MALAYSIA ARCHITECTURAL JOURNAL

Malaysia Architectural Journal

Journal homepage:
https://majournal.my/index.php/maj
e-ISSN : 2716-6139

Research on Classification Evaluation and Strategy of Utilization of Historical Buildings —Taking 54 historical buildings in Beijing old city as an example

Rong Yuefang [1], Song Jian [21*], Zhang Dian [3]

[1]Professor, Dept. of Urban and Rural Planning, Beijing Univ. of Civil Engineering and Architecture, Beijing, China.
[2*]Ph.D. Candidate, Dept. of Urban and Rural Planning, Beijing Univ. of Civil Engineering and Architecture, Beijing, China.
[3]Postgraduate, Dept. of Infrastructure, People's Public Security Univ. of China, Beijing, China.

ARTICLE INFO

Article history:
Received: 30 April 2024
Received in revised form
Accepted: 15 October 2024
Available online: 23 June 2025

Keywords:
Historic building; Open utilization; Evaluation method; Classification guideline; Beijing old city

ABSTRACT

Historic buildings are important manifestations of historical, artistic, and scientific values from different periods, and they are important research objects for urban historical and cultural studies. Strengthening the rational utilization of historic buildings is an inevitable trend in current development. There have been practical explorations in the open use of historic buildings in various places, some experiences have been accumulated in terms of engineering techniques, social participation, and management operations. However, at this stage, the open use of historic buildings is mostly in the pilot exploratory stage, and there is still a lack of overall planning. The construction of a scientific and effective evaluation index system for the openness and appropriateness of the use of historic buildings is the first prerequisite for the protection and rational use of historic buildings, and it is also a powerful support for the complete demonstration of the city's historical features. Based on this, this article focuses on the characteristics of historic buildings, and constructs an indicator system for evaluating the potential of open use of historic buildings from three dimensions: current conditions, value endowment, and external environment of historic buildings. Combining different forms of open use of historic buildings, it studies and determines the evaluation criteria for each indicator from six aspects: visiting and touring, cultural display, business services, public office, community services, and state services. Taking 54 historical buildings in Beijing old city as an example, the article applies a classification evaluation method to provide reference for the overall planning and categorized management of the open use of historical buildings in Beijing old city.

[1*] *Corresponding author.*
E-mail address: 18307362311@163.com

1. Introduction

Historical building is an important component and representative of Chinese cultural heritage resources, which embodies and inherits the essence of Chinese civilization. In China, "cultural relic architecture" is not a specific term under the legal framework, but a concept with more academic and practical significance. According to the classification of cultural relics protection units in the Law of the People's Republic of China on the Protection of Cultural Relics, the concept of "cultural relic architecture" discussed in this paper mainly includes two types: ancient architecture, modern and important historical sites and representative architecture. Nowadays, more and more historical buildings reflect the important values and characteristics of history, society and cultural heritage. The protection and rational use of historical buildings will play an important role in the protection and inheritance of the historical and cultural traditions of the nation and the region, promoting the sustainable development of social economy and the construction of ecological civilization [1-4]. At the 22nd Meeting of Commission for Deepening Overall Reform of the CPC Central Committee in 2021, General Secretary Xi Jinping stressed that we should strengthen the protection and utilization of historical buildings and the protection and inheritance of cultural heritage, improve the research, interpretation, display and dissemination of historical buildings, so that historical buildings can truly come alive, better integrate into life. According to the outline of the 14th Five-year Plan of Beijing, improving the protection system of famous historical and cultural cities and building Beijing into a world famous and cultural city showing cultural confidence and diverse and inclusive charm is one of the main vision goals by 2035. How to make reasonable use of the old city in Beijing on the basis of the protection of historical buildings is an important issue that needs to be paid attention to in the capital's historical buildings work and urban construction.

From the perspective of the development process of the protection and utilization of historical buildings, foreign countries and regions, especially in Europe, generally have varieties of historical buildings, and the understanding and practice of the utilization of historical buildings is earlier than China[5-6]. The system foundation is perfect, and there are abundant and excellent examples of the reconstruction and reuse of historical buildings. Since 1993 Athens Charter defined the principle of restoration of "historic monuments", relevant international organizations and scholars have carried out a large number of studies on the definition of historical buildings, conservation principles, research scope and conservation measures. The research on conservation and utilization of historical buildings abroad has experienced an evolution process from "commemorative" to "stylistic" and then to "adaptive"[7-8]. Its modern conservation and utilization pays attention to the process of providing principled guidance and guiding the protection procedure, so as to better adapt to the protection and utilization of historical buildings in different areas and types [9-14]. On the basis of learning from the concepts and principles of protection and utilization of historical buildings in China, for many years, the industry has regarded "protection" as the focus of historical buildings research, and has explored a series of protection and management systems from individual buildings to blocks and then to the entire city. A set of legal system from microscopic to macroscopic, which includes institutions about cultural protection units, historical and cultural blocks and historical and cultural cities, have been formed. In recent years, as the society and industry pay more attention to "utilization", the research on "utilization of historical buildings" has gradually increased, such as Lang Xufeng [15], Li Dongjun [16] , Wang Zhiru [17]carried out studies on the management system of the use of historical buildings, the degree of renovation, and the relationship between the dynamics in the renovation process and the surrounding environment, and further improved the relevant systems and policies of the open utilization of historical buildings. In addition, local governments also actively explore the policy mechanism and modes of open utilization of historical buildings. For example, In 2020, Xicheng District of Beijing took the lead in releasing the first batch of historical buildings activation utilization plan, and launched 7 historical buildings such as Shexian County Hall to carry out cultural exchange and experience. Hong Kong has implemented the "Revitalizing Historic Buildings Partnership Scheme" since 2008. Through

public bidding to social non-profit organizations, this scheme proposes strategies such as space renovation, event planning, and operation management for government-owned heritage buildings, and the types of utilization mainly include, but are not limited to, theme activity centers, medical halls, hotels, museums, cultural centers and etc. In general, the conservation and utilization of historical buildings at home and abroad shows the development characteristics from point to surface, from static protection to dynamic management, activation and utilization.

