of traditional villages based on the evaluation results of the SD of the CL in Changbai Mountain. The first section of this chapter proposes planning strategies for the SD of 11 traditional villages in Changbai Mountain to guide the SD of traditional villages based on the CLC analysis of traditional villages in Changbai Mountain and the results of A-IPA. The second section explains a concept of development that is compatible with protection and development. The third section describes the implementation of sustainable conservation and development strategies from the perspective of the cultural industry and economic development.

7.1 A suggestion for the sustainability strategy based on A-IPA results

Based on the results of the analysis of the AIPA of the stakeholder-based SD, with respect to the importance of stakeholder perceptions in the previous chapter, sustainability strategies to develop traditional villages at Changbai Mountain are suggested as follows (see Figure 7.1 for details).

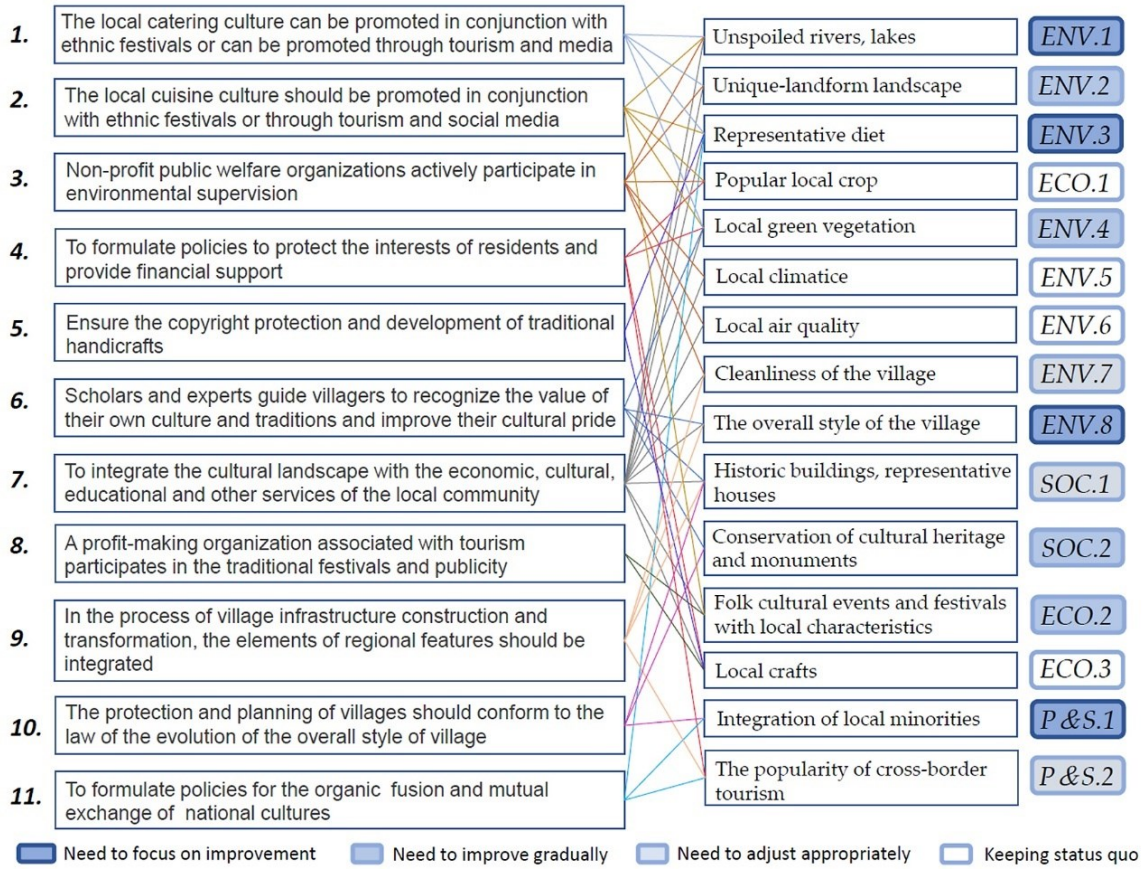

Figure 7.1. Eleven specific sustainability strategies and corresponding indicators and the level of indicators.