Although some practical achievements have been made in the research on the protection and utilization of historical buildings, experience has been summarized in the aspects of engineering skills, public and management ownership. However, at the present stage, the research perspective of the open utilization of historical buildings is relatively single, and the protection and utilization of historical buildings lacks linkage with the overall functional orientation of the block, which mostly belongs to the single-point exploratory utilization. Therefore, systematic evaluation should be carried out before the open utilization of historical buildings. As far as the value evaluation of historical buildings is concerned, western countries have formed a complete set of protection and renewal mechanisms ranging from investigation, evaluation, registration to education [18-21]. In recent years, based on the research of many foreign scholars, including Zhu [22], XuanYing [23], Hai-ping [24], domestic scholars have also tried to build an evaluation index system for the protection and utilization of historical buildings, but most of them only consider the dimensions of "history, value, status quo, location", etc., and fail to integrate historical buildings with the surrounding environment from the perspective of utilization. As a result, domestic scholars have failed to quantify the relationship between historical buildings and the surrounding environment from the perspective of utilization potential, and thus ignored incorporating them into the evaluation system. In 2020, the "Guidelines for the Open Use of Historical buildings" and the "Guidelines for the Open Use of Historical buildings" were promulgated. The documents supplemented the general conditions and requirements for the open use of historical buildings, and encouraged the use of different forms of open use [25-28], however, there is no unified evaluation standard for evaluation. （Calgary Historic Resource Evaluation System Handbook）

Taking all factors above into consideration, based on the perspective of feature value identification, first of all, this paper deeply analyzes the relationship between the open utilization of historical buildings and the ontology value and the surrounding environment based on multi-dimensional theory. Then, using the combination methods of Delphi and analytic hierarchy process, this paper constructed a classification evaluation system for the open utilization of historical buildings, and established the evaluation standards for classification and utilization of historical buildings. In addition, taking 54 historical buildings in the old city of Beijing as an example, this paper carried out empirical research to ensure the availability and operability of evaluation indicators. Last but not least, based on the evaluation results, this paper puts forward suggestions for the open utilization of historical buildings based on classification evaluation, which provides support for the research on the protection and rational utilization of historical buildings with "one policy for one historical building", and also provides a reference for improving the systematic research on the classification and open utilization of historical buildings.

2. Methodology and Materials

2.1 Multidimensional Theoretical Analysis

Combing the theoretical research results of the protection and utilization of historical buildings, it is found that the ideas of historical buildings protection and utilization at domestic and abroad have gone through a development process from "strict protection" to "combination of preservation and use" [29]. During this process, value assessment, as an important work in the protection and utilization of historical buildings, has undergone a long period of critical reflection and development in the industry.

"Inherent intrinsic value" has been questioned by more and more scholars. It is generally believed that the value of historical buildings is not completely contained in the material form, but artificially endowed and constantly constructed. In the process of protection and utilization, the meaning and value of historical buildings are constantly being created, and they are constantly developing in the process of being created. Scholars pay more attention to the status of the subject in the process of value judgment, and tend to place historical buildings and buildings in specific time, space and social context to make value analysis. Under the transformation of this value cognition, the value connotation of historical buildings has changed from idealism and unity to empiricism and diversity [30]. This transformation of diversified value connotations has laid a theoretical foundation for the evaluation of the open utilization of historical buildings from multiple dimensions, such as the status quo, ontology value and surrounding environment.

Based on above, this paper extracted three dimensions of ontology, value endowment, and external environment from the theories and policies of historical building protection, heritage protection, and historical buildings activation and utilization, and judged whether historical buildings have the potential for open utilization and the appropriate open utilization form from a comprehensive perspective. It made up for the limitations of the existing value - status-based evaluation perspective of historical buildings, in order to fully tap the multi-use value of historical buildings on the basis of identifying the characteristic value of historical buildings.

2.2 Classification and Utilization Basis

By summarizing the relevant national policy documents on the protection and utilization of historical buildings since 2005 (Table 1), this paper sorted out the types of open and utilization cases of historical buildings at home and abroad, and combined with the current characteristics of the old city of Beijing, the general planning of Beijing and other higher-level planning and other related requirements, it proposed six types of open utilization of Beijing's old city historical buildings: state services, tours, cultural exhibitions, business services, public welfare offices and community services.

Table 1
Summary of Historical buildings protection and utilization policies since 2005

Time	Policy Action	Influences
2005.12	The State Council issued the "Notice on Strengthening the Protection of Cultural Heritage"	Pay attention to overuse
2008	National museums are officially opened to the public for free	——
2011.08	The State Administration of Cultural Heritage issued the "Regulations on the Management of Commercial Activities of State-owned Historical buildings Protection Units (Trial)"	Clarify the operating activities of state-owned historical buildings protection units
2014	"Key Points of Work of the State Administration of Cultural Heritage in 2014"	It is necessary to coordinate the protection and utilization of historical buildings, and emphasize the improvement of the level of serving the society
2015	"Guidelines for the Protection of Historical buildings and Monuments in China"	From the perspectives of function continuation and new functions, the principles and methods of rational use are expounded.
2016	The State Council issued the "Guiding Opinions on Further Strengthening the Work of Historical buildings"	Further elaboration of guidance on various aspects of historical buildings protection
2017	The State Administration of Cultural Heritage issued the "Guidelines for the Opening of Historical buildings (Trial)"	Promote the rational use of historical buildings and buildings, and expand the opening of historical buildingsresources to the society
2018	The General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued the "Opinions on the Implementation of the Revolutionary Historical buildings Protection and Utilization Project (2018-2022)"	Provide guidelines for " protection, utilization and inheritance of revolutionary historical buildings, restoration, display and dissemination, value mining and utilization innovation "
2018	The General Office of the Central Committee of the Communist Party of China and the General Office of the State Council	Strengthen top-level design, institutional innovation and precise management, and

	specially issued the "Several Opinions on Strengthening the Reform of the Protection and Utilization of Historical buildings"	promote historical buildings to better serve the overall situation of economic and social development
2019	Detailed Rules for the Implementation of the Interim Measures for the Administration of Recognition of Historical buildings in Beijing (for Trial Implementation)	Further standardize the principles and requirements for the identification of movable historical buildings and immovable historical buildings
2020	The State Administration of Cultural Heritage issued the "Guidelines for the Open Utilization of Historical buildings"	Advocate the correct concept of historical buildings protection to the society and the public, and recommend the correct open utilization method
2021	"Regulations on the Protection of Beijing's Famous Historical and Cultural Cities"	Strengthen the protection of Beijing's famous historical and cultural city, coordinate the protection and utilization of historical and cultural heritage and the development of urban and rural construction
2021	"Beijing Famous Historical and Cultural Cities during the "14th Five-Year Plan" —Period Conservation Development Plan	It is proposed to revitalize the cultural vitality of the old city by promoting the vacating and opening up of cultural relics and historical buildings.

2.3 The Analytic Hierarchy Process to Support the Decision-making

2.3.1 Establishment of analytic hierarchy process comparison matrix

The comprehensive trade-off of the multi-factor can be simplified to the pairwise comparison between the factors by using the analytic hierarchy process to calculate the weight of the factor, and the relatively accurate weight value can be obtained through quantification, calculation, and verification, which can improve the rationality and accuracy of the factor weight determination process in the evaluation system to a certain extent. When comparing the importance of factors in pairs, the corresponding scores are given based on the different importance of the two, and matrix A (Formula 1) is constructed, where aij is the assignment of the importance comparison between factors i and j, and n is the number of factors involved in the comparison. In this study, the comparison of the importance of factors is completed by expert discussion and reviewed by the expert group after the results are obtained. The basic value judgment is carried out by experts, and the weight calculation is completed by the AHP method. The two methods are combined to obtain a comparison matrix table of evaluation factors for opening and utilization of historical buildings.

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \quad (1)$$

2.3.2 Matrix consistency test

When comparing the importance of factors, as the comparison is carried out in pairs, there may be inconsistencies in the overall logic, and consistency tests need to be carried out. The consistency index CI (Consistency Index) of the matrix is calculated by Formula (2), where max is the maximum eigenvalue of the matrix and n is the number of factors involved in the comparison. Then the CR (Consistency Ratio) of the matrix is calculated by Formula (3), where RI is the Random Consistency Index. The smaller the consistency CR value is, the better the consistency of the representative matrix is. ⁻It is generally believed that when CR ≤ 0.1, the consistency of the matrix is acceptable. In this study, after the consistency of the matrix is tested and the matrix value is adjusted repeatedly, finally, the CR value is 0.006, which is far less than 0.1, indicating that the matrix has good consistency.

$$CI = \frac{\lambda_{max} - n}{n - 1} \tag{2}$$

$$CR = CI / RI \tag{3}$$

2.3.3 Calculation and comprehensive evaluation of factor weight

In the matrix, the average score of each factor is obtained by averaging the comparison scores of each factor with all other factors. The average score of all factors is normalized to obtain the weight (W)of each factor. Formula (4) is the calculation method of factor weight, where W_i represents the weight of factor i, a_{ij} represents the assignment of the importance comparison between factors i and j; and n represents the number of factors participating in the comparison. Finally, the scores of all evaluation factors are weighted and comprehensively analyzed to obtain the historical value evaluation score of each building (Formula 5), where S_{ij} denotes the comprehensive score of the historical building in the evaluation of opening and utilization, S_i denotes the score of the building in the evaluation factors, W_i denotes the weight of the evaluation factors, and n denotes the number of factors involved in the comparison.

$$W_i = \frac{\sqrt[n]{\prod_{j=1}^{n} a_{ij}}}{\sum_{i=1}^{n} \sqrt[n]{\prod_{j=1}^{n} a_{ij}}} \tag{4}$$

$$S_{ij} = \sum_{i=1}^{n} S_i \times W_i \tag{5}$$

The historical buildings with opening and utilization potential can be screened out by setting the corresponding threshold according to the need. The types of opening and utilization can be classified and evaluated according to different conditions by categorizing them into sightseeing, cultural exhibition, business service, public welfare office, community service, and state service.

2.4 Evaluation samples

Beijing is an ancient cultural capital with rich architectural heritage, and as of 2019, after the announcement of the eighth batch of national protection units, among the 2,852 administrative units counted, the Xicheng District and the Dongcheng District of Beijing ranked the first and the second in terms of the number of units owned by the national protection units respectively, with 44 units in the Xicheng District and 37 in the Dongcheng District. The Old City of Beijing is the core conservation area of Beijing's East and West Districts, and also the area with the highest density of historical buildings and buildings. It is also the area with the highest density of historical buildings. Therefore, it is widely representative and practically significant to select it as the empirical research site.

Fig. 1. Distribution map of 54 sampling sites for evaluation of heritage buildings

There are 279 historical buildings within the scope of the Old City of Beijing with the type of "Important Historical Sites and Representative Buildings of Modern Times". Considering factors such as the level of protection of historical buildings, the date of construction and the type of historical buildings, 54 historical buildings were randomly sampled to carry out the field research and evaluation and analysis (Fig. 1), and the database of the actual research was set up. Among them, there are 13 national key historical buildings protection units, 18 Beijing-level historical buildings protection units, and 23 district-level historical buildings protection units and other important historical sites and representative buildings of modern times with protection value.

3 Construction of a classification evaluation system for the open utilization of historical buildings

3.1 Principles of Construction of Evaluation System

The evaluation index system is a hierarchical structure formed by decomposing the content of the evaluation system layer by layer. A reasonable index system is an important guarantee for the objective, comprehensive and accurate evaluation results. Therefore, in order to ensure the rationality of the indicator system, the following principles should be followed:

The first is the scientific principle. Only by following the scientific selection method can the scientific objectivity of the evaluation results of the classification and open utilization of historical buildings be guaranteed. Second, taking into account the representative indicators of multiple dimensions and all aspects; the third is the principle of generality, based on the characteristics of historical buildings, the general indicators of historical buildings evaluation are selected, so as to better provide a basis and reference for the evaluation of historical buildings in different regions of the country. The fourth is the principle of practicality, which ensures the operability and accessibility of the evaluation indicators, and ensures the degree of implementation of the evaluation; the fifth is the principle of goal orientation, the purpose of the evaluation is not to simply draw the merits of the open use of historical buildings, and what is more important is to guide and encourage the open utilization

of historical buildings to develop in a scientific and reasonable direction, so the selection of evaluation indicators should be screened under the guidance of goals [31-32].

3.2 Technical Route

This research is guided by the evaluation target of the classification and utilization of historical buildings, which used the method of combining qualitative and quantitative analysis to carry out the classification and utilization evaluation of historical buildings according to the ideas of evaluation index selection - evaluation index confirmation - evaluation system construction - classification and utilization evaluation standards. Firstly, through the collation of relevant literature and on-the-spot investigation, a preliminary evaluation index selection reference library is established. Secondly, the index is further screened through research methods such as expert consultation and correlation analysis, so as to obtain a relatively complete and scientific evaluation of the open utilization of historical buildings. Based on this, the indicator weight is determined by the combination of Delphi method and Analytic Hierarchy Process (AHP) method. By comparison, multiple evaluation judgment matrices are constructed to evaluate the relative importance of each element at the target system and criterion level. Finally, according to the different ways of open utilization, the positive and negative correlation of the indicators and the quantitative evaluation method of the indicators, the classification and utilization evaluation standards are established (Fig. 2).

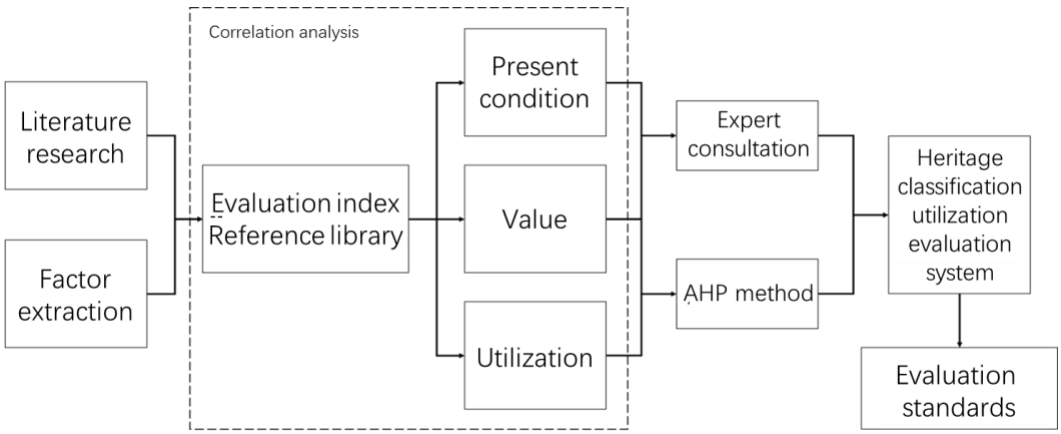

Fig. 2. Technical route of the classification of historical buildings utilization evaluation index system

3.3 Construction of Evaluation Index System

Through questionnaires, interviews, expert consultation, correlation analysis, regression analysis and other methods, the indicators with higher correlation and closer relationship with the research are selected from the indicator reference library and retained. , or the indicators that are not easy to obtain are discarded. Finally, according to the selection results, an evaluation index system for the classification and open utilization of historical buildings based on value protection is determined, including three dimensions of the status quo of historical buildings, the value endowment of historical buildings, and the external environment of historical buildings, as well as 42 evaluation indicators.