In Figure 7.1, there are 11 specific strategies for each CL carrier. Some strategies correspond to more indicators, such as Article 3, "non-profit public welfare organizations actively participate in environmental supervision," and Article 7, "to integrate the CL with the economic, cultural, educational, and other services of the local community." This strategy is specifically described and expanded in Sections 7.2 and 7.3.

7.2 Concept of development compatible with protection and development

Conservation and development are the core principles of SD strategy. As modern civilization evolves, traditional CLs cannot be completely unchanged. They will evolve with time and cultural exchange. In fact, CL development is an internalized and circular process of creation. Sustainability strategies should be formulated in a way that is consistent with development. Now that change is inevitable and development is the normal and driving force for survival, traditional CLs should not be confined to the "exhibition hall;" otherwise, it will lead to the withering of culture. Both protection and development are key to the SD of a traditional village for an excellent CL. Integrating CLs into the economic, cultural, educational, and other services of the local community will improve the living environment of community residents. Simultaneously, as a multi-ethnic region, the organic fusion and exchanges among different cultures are also effective in supporting the SD of traditional villages. After retaining the local cultural ideology, development based on the integration of other cultures is more conducive to the heterogeneous evolution of the CL.

Based on the definition of SD, the sustainable development of traditional villages means that they should be able to effectively inherit their own historical and cultural information and ensure the authenticity, typicality, and uniqueness of the information to be passed on scientifically. Simultaneously, it can have effective dialogue and a harmonious coexistence with the background of the times and the social environment to obtain eternal vitality. The combination of the landscape features reflects the complete display requirements of the village CL in terms of range, variety, taste, information, and time sequence, and conforms to the inherent requirements of the SD of traditional villages. It is an important approach for seriously reflecting on the existing problems in the protection and development of traditional settlements by considering regional, resource, quality, and historical and cultural issues.

Rural tourism and commercial exploitation activities need to be adapted to the cultural and ecological environment [201,202]. In the development process, the history of traditional villages should be respected: that is, the material culture of traditional ancient

architecture with a certain cultural, historical, and archeological value, and the intangible culture with typical characteristics of the region, ethnic group, and specific historical period. Cultural protection in rural tourist areas should effectively inherit and preserve cultural resources and integrate the resources of tourism and culture. First, it is necessary to clarify the main body of rural tourism and business development accurately and reasonably locate the development target to preserve the use of resources. Second, it is necessary to increase the consciousness of the protection of rural cultural resources. This, in addition to intensifying the promotion and preservation of traditional village culture, highlights supervision and mobilizes the public to participate in supervision. Finally, it is necessary to improve the overall quality of rural cultural tourism practitioners and fully release the attraction of rural culture and the advantages of the tourism development industry.

7.3 Sustainable Conservation and Development Strategies

7.3.1 Comprehensive development model involving multiple participant types.

The traditional villages of Changbai Mountain have obvious characteristics of a multi-ethnic culture. As part of the cultural heritage, this ethnic minority's CL belongs to the category of public cultural symbols. Therefore, the SD of traditional villages also requires the extensive participation of various organizations in society, which should include the government, experts, clans, villagers, and other related groups, to achieve multi-level development of the CL.

The government is the coordinator of policy formulation and all aspects of the relationships among the various actors. Therefore, the government should formulate a more complete system to maximize the development of villages on the basis of protecting the interests of residents. On the other hand, the government should ensure the maintenance of the main direction of the CL of the village and provide reliable services—for example, helping villagers formulate and implement protection and development plans, and providing financial support. The protection of regional culture also requires the cooperation and enthusiasm of the owners of cultural skills. Meanwhile, the participation of scholars, especially anthropologists, is also very important to guide villagers in realizing the value of their own culture and tradition and striving to create the right environment to practice re-understanding their culture. The integrity and continuation of the cultural context are the core of the SD of the CL of traditional villages. Local people are not only an important part of the authenticity and integrity of the intangible cultural heritage but also a critical driver of its protection and development. The CL of villages is strongly linked to the lives of local people, such as dwellings and historical sites, agricultural production, and living skills and tools, especially traditional handicrafts; the protection and development of copyrights are necessary to safeguard their interests. Only through inheriting and protecting valuable traditions and implementing them can CLs be developed effectively

and continuously. Therefore, it is necessary to cultivate cultural pride and consciousness of ethnic identity among villagers and make cultural inheritance a conscious act. Some for-profit organizations related to tourism and non-profit public welfare organizations are also indispensable to promoting the SD of villages.