In order to ensure the scientificity and convenience of statistics, the weight assignment process is carried out in the YAAHP software. According to the above classification and open utilization evaluation index system of historical buildings, the hierarchical structure is constructed in the software, and the questionnaires are exported and distributed. A total of 25 scholars in related fields were consulted by experts in this research, and 22 valid questionnaires were obtained. Finally, the

questionnaire results are imported into the YAAHP software, and the specific weights of each index are obtained by judging the matrix solution weights, the relative weights of each layer, and the matrix consistency detection. (Table 2).

Table 2
Evaluation index system table for the open utilization of historical building buildings

Dimension layer	The standard layer	Evaluating Indicator	Data Sources	Metric Weight	Plus-minus Relativity
The status quo of the historical building buildings A	Basic status of the building A1	Structured safety A11	The Third National Cultural Relics Survey (2007)	0.0257	+
		Building area A12	The Third National Cultural Relics Survey (2007)	0.0080	+
		Building height A13	Field research	0.0069	+
		Number of rooms A14	Field research	0.0104	+
		The area ratio of modern buildings or structures in the site A15	Field research	0.0139	−
		Infrastructure supporting perfection degree A16	Field research	0.0196	+
		Historical buildings protection grade A17	The Third National Cultural Relics Survey (2007)	0.0240	+
	Current situation of courtyard space environment A2	Outdoor site area A21	Gaode map	0.0313	+
		Number of entrances and exits A22	Field research	0.0164	+
		Is immediately adjacent to the city road or not A23	Field research	0.0406	+
		Urban interface length A24	Gaode map	0.0278	+
	Current situation of the social environment A3	Historical building property right type A31	The Third National Cultural Relics Survey (2007)	0.0419	+
		Using the population density of A32	Field research	0.0290	−
Historical building building value endowment B	Historical and cultural value B1	Built in time B11	The Third National Cultural Relics Survey (2007)	0.0511	+
		Historical significance degree B12	Score by expert	0.1000	+
	Art aesthetic value B2	Art Representative B21	Score by expert	0.1297	+
	Tourism economic value B3	Tourist representative B31	Score by expert	0.1296	+
	Technology value B4	Technology representative B41	Score by expert	0.0430	+
External environment of cultural building C	Location condition C1	The closest distance to the central axis of Changan Avenue is C11	Gaode map	0.0095	−
		The closest distance to Tiananmen Square C12	Gaode map	0.0052	−
		Is it located in the historical and cultural district or not C13	Detailed Control Planning of Capital Functional Core Area (Block Level) (2018-2035)	0.0194	+
		Is it located in the traditional bungalow area or not C14	Detailed Control Planning of Capital Functional Core Area (Block Level) (2018-2035)	0.0094	+
	Traffic condition C2	Public transport coverage C21	Baidu source data POI	0.0223	+
		Urban road network density C22	Open-street map	0.0155	+
		Parking lot density C23	Open-street map	0.0202	+
	Commercial clothing facility C3	Spatial density of large catering service facilities C31	Baidu source data POI	0.0037	+
		Small and medium-sized catering service space density C32	Baidu source data POI	0.0074	+
		Space density of middle and high-end hotels C33	Baidu source data POI	0.0051	+
		Hotel homestay space density C34	Baidu source data POI	0.0077	+
		The space density of small commercial facilities C35	Baidu source data POI	0.0063	+
		Comprehensive shopping center space density C36	Baidu source data POI	0.0061	+
		Park green space area C41	Gaode map	0.0136	+

	Green space public space C4	Green coverage rate C42	Gaode map	0.0146	+
	Planning condition C5	Is it located along the cultural visit route or not C51	Detailed Control Planning of Capital Functional Core Area (Block Level) (2018-2035)	0.0120	+
		Is it located in the second ring Road specific style control area or not C52	Detailed Control Planning of Capital Functional Core Area (Block Level) (2018-2035)	0.0060	+
		Planning the land use function C53	Detailed Control Planning of Capital Functional Core Area (Block Level) (2018-2035)	0.0059	+
	Land price rent C6	Average residential rent price C61	Anjuke APP	0.0091	+
		Residential Transaction price C62	Anjuke APP	0.0101	+
		Shop and store rent C63	Anjuke APP	0.0120	+
	Socioeconomic C7	Population density C71	Beijing Statistical Yearbook (2021)	0.0077	+
		Population age composition C72	The Sixth National Population Census (2010)	0.0155	+
		Educational level C73	The Sixth National Population Census (2010)	0.0068	+

3.4 Classification and Evaluation Criteria for Open Utilization of Historical Buildings

In order to ensure the integrity and scientificity of the evaluation, based on the construction of the evaluation system, this study further proposes the evaluation criteria for the classification and open utilization of historical buildings, which are divided into two parts: the overall evaluation part and the sub-utilization function evaluation. According to the total score of all indicators, the overall open utilization potential of historical buildings can be obtained. On this basis, the correlation of indicators is screened according to the proposed six utilization methods, and the irrelevant indicators are assigned a value of 0, and then the type of Open utilization potential of features.

The evaluation indicators for the classification and open utilization of historical buildings proposed in this paper can be divided into qualitative indicators and quantitative indicators. method and according to the relevant evaluation standards, a reasonable threshold interval is given by standardization, so as to carry out quantitative evaluation. Finally, an evaluation method system combining subjective and objective evaluation will be formed, and to a certain extent, it will be used to promote the classification and open utilization evaluation of historical buildings (Table 3).

Table 3
Detailed rules for the classification and open utilization of historical building buildings

Num.	Evaluating Indicator	Community Service	Cultural Exhibition	Sightseeing	Business Services	Public Welfare office	State Service
A11	Structured safety A11	Level 4 or above	Level 4 or above	Level 4 or above	Level 4 or above	Level 4 or above	Level 4 or above
A12	Building area A12	>20, +	>100, +		>20, +	>100, +	>100, +
A13	Building height A13	>4			>4	>4	>4
A14	Number of rooms A14					>2	>2
A15	The area ratio of modern buildings or structures in the site A15			<20%			
A16	Infrastructure supporting perfection degree A16	>3	>3	>2	>3	>3	>3
A17	Historical buildings protection grade A17	<=2, −	+	+	<=2, −	<=2, −	
A21	Outdoor site area A21		>20	>50			>50
A22	Number of entrances and exits A22	≥1	≥1	≥2	≥1	≥1	≥2
A23	Is immediately adjacent to the city road or not A23	yes	yes		yes		yes
A24	Urban interface length A24	+	+		+		+
A31	Historical building property right type A31	+	+	+	+	+	+
A32	Using the population density of A32	−	−	−	−	−	−
B11	Built in time B11	−	+	+	−	−	
B12	Historical significance degree B12	−	+	+	−	−	+
B21	Art Representative B21	−	+	+	−	−	+

B31	Tourist representative B31	−	+	+	−	−	
B41	Technology representative B41	−	+	+	−	−	+
C11	The closest distance to the central axis of Changan Avenue is C11	−	+	+	+	−	+
C12	The closest distance to Tiananmen Square C12	−	+	+	+	−	+
C13	Is it located in the historical and cultural district or not C13		+	+	+		
C14	Is it located in the traditional bungalow area or not C14	+			+		
C21	Public transport coverage C21	+	+	+	+		+
C22	Urban road network density C22		+	+	+		+
C23	Parking lot density C23		+	+	+		+
C31	Spatial density of large catering service facilities C31		+	+	+		+
C32	Small and medium-sized catering service space density C32		+	+	+		
C33	Space density of middle and high-end hotels C33		+	+	+		+
C34	Hotel homestay space density C34		+	+	+		
C35	The space density of small commercial facilities C35		+	+	+		
C36	Comprehensive shopping center space density C36		+	+	+		
C41	Park green space area C41	+	+	+	+		+
C42	Green coverage rate C42			+	+		+
C51	Is it located along the cultural visit route or not C51		+	+	+		+
C52	Is it located in the second ring Road specific style control area or not C52		+	+			
C53	Planning the land use function C53	Living + Public service	Public service	Public service	Living + business	Public service	Public service
C61	Average residential rent price C61				+	−	+
C62	Residential Transaction price C62				+	−	+
C63	Shop and store rent C63				+	−	+
C71	Population density C71	+	+	+	+	−	
C72	Population age composition C72		+	+	+		
C73	Educational level C73				+	+	+

Note: "+" indicates that the index has positive correlation in a classification evaluation, "-" indicates negative correlation; "empty" means that the index does not participate in the evaluation of open utilization type; "Text description" indicates that the index is admittance index in a classification evaluation, that is, the condition can participate in the evaluation; the scoring interval of expert scoring data is [1,5].

4. Results

The study standardised the scores of each indicator and formed the overall evaluation results of the 54 sampled heritage buildings and the evaluation results of the classified use according to the positive and negative correlation of the indicators (Fig. 3). According to the overall evaluation results, it can be seen that the number of very suitable, more suitable, suitable, less suitable and unsuitable among the 54 sampled heritage buildings are 4, 15, 14, 14 and 4 respectively.

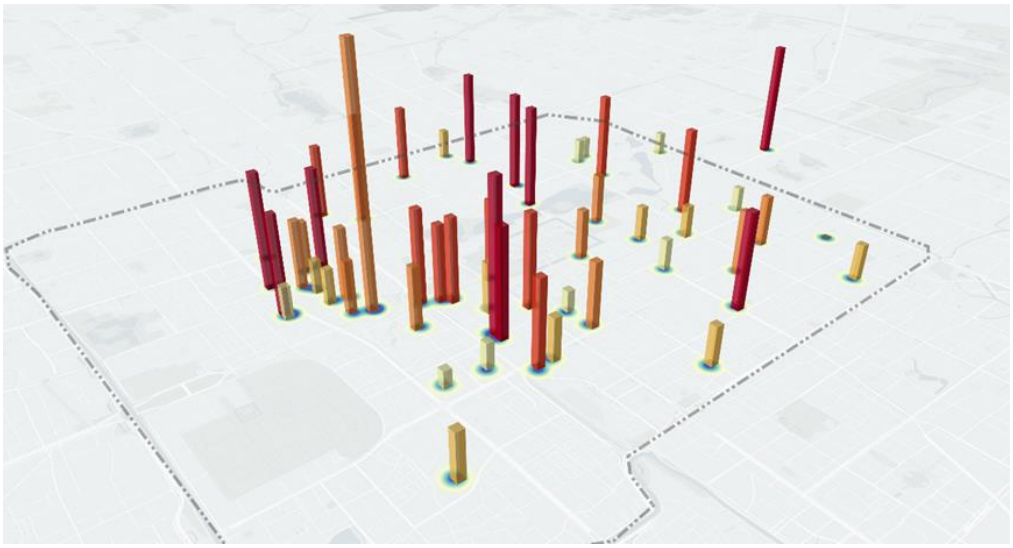

Fig. 3. Spatial distribution map of overall evaluation results of open utilization of historical buildings

4.1 Analysis of Open Utilization Conditions of Historical Buildings

The following characteristics can be found from the three-dimensional analysis of the status quo of historical buildings, the value endowment of historical buildings, and the open use of the external environment:

4.1.1 In terms of the status quo of historical buildings

As shown in Table 4, the status quo of the former site of the Central Hospital, the initial building of the Beijing Hotel, and the former site of the French embassy are relatively good. The current conditions of the ontology that can support open use are poor, mainly reflected in the small outdoor site area, low structural safety, low building area and building height, imperfect infrastructure configuration, low historical buildings level, and long distance from urban roads, the short length of the urban interface, the type of property rights and the difficulty of vacating and retreating caused by the willingness of users. By analyzing and comparing the ontology characteristics of historical buildings, it can be found that on the whole, the status quo of historical buildings at the national key historical buildings protection unit level is relatively good, while the local status quo of historical buildings that have not been approved as historical buildings protection units or the protection level of city and county historical buildings protection units is relatively poor. The historical buildings with larger outdoor area and belonging to private delivery room and central delivery room generally have higher potential for open utilization.

4.1.2 In terms of the value endowment of historical buildings

As shown in Table 4 , the value of Keyuan, the former site of Beiping Library, and the former site of Fu Jen Catholic University are relatively high, while that of No. 169 Drum Tower West Street, Banzhang Road Commercial and Residential Building, Dongcheng District Qianyongkang Hutong No. 7 Siheyuan and other historical buildings have low value conditions to support open use, mainly reflected in the low degree of historical significance, low representation of art and technology, and low tourism development potential. on higher issues. By analyzing and comparing the ontology characteristics of historical buildings, it can be found that, in general, historical buildings with higher representation of art and technology and greater tourism development potential have higher ontology

value endowments for opening up and utilization after they are evacuated. That is to say, historical buildings with higher representation of art and technology generally have higher vacated value, and the age of completion has less impact on the potential of opening and utilization of historical buildings.