In conclusion, according to the results of the AIPA analysis of the traditional villages in Changbai Mountain, other than overall planning by the government, river management, and coordinated development of traditional rafting activities, there is a need for NGOs to participate vigorously in the development of local festivals. At the same time, they need to ensure that the environment is protected and avoid wasting resources.

7.3.2 The orientation of development based on cultural identity

7.3.2.1 The inheritance of cultural symbols

As a culturally homogeneous geographical region, the site selection and morphosis of traditional villages in Changbai Mountain are heterogeneous CLs. The CL component is also closely associated with the effects of ethics and religious beliefs on settlements and planning [192]. For example, Jinjiang village and Luquanzi village represent Manchu culture, Bailong village and Shuinan village have a Yanbian Korean background, and Songlingtun Village lies within Han culture. Although they possess the traditional Chinese characteristics of "facing yang and against yin," the site selection, surrounded by mountains and rivers, and the universality of street space characteristics, with each village still maintaining its own style, is the indicator with the highest importance in the "concentrate here" quadrant.

Therefore, elements of regional features should be integrated instead of creating stereotyped villages in the process of village infrastructure construction and transformation. The protection and planning of villages should conform to the evolution rule of village spatial forms, and national cultural elements should directly be part of the formation of the spatial fabric of villages. A representative diet is a symbol of regional culture and is closely related to biological resources. The local cuisine should be promoted in conjunction with ethnic festivals, or through tourism and social media. The local ingredients should be gathered or cultivated within the scope of the law. The economic component is linked to various uses of local resources. Therefore, the use of local tangible and intangible cultural resources can both develop the economy and promote the culture.

7.3.2.2 Popularize education of traditional village culture

Favorable traditional culture education is a vital pathway for enhancing people's cultural concepts and awareness. Excellent hometown cultural and traditional education

should be incorporated into the preschool and elementary school education system for traditional villages in Changbai Mountain. Simultaneously, feasible cultural exchanges are essential. Government departments can reach a cooperative relationship with other willing villages or cities by adopting the forms of "friendly exchange villages" and "city-traditional village alliances" to promote the dissemination and interaction of the excellent culture of traditional villages in Changbai Mountain.

In addition, digitalization and online cultural dissemination are imperative in the 5G era. From 2017 to 2020, the Chinese government emphasized that it is necessary to speed up the construction of digital museums of famous Chinese historical and cultural towns and villages and the construction of a rural cultural heritage resource database [203,204]. The "Chinese Traditional Village Digital Museum," for which the Chinese Academy of Planning was responsible for technical construction, operation, and maintenance, was officially launched in April 2018. The traditional village digital museum is an important carrier for recording, displaying, and disseminating. It aims to archive comprehensive information for traditional villages through digital technology [205]. Compared with traditional recording methods, its recording means are more diversified, including graphics, audio and video multimedia, virtual reality (VR), visual display, big data, mobile Internet, and a 3D real-world model. Diversified recording methods allow different content in traditional villages to be fully explored and expressed [206,207].

7.3.2.3 Promotion of multi-platform media and cultural industrialization and branding

In the current era of convergence media, media is not only a cultural communication tool but also a social infrastructure [208]. Actively expanding the multi-channel propaganda platform of the traditional villages of Changbai Mountain and using popular social media platforms for propaganda have a significant effect on the cultural dissemination of traditional villages. Meanwhile, participating in the selection of traditional culture and folklore can not only present the cultural value of traditional villages but also attract investment.