4.1.3 In terms of the external environment for the opening and utilization of historical buildings

As shown in Table 5, the former Ruifuxiang site of the Dashilan commercial building, the former site of the Jingshi Women's Normal School, and the Siheyuan at No. 161 Zhushikou East Street have better open environment conditions, while the Peking University Geology Museum has better open environment conditions. The old site, the former residence of Xun Huisheng, the former residence of Cai E and other historical buildings can support the poor external environmental conditions for open use, mainly reflected in the low density of urban road network, difficult parking, low spatial density of catering service facilities and commercial service facilities, and park green space. On issues such as low area, disconnected from cultural visit routes, and low residential transaction prices. By analyzing and comparing the ontology characteristics of historical buildings, it can be found that, in general, historical buildings located on cultural visit routes, with high urban road network density, and high spatial density of catering and commercial service facilities have better open environment conditions for opening and utilization. The historical buildings located along the cultural visit route and the surrounding parks and green areas generally have higher potential for utilization.

Table 4
Summary of the overall evaluation results of 54 historical buildings

Name	District	Score 1	Score 2	Score 3	overall result	Degree
French embassy site	Dongcheng	0.193	0.355	0.158	0.707	Very suitable
The former site of Jingshi Daxuetang Branch University	Dongcheng	0.153	0.433	0.069	0.655	
Jinghua Press	Xicheng	0.156	0.334	0.127	0.617	
The former site of the Jingshi Women's Normal School	Xicheng	0.154	0.318	0.142	0.613	
Beiping Library Site	Xicheng	0.181	0.316	0.105	0.602	
St. Michael's Church	Dongcheng	0.160	0.281	0.153	0.594	more suitable
Xishku Church	Xicheng	0.145	0.335	0.114	0.594	
Former site of the Central Hospital	Xicheng	0.199	0.265	0.130	0.593	
Commercial Press Site	Xicheng	0.142	0.316	0.117	0.576	
The initial construction of Beijing Oriental Hotel	Xicheng	0.147	0.291	0.130	0.568	
Fuwang Mansion (Jiuye Mansion)	Dongcheng	0.161	0.303	0.099	0.563	
Former site of Fu Jen Catholic University	Xicheng	0.149	0.316	0.097	0.562	
The initial construction of Beijing Hotel	Dongcheng	0.188	0.265	0.105	0.557	
Former site of Zhengyangmen East Station of Beijing-Fengshan Railway	Xicheng	0.147	0.275	0.135	0.556	
Keyuan	Dongcheng	0.096	0.355	0.101	0.552	
French post office	Dongcheng	0.130	0.281	0.121	0.531	
Asli Church	Dongcheng	0.115	0.281	0.133	0.529	
Architectural remains of Jingshi University Hall	Dongcheng	0.164	0.249	0.116	0.528	
Qi Baishi's Former Residence	Xicheng	0.155	0.265	0.107	0.527	
Beijing Congress Site	Xicheng	0.120	0.267	0.125	0.513	

Former Macquarie Bank	Dongcheng	0.159	0.238	0.113	0.509	
Ruifuxiang Site of Dashilan Commercial Building	Xicheng	0.137	0.216	0.138	0.491	
Store at No. 37 , Dashilan West Street	Xicheng	0.151	0.216	0.123	0.490	
Mei Lanfang's ancestral home	Xicheng	0.097	0.283	0.103	0.484	
Dashilan commercial building Xiangyihao silk shop site	Xicheng	0.135	0.216	0.132	0.483	
Chongli Residence	Dongcheng	0.138	0.235	0.103	0.476	
Chinese Bible Society site	Dongcheng	0.143	0.225	0.107	0.474	
Quanjude old facade wall	Xicheng	0.117	0.203	0.144	0.464	
Former site of Peking University Geology Museum	Dongcheng	0.143	0.210	0.085	0.438	suitable
Tonggutang site	Xicheng	0.104	0.210	0.124	0.438	
Tian Han's former residence	Dongcheng	0.087	0.254	0.096	0.438	
Yuxing Bank of China	Xicheng	0.071	0.236	0.131	0.438	
Ninghe Temple	Dongcheng	0.143	0.174	0.117	0.434	
Prince Chun's Mansion	Dongcheng	0.109	0.203	0.121	0.432	
Former site of Beijing Tramway Repair Factory	Xicheng	0.095	0.216	0.105	0.416	
The old site of the Qing Dynasty Post Office	Dongcheng	0.086	0.200	0.123	0.410	
Beizongbu Hutong, Dongcheng District	Dongcheng	0.137	0.173	0.089	0.399	
beixicang	Dongcheng	0.036	0.245	0.112	0.393	
Hall of the Solitary	Dongcheng	0.097	0.187	0.109	0.392	
Zhujia Hutong No. 45 Tea Room	Xicheng	0.091	0.179	0.122	0.391	
Beiping Telephone North Bureau Site	Dongcheng	0.114	0.173	0.101	0.388	
Former Residence of Xun Huisheng	Xicheng	0.074	0.219	0.092	0.385	
Tan Xinpei's former residence	Xicheng	0.080	0.201	0.103	0.384	less suitable
Courtyard No. 23 , Minkang Hutong	Xicheng	0.131	0.153	0.099	0.384	
Banzhang Road Commercial and Residential Building	Xicheng	0.123	0.121	0.139	0.383	
Siheyuan, No. 25 East Art Museum Street, Dongcheng District	Dongcheng	0.078	0.189	0.113	0.380	
7 Courtyard of Ouya Hutong	Xicheng	0.087	0.168	0.113	0.369	
Shuntian Mansion Lobby	Dongcheng	0.059	0.192	0.115	0.365	
No. 169 , Drum Tower West Street	Xicheng	0.128	0.121	0.115	0.364	
Siheyuan, No. 20, Xinkai Road, Chongwen District	Dongcheng	0.096	0.147	0.119	0.362	
Cai E's former residence	Xicheng	0.073	0.187	0.097	0.357	
Shuntian Fu School	Dongcheng	0.087	0.165	0.099	0.351	not quite suitable
Siheyuan, No. 161 East Street , Zhushikou	Xicheng	0.066	0.137	0.135	0.338	
Siheyuan, No. 7 Qianyongkang Hutong, Dongcheng District	Dongcheng	0.081	0.111	0.099	0.290	

4.2 Analysis of Open Utilization Types of Historical Buildings

According to the classification evaluation results of 54 historical buildings, it is shown that cultural display and sightseeing are the most commonly used methods. In this study, 32 and 29 historical buildings are suitable for cultural display and sightseeing functions, accounting for 59.25% and 53.70% of the total number; while the utilization methods of community service, business service and state service are generally applicable. In this study, 27, 15 and 14 historical buildings are suitable for

these three types of functions and are open to use, accounting for 50.00 % , 27.78% and 25.92%of the total number; the utilization of public welfare office is the least applicable, only 6 (11.11%) historical buildings in this study are suitable for such functions(Fig. 4).

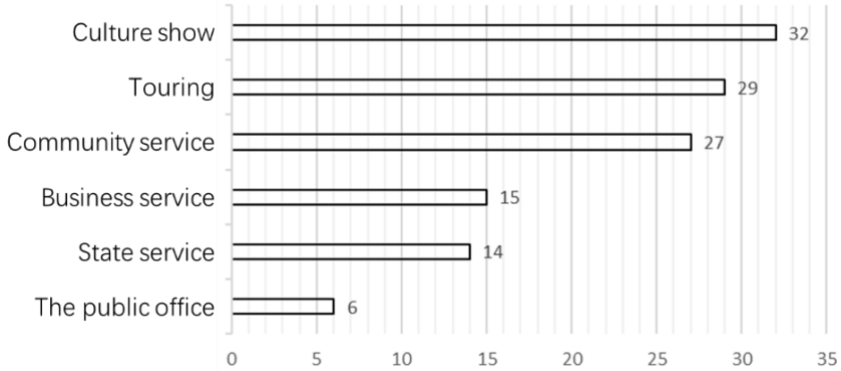

Fig. 4. Statistical chart of applicable types of open utilization of historical buildings

4.2.1 Comparative analysis with the overall evaluation score

Historical buildings with higher overall scores tend to be more suitable for open utilization types; conversely, historical buildings with lower scores tend to have more single open utilization types. For example, the former site of the French embassy, the former site of the Beijing Normal University Branch University, and the Jinghua Press Bureau are the top three with the highest overall scores among all historical buildings, and their applicable types of open use are 3, 3 and 5 respectively.

4.2.2 Comparative analysis with the classification evaluation scores

The 54 historical buildings in this study generally have high scores in the evaluation of cultural display and tour utilization, with an average score of 0.48 and 0.47 respectively; while in the classification of public welfare office and community service The scores in the evaluation are generally low, and the average score is less than half of the scores of cultural display and tour, which are 0.22 and 0.19 respectively.

5 Suggestions for the opening and utilization of historical buildings in the old city of Beijing based on classification evaluation

5.1 Comprehensive Evaluation of Open Utilization Conditions from a Multi-dimensional Perspective

Historical buildings are the carriers of human social life, culture and art, and economic and social development, and their activation and utilization have attracted attention from all walks of life [33-34]. Taking relevant research as a starting point, we can find that the open utilization of historical buildings in the past mostly focused on the protection, development and utilization of the building itself and its existing value, but lacked analysis of its surrounding environment, potential customer groups and urban dimensions. This has resulted in the ineffectiveness of the open utilization of historical buildings and the need for a secondary evaluation of open utilization. Under the support of many theories such as value protection theory, place theory, and symbiosis thought, and with the help of the work policies and guidelines issued and issued by the State Council and the Historical buildings Bureau, this research focuses on three aspects: the status quo of historical buildings, the value of historical buildings, and the surrounding environment of historical buildings. Dimensionally construct an evaluation system for the open utilization of historical buildings. This evaluation method not only helps to solve the mode bottleneck of single-point utilization of historical buildings, but also facilitates

the overall planning and coordination of historical buildings by authorities at all levels; The inclusion of historical buildings makes the opening and utilization of historical buildings more "humanized" and effectively meets the needs of Beijing old city residents for cultural and leisure space.

5.2 According to the Classification of Historical buildings, Guide the Form of Open Utilization

How to explore the continuous symbiosis of historical buildings through the revitalization and utilization of historical buildings, and relieve the financial pressure for the repair and relocation of historical buildings? This problem has now become the top priority of the open utilization of historical buildings. However, the current open utilization of historical buildings, due to the lack of pre-analysis and guidance of utilization forms and functions in the process, leads to the disconnection between the protection and repair of historical buildings and the open utilization, which increases the investment of manpower and capital, and the repeated construction is not used. Cultural heritage building protection [35]. Based on this, this study proposes a classification evaluation standard guided by the characteristics of historical buildings. This system helps the historical buildings management department and participating units to judge the suitable open utilization form of the historical buildings in the early stage of the project, so as to formulate the protection and open utilization of "one policy for one place" for the historical buildings in the old city of Beijing on the basis of understanding the overall situation. Program.

5.3 Establish an Evaluation System to Dynamically Manage Open Utilization Projects

The cultural heritage building management information platform is an important technical support for the long-term supervision and operation and maintenance of historical buildings, but the current information platform construction is mostly limited to basic functions such as data display and transmission, document publication, and popularization of popular science. Maintenance and sales regulation are less effective. The classification evaluation method for the open utilization of historical buildings proposed in this study can be used as a part of the historical buildings management information platform to evaluate the potential conditions and suitable utilization forms of historical buildings in real time. , The operator provides various real-time information of historical buildings, assists the intelligent management of historical buildings, and enriches and improves the functions of the historical buildings building management information platform.

6 Conclusions

As the material carrier of historical, artistic and scientific value in various periods, historical buildings are the essence of urban style display and an important research object of urban history and culture. To highlight the overall value of the capital's history and culture, in addition to strengthening the protection of historical buildings protection units, it is also necessary to explore reasonable and appropriate ways to use historical buildings to inherit and develop historical and cultural values. How to evaluate the multiple values of open utilization of historical buildings from the perspective of rational utilization is the question that this article attempts to answer.

By referring to the previous research results of the evaluation index system for the value of historical buildings, and on the basis of multi-dimensional theoretical analysis, this paper puts forward the general idea and main principles for the construction of the evaluation index system for the open utilization of historical buildings based on feature value identification. The combination of analytical methods is based on the status quo of historical buildings (ontology, courtyard environment and social environment), historical buildings value endowment (historical and cultural value, artistic aesthetic value, tourism economic value, scientific and technological value) and historical buildings The external environment of buildings (location conditions, Traffic conditions, commercial and service

facilities, green space and public space, planning conditions, land price and rent, social economy), screened out 42 basic characteristic indicators reflecting the current situation and open utilization potential of historical buildings, and proposed based on state affairs services, visits and tours. , cultural display, business service, public welfare office and community service six utilization methods of classification and utilization evaluation criteria. Taking 54 historical buildings in the old city of Beijing as an example, using the GIS spatial analysis method and mathematical analysis method, the comprehensive evaluation results and the classification and utilization evaluation results are calculated, which further proves the operability and scientificity of the indicators.

Analysis and evaluation results show that: 1. The historical buildings in the old city of Beijing are generally suitable for the utilization of cultural exhibitions and tours, and the utilization of public welfare offices is the least applicable; 2. In terms of the ontology value and status quo of historical buildings, tourism development potential and artistic representation 3. In terms of spatial distribution characteristics, those located along the central axis of Beijing and along the cultural visit route, and the surrounding parks and green spaces have a relatively large area. Large historical buildings have relatively higher scores, and more types are suitable for open use.

This study puts forward a new idea for the construction of the evaluation system for the classification and open utilization of historical buildings, in order to provide a reference for the research on the classification and open utilization of historical buildings from a systematic perspective. However, although through the empirical study of sampling historical buildings in the old city of Beijing, the evaluation index system and classification and utilization evaluation standards proposed in this paper based on the identification of historical buildings from a multi-dimensional perspective have preliminarily demonstrated its feasibility, but the specific evaluation indicators Screening and assignment need further research and optimization.