The power of the media as the architect of the image of the rural cultural industry is nonnegligible. However, high-quality rural cultural industries cannot face the public's vision due to a lack of channels for promotion. The development of CLs requires high clicks and page views, and the improvement of the popularity of traditional villages cannot occur without the communication of the media.

The rural cultural industry has entered a whole new era under the background of the "Internet Plus" model. New media have provided various cultural industries with extensive display platforms and opportunities [209]. Audiences in the age of convergence media have become accustomed to understanding the world at their fingertips, receiving

fragmented information in fragmented time, and realizing information acquisition, exchanges of opinions, and entertainment through mobile clients. This general lifestyle puts new requirements on the promotion and interaction of rural cultural industries. Li Ziqi, who has more than 16 million fans on YouTube, is a very successful case [210]. Her short videos mainly show the rural CL, natural ingredients, and simple sensibility of Southwest China through the details of rural life, spreading China's rural and diet culture, etc. [211]. Li Ziqi took full advantage of new media and released short videos through multiple platforms that have attracted widespread attention. At the same time, investing funds to support her company has also realized abutting joint of cultural resources and cultural industries. Therefore, in the fierce competition in the modern cultural industry, only by improving the aesthetics of video creation and innovating cultural products can one stand out on the market.

The development of CL should have a modern, international, and strategic vision. In the development of CL-related industries, the media is a propaganda microphone. It is significant for the publicity of the cultural industry to establish an integrated publicity mechanism led by mainstream media and advanced by new media. This multimedia, virtual, and realistic approach is very convenient for the sustainable development and dissemination of CL, especially in the post-pandemic era [212].

7.3.3 Strategies based on economic development

First, economic sustainability is a guarantee for the SD of traditional village CLs. We should take advantage of Changbai Mountain as the origin of Manchu culture, integrate it into the characteristic cultural industry, increase its innovative economy, diversify its traditional village economy, and promote development. We should also actively introduce human resources to inject vitality into the SD of traditional villages.

Second, the property rights of traditional villages should be dealt with properly. At present, most traditional village buildings in China are privately owned by the villagers. Under such circumstances, because of the villagers' limited personal capacity and insufficient resources, it is impossible to complete such a huge project. The repair and protection of the village architecture requires a large amount of funds, human resources deployment, and professional and technical personnel. Therefore, the village committee needs to actively communicate and cooperate with the local government. The government allocates a special fund for village protection and provides professional and technical personnel to participate in cultural preservation. Under the supervision and management of the village committee and the government, the villagers should establish a repair committee. The repair committee will make proper use of funds to complete the protection of the building. Furthermore, the government can formulate a land exchange plan and build new houses through reasonable site selection so that the aborigines of the ancient

buildings can be properly resettled and the original appearance of the traditional villages can be preserved intact.

7.4 Management principles for implementing sustainable development strategies

SD is a dynamic process of continuous improvement. In the planning process of traditional villages, new contradictions will constantly appear with changes in politics, economy, and culture. The principle of the regular adjustment of planning is to adhere to the development mode of small-scale organic renewal to constantly solve new contradictions and dynamically manage the various problems that arise. Management is the key to the orderly implementation of sustainable development planning. Formulating a scientific and standardized management system and cultivating management talents are important components of the SD of traditional village CLs. The system is the guarantee, and implementation is the key. It is necessary to fully understand people's conditions and respect their opinions after planning, and the villagers' feedback should be solicited regularly during the implementation of the plan to continuously improve the awareness and ability of villagers' self-government. Management should be guided by people's basic needs, improve infrastructure in accordance with local conditions, effectively improve residents' living standards, and enhance villagers' sense of belonging. It should control the population capacity of traditional villages, prevent hollow villages, and restore and maintain the social vitality of villages.

Chapter Eight:
Conclusion

Overview of Research, Result and Benefits
Limitations
Future Research

8.1 Overview of Research, Result and Benefits

A rural landscape is not only a material and economic entity but also a social and cultural entity [33]. Cultural characteristics in the planning and construction of the physical space of the rural landscape should be preserved and perpetuated to obtain a complete infrastructure, natural field scenery, and a strong regional culture [72,213].

Based on many domestic and foreign relevant materials and field research, this paper sorted out the elements of the CL of Changbai Mountain's traditional village. Literature research, the GIS, space syntax, a questionnaire, and the IPA method were used to further analyze 15 indexes of Changbai Mountain's traditional village CL protection and SD from two aspects: tangible and intangible CLs. The focus of this dissertation is on realizing the exploration and identification of the integrated landscape features of the traditional village CL and the optimization of IPA methods for local stakeholders. It is an unprecedented cross-cutting study of the "integration of CL, traditional villages, and SD." Meanwhile, based on the study of 11 cases of traditional villages in Changbai Mountain and the impact of cultural landscape characteristics on the social, economic, ecological, and cultural aspects of traditional villages, it proposed building an Internet platform and creating cultural industries based on cultural and economic development. Series of corresponding sustainable development strategies. At the same time, based on the study of 11 cases of traditional villages on Changbai Mountain and the impact of CLCs on the social, economic, ecological, and cultural aspects of traditional villages, it proposes building a series of corresponding sustainability strategies through an Internet platform and creating cultural industries based on cultural and economic development. According to the main research line of "Establishing a CL feature identification system–Refining carriers of CLC–Implementing the IPA method of design optimization–Formulating an SD strategy," the main research results are as follows:

1) Based on SD, a geographical method to identify the characteristics of traditional village CLs and an innovative research framework were constructed.
2) A Likert Scale of characteristics of traditional village CLs was designed, and stakeholders' satisfaction with and perception of the importance of rural CLs were measured.
3) Based on TIPA and MIPA, the IPA method was optimized with SEM.
4) The connotations, dimensions, principle, and strategy of the SD of traditional village CLs were proposed.

8.2 Limitations

First, this study mainly studies the rural cultural landscape from the perspective of sustainable development without a more comprehensive view of the impact of the

association between various elements of CLC on traditional villages.

Second, the IPA model has been widely used in a variety of industries because it is simple, intuitive, and easy to explain. The main purpose of IPA analysis is to analyze performance improvement strategies. Accurately judging the importance of each evaluation element is a prerequisite for ensuring objective and accurate results from the IPA analysis. Although we have clarified the proportion of the 15 indicators of CLs in the future development strategy for the stewardship of cultural and natural resources, there are limitations that need to be addressed. This study considers the traditional villages of Changbai Mountain as a homogeneous study area within territorial analysis and may ignore individual research factors of the villages. In addition, preserving the effective forces of villages and strengthening the homing attraction of people should also be the focus of future research.

8.3 Future Research

Taking SD as the framework, CLs as the carriers, and the theoretical innovation of traditional village management research as the purpose, this paper explores the importance and performance construction of traditional village CLs by mining and extracting some representative traditional village landscape factors. This dissertation includes CL research, village preservation research, village management research, and village landscape planning and design, which are of great significance to the SD of rural cultural preservation and rural tourism.

Traditional villages are important space carriers for the inheritance of regional culture and are the most representative landscape of regional cultural heritages. The identification of and research on the characteristics of heritage landscapes can reveal the humanistic geography and social culture of regional cultures. The study of the CL of a village should focus not only on the outside of the village but also on the demands of the local residents of the village to explore the protection of the CL of the traditional village in Changbai Mountain and SD. In this dissertation, the theoretical model of CLCs, the design of the CLC carrier scale, and the combination of SEM and IPA were preliminarily explored by integrating geographical and statistical methods to provide some enlightenment for future research. This provides a reference for the determination of relevant research directions and fields in the future so as to attract more scholars to pay attention to the issue of the cultural inheritance, protection, and development of traditional villages.

In summary, the CLCs of traditional villages reflect the human-land interaction footprint of the region. CLs represent a sense of belonging and identity. Studying the influencing factors of cultural differentiation and exploring internal evolution rules are conducive to the formulation of scientific optimization and regulation policies for

traditional villages, which is of great significance for rural revitalization. Time, cultural industries, and tourism should be the economic drivers of rural revitalization.