Acknowledgement
This research was funded by a grant from the Beijing Municipal Social Science Foundation Major Project on Consultation and Decision Making (21JCA004)

References

[1] Nesticò A., Macchiaroli M., Pipolo O.. (2015). Costs and Benefits in the Recovery of Historic Buildings: The Application of an Economic Model. Sustainability 7 (11)(2015) 14661–14676,
[2] Zhang, J.. (2002). Current Situation and Problems of Urban Conservation and Renewal in Beijing. Urban Planning, (02):73-75.
[3] Bian, L. C.. (2013). A preliminary study on holistic urban design thinking in historic city conservation. Western Habitat Journal, (04):7-12.
[4] Shan J. X.. (2019). Urban construction and cultural heritage protection. China Construction, (02):10-13.
[5] John H.. (2015). European and American architectural conservation: experience and practice. Electronic Industry Press. China: Beijing.
[6] John H.. (2016). Immortality: a global overview of architectural conservation. Electronic Industry Press. China: Beijing.
[7] Chen W., Luo L. J.. (2015). The Experience and Inspiration of ‘Conservation and Revitalisation’ of Contemporary Hong Kong Historic Buildings[J]. West Journal of Habitat, 03:38-43.
[8] Liu, P.Y., Li, K.. (2010). Research on the Protection and Reuse System of Beijing's Industrial Architectural Heritage[J]. Journal of Architecture, 12:1-6.
[9] Cao B. W., Zhao X. and He L.. (2019). Stone from other mountains:International theory and practice of conservation and utilization of cultural relics. Heritage Publishing House, Beijing, China: Cultural Relics Publishing House. 2019:6-10.
[10] Shao, Y.. (2017). French state built heritage conservation education and practice system and the inspiration for China. Proceedings of the Chinese Academy of Sciences, 32(7), 14.
[11] Li M.. (2019). Preparation of a Living Use Plan for the Preservation of Cultural Heritage Buildings in Japan and Its Implications. Research on Natural and Cultural Heritage, 4(11), 6.

[12] Huang Q and Hyo Z.Y.. (2014). Strategies and Practices of Industrial Heritage Preservation and Reuse - Implications of British Urban Experience for Shanghai. New Architecture (2), 4.
[13] AVRAMI E C. (2012). A systems approach to historic preservation in an era of sustainability planning. Rutgers the State University of New Jersey, School of Graduate Studies.
[14] Wang, S.. (2015). Experience and inspiration of cultural heritage protection in France and Italy. Journal of North China Electric Power University: social science edition (2), 6.
[15] Lang, X. F.. (2012). Discussion on the protection and utilization of cultural relics and architecture of a number of issues. Hangzhou Wenbo (2), 4.
[16] Pĩnero I., San-José J. T.. P. Rodríguez, M.M. Losá˜nez (2017). Multi-criteria decision-making for grading the rehabilitation of heritage sites. Application in thehistoric center of La Habana. J. Cult. Herit. 26 144–152.
[17] Wang Z. R.. (2019).Conservation and Reuse of Cultural Relics Buildings--The Case of Shuang Guandi Temple of Guoguo in Beijing. Proceedings of the 2019 Annual Meeting and Symposium of the Architectural History Branch of the Architectural Society of China (below). 105-108.
[18] Zhang Y. L.. (2006). An Application of the AHP in Cultural Heritage Conservation Strategyfor China. Can Soc Sci 2 (3) (2006) 16–20.
[19] Lijun W., Ping S. and Wei H.. (2011). Conflict, Diversity, and Public Participation: A Study of the Preservation History of Architectural Historic Properties in the United States. Journal of Architecture (5), 5.
[20] Ding Q., Zhu F. Y., Liang J.. (2021). (2021). The protection and renewal strategy of historical and cultural neighbourhoods under the guidance of property rights--Taking the urban renewal design of Beijing Yanshou Street as an example. China Famous Cities, 35(09): 36-42.DOI
[21] Zhang Y., Hao S. M., Duo N. et al. (2018). Fuxuijin Hutong No. 50 'Open Room Renewal' Courtyard, Beijing, China. World Architecture, 2018(08):44-51+129.
[22] Suzhou Cultural Relics Bureau. (2008). Architectural Assessment of Suzhou Gate of Heaven Historical and Cultural Neighborhood. China Tourism Press, Beijing, China: China Tourism Press, 2008:3-6.
[23] Xuan Y., Zheng X. H. and Liu Z. P.. (2011). Exploring the classification and evaluation system of point-shaped historical and cultural resources. China Famous Cities (3), 5.
[24] Lv H. P., Liu L. J., Li Y.. (2021). Research on Evaluation Indicator System and Methods for Protection and Utilization of Historic Buildings. Proceedings of the 2021 Academic Exchange Conference on Industrial Architecture (Upper Volume).2021:2-8.
[25] Li X. G., Hou X. J., Tan Z.. (2018). 'Beijing in Miniature"-Renovation of No. 28 Da Yuan Hutong[J]. Journal of Architecture, (07):5-15.
[26] Liu X. D., Yang Y. D., Shu Y. et al. (2013). Research on the Protection and Utilisation Planning and Management of Urban Industrial Heritage Buildings--Taking Hangzhou as an Example. Urban Planning, 04:81-85.
[27] PRC State Administration of Cultural Heritage (SACH) (2019). Subject Group of the Case Guidelines for the Open Use of Cultural Heritage Buildings. Case Guidelines for Open Use of Heritage Buildings. Beijing, China: China Construction Industry Press, 2019:70-77.
[28] PRC State Administration of Cultural Heritage (SACH) (2019). Group on the Guidelines for the Opening of Built Heritage Sites. Guidelines for the Opening of Cultural Heritage Buildings. Beijing, China: PRC State Administration of Cultural Heritage (SACH). 2019:7-20.
[29] Zhou, W.. (2009). Historical building preservation and reuse: a study on theories and modes of relationship of old and nwe space: study on theories and modes of relationship of old and nwe space. Beijing, China: China Building Industry Press.2009:61-66.
[30] Wong L L. (2016). Adaptive reuse: extending the lives of buildings. Berlin: Birkhauser, 2016: 33-48.
[31] G. Di Ruocco, A. Nesticò. (2018). Archaeological Site Conservation and Enhancement:An Economic Evaluation Model for the Selection of Investment Projects. Sustainability 10 (11) (2018) 3907.
[32] Ruan Y. S. and Lin L.. (2003). The principle of authenticity in cultural heritage protection. Journal of Tongji University (Social Science Edition), 14(2), 1-5.
[33] Yiyan and Chen Y.. (2021). Statistical Characterization and Research on National Key Cultural Relics Protection Units. Southeast Culture (4), 11.
[34] Zhang J. and Wen A. P.. (2021). J. Zhang: Repairing the old and innovating the new. Beijing Planning and Construction, 2021(1):201-205.
[35] Bian L C., Wu X. H. and Shi Y.. (2019). Problem identification and thinking in the protection of historical and cultural neighborhoods in the old city of Beijing. Beijing Planning and Construction (S02), 8.