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Appendix: I Full Questionnaires （WeChat and Web page）

Full Questionnaires of the Cultural Landscapes of Traditional Villages in the Changbai Mountain

WEB PAGE VERSION

We would be very grateful if you can complete this questionnaire. We are very grateful for your contribution to the protection of traditional villages in Changbai Mountain

PART ONE

Q1. What is your gender

- Male
- Female

Q2. How old are you?

- ≤20
- 21-30
- 31-40
- 41-50
- 51-60
- ≥60

Q3. Which ethnic group are you from?

- Han
- Manchu
- Koreans
- Other ethnic minorities

Q4. What is your educational background?

- High school and below
- College and bachelor
- Master degree or above

Q5. What's your occupation?

- Farmer
- Civil servant
- Company employee
- Education, medical, research
- Freelance
- Student

Q6. Where are you come from?

- Jilin

- Tonghua
- Baishan
- Yanbian
- Other parts of Jilin Province
- Outside Jilin Province

Q7. Have you ever traveled to Changbai Mountain?

- I have been to Changbai Mountain
- I have never been to Changbai Mountain
- My hometown is in Changbai Mountain

PART TWO

Q8. Evaluation on the importance of the cultural landscape in Changbai Mountain

		very unimportant	unimportant	generally important	important	very important
1	**Unspoiled rivers, lakes**					
2	**Landscape with unique landform**					
3	**Representative diet**					
4	**Locally popular crop**					
5	**Local green vegetation**					
6	**Local climate**					
7	**Local air quality**					
8	**Cleanliness of the village**					
9	**The overall style of the village**					
10	**Historic buildings, representative houses**					
11	**Degree of conservation of cultural heritage and monuments**					
12	**Folk cultural events and festivals with local characteristics**					
13	**Local crafts**					
14	**Degree of integration of local minorities**					
15	**The popularity of cross-border tourism**					

Q9. Evaluation on the performance (satisfaction) of cultural landscape in Changbai Mountain

		very dissatisfied	unsatisfied	normal value	satisfactory	very satisfied
1	**Unspoiled rivers, lakes**	○	○	○	○	○
2	**Landscape with unique landform**	○	○	○	○	○
3	**Representative diet**	○	○	○	○	○
4	**Locally popular crop**	○	○	○	○	○
5	**Local green vegetation**	○	○	○	○	○
6	**Local climate**	○	○	○	○	○
7	**Local air quality**	○	○	○	○	○
8	**Cleanliness of the village**	○	○	○	○	○
9	**The overall style of the village**	○	○	○	○	○
10	**Historic buildings, representative houses**	○	○	○	○	○
11	**Degree of conservation of cultural heritage and monuments**	○	○	○	○	○
12	**Folk cultural events and festivals with local characteristics**	○	○	○	○	○
13	**Local crafts**	○	○	○	○	○
14	**Degree of integration of local minorities**	○	○	○	○	○
15	**The popularity of cross-border tourism**	○	○	○	○	○

PART THREE

Q10. Perception of factors influencing the sustainable development of cultural landscapes

		no influence	influence but unsure of severity	a major influence	enormous influence
1	**Environment**	○	○	○	○
2	**Economy**	○	○	○	○

3	**Society**	○	○	○	○
4	**Qeace & Security**	○	○	○	○

Thank you very much for your contribution to the protection of traditional villages in Changbai Mountain!

Appendix: II

Table 1. Collection of monographs related to cultural landscape in Changbai Mountain

Category	Quantity	Title of Monographs
County Annals	2	*《County Annals of Fusong》 《County Annals of Tonghua》*
City Annals	5	*《City annals of Dunhua》 《City annals of Tumen Toponymy》 《City annals of Tumen》 《City annals of Tonghua》 《City annals of Baishan》*
Local Chronicles	5	*《Local Chronicles of Yanbian Korean Autonomous Prefecture》 《Local Chronicles of Jilin Folk》 《Local Chronicles of Changbei Mountain》 《Forest Log Record of Tonghua County》 《Local chronicles of Jilin》*
Investigation of Place Name	4	*《Investigation of Place Name》 《Confluence of fishing and hunting nationalities in northern China》 《Investigation of place name in Tonghua County》 《Investigation of Place Name in Linjiang City》*
Manners and Customs	10	*《Research on Museum and Protection of Intangible Agricultural Cultural Heritage》 《Jilin Province Folk》 《Folk Customs and Tourism in Changbai Mountain》 《Knowledge of Chinese folk customs - Jilin Folk Customs》 《The Traditional Custom in Changbai Mountain》 《Local Chronicles of Jilin Folk Customs》 《Spirit of Nature Worship in China》 《Ginseng Gathering custom in Changbai Mountain》 《The Magical Changbai Mountain》 《Chinese Intangible Cultural Heritage Protection》*
Inspection Record	5	*《On the Banks of the Yalu River》 《Tour Guide in Jilin》 《Investigation of Alkaline Soil Dwellings in Jilin》 《Development and Management of Forest Resources in Changbai Mountain》 《Nostalgia》*
The Historical Data of Science and Technology	4	*《Study on Sunshine Adaptability of Courtyard Dwellings》 《Analysis on the construction technology of alkaline earth dwellings in Jilin province》 《Forestry construction in Jilin》 《Research on historical data of modern forestry science and technology in northeast China》*
Residence and Building	14	*《Tourism Architecture Landscape Morphological Culture in Changbai Mountain》 《Jilin Local-style Dwelling Houses》 《Research on Architectural Culture in Jilin》 《Research and Conservation of Modern Chinese Architecture》 《Practicality, economy, aesthetics and construction of new residential houses in Jilin Province》 《Log Cabin Village》 《Chinese Residential Architecture - Volume A》 《Korean folk houses in China》 《Local-style Dwelling Houses in Jilin》 《Picture of Chinese Classical Architecture - Residential Houses》 《The research of Architectural Culture》 《Zhang Yuhuan Anthologies of Chinese Dwellings》 《Ancient Chinese Architectural Culture - Yanbian》 《The Research of Jilin Architectural Culture》*
Ballad	1	*《Chinese Ballad Collection - Jilin Chapter》*
Regional Culture and Minority Culture	8	*《Chinese Regional Culture - Volume 1》 《The Korean Nationality》 《Research on Korean culture and Cultural Industry Strategy》 《Changbai Mountain culture of China》 《Manchu and Changbai Mountain》 《Confluence of Fishing and Hunting Nationalities in Northern China》 《Black land culture and northeast writers group》 《Fishing and Hunting Culture》*

Publications and Conferences

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1. **Zhang, Q. S**., Kim, E. Y. *, Yang, C. X., and Cao, F. C.， Sustainable Strategy for the Development of Cultural Landscape of Traditional Villages through Optimized IPA approach， *Journal of Cultural Heritage Management and Sustainable Development*, Emerald Group Publishing, 2021.

2. **Zhang, Q. S**., Kim, E. Y., Yang, C. X., and Cao, F. C., An Integrated Approach for Optimising the Spatial Planning of Tourist POIs for Traffic Accessibility: Dalian City, China， *International Journal of Transport Development and Integration.* 5(2), pp.162-174, 2021.

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1. **Zhang, Q.,** Kim, E. *, Yang, C., Cao, F., and Huynh, V. N., Integrated approach for optimizing the touristic space plan for sustainable urban development: A case study of Dalian city, China, *WIT Transactions on Ecology and the Environment*, WITPress, 241, pp.57–67, 2020.

2. **Zhang, Q. S.**, Kim, E. Y., Yang, C. X., and Cao, F. C., Identification of Cultural Landscape Factors for Sustainable Development: A Case Study of Traditional Villages in Changbai Mountain Area, *IOP Conference Series: Earth and Environmental Science*, 495(1), 2020.

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1. Sep.2020, *11th International Conference on Sustainable Development and Planning,* Bilbao, Spain ◎○
2. Mar.2020, *4th International Conference on Sustainable Development and Green Buildings, (ICSDGB 2020),* Sanya, China ◎○
3. Oct.2020, *4th International Conference on Environmental, Industrial and Energy Engineering (EI2E 2020)*, Guiyang, China

Notes: Put ○ for refereed paper and ◎ for oral presentation at international conference