



PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 23 ISSUE 5 (2025), Page 81 – 96

LANDSCAPE VITALITY ASSESSMENT OF ASSOCIATED SPACE UNDER OVERPASS: A CASE STUDY OF CHONGQING, CHINA

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Abstract

Urbanization has improved traffic flow via overpasses, yet underpass spaces lag in landscape development, falling short of residents' expectations. This leads to reduced aesthetics, potential misuse, and underutilization of urban land. This study analyzed the landscape vitality of 21 underpass spaces in Chongqing's urban interchanges. Influencing factors were classified into natural, physical, and event environmental factors based on landscape perception theory, Alexander's pattern language, and environmental behavior theory. Vitality indicators were identified through literature review, behavioral observation, and focus group interviews. An evaluation system with five criteria was constructed using grey relational analysis and analytic hierarchy process: natural vitality (0.0824), locational vitality (0.2139), spatial vitality (0.2805), facility vitality (0.3386), and cultural vitality (0.0846). These criteria involve 19 indicators, with activity facility quantity having the highest weight (0.1489). Five underpass spaces were evaluated—Egongyan, Huanghuayuan, Sujiaba, Yanggongqiao, and Wulidian—and their landscape vitality ranked. Key areas for improvement include plant aesthetics, entrance accessibility, activity space suitability, noise control, facility quantity, space management, and cultural features. This study provides guidance for future urban underpass space optimization.

Keywords: Space under Overpass; Public Space; Landscape Perception Theory; Evaluation of Landscape Vitality

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INTRODUCTION

As China's *14th Five-Year Plan* has become effective (Xinhua News Agency, 2021), urban development priorities have shifted to enhancing existing assets, efficiently utilizing land, and long-term development of underground spaces. As a significant form of landscape, underpasses and their associated spaces are crucial for optimizing urban vitality. Chongqing, a mountainous city, has witnessed the construction of numerous overpasses, the number of which had reached 290 by 2023 (NetEase News, 2023). This has now created diverse overpass spaces (Figure 1).

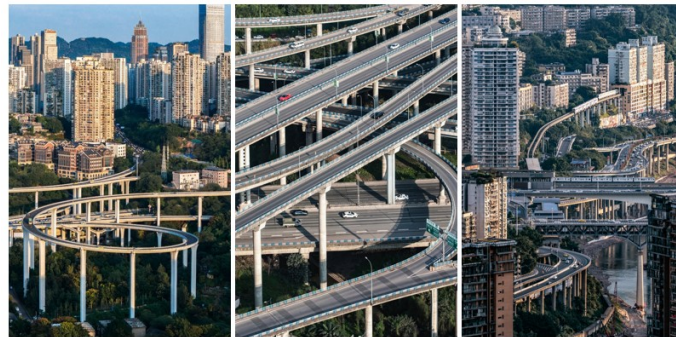


Figure 1: Various Overpasses in the Main Urban Area of Chongqing
Source: *The Paper News* (2024) <https://www.thepaper.cn/>

Overpasses, while alleviating traffic congestion, often create the underutilized spaces that result in environmental neglect and poor management (Figure 2), which has negative effects on urban life and urban aesthetics (Yang H., 2021). In response, Chongqing's 2022 Action Plan has been published to promote ecological restoration and improvement, with the aim of enhancing public space utilization and improving the quality of life (Chongqing Municipal People's Government, 2022) (Figure 3). In this study, a model is developed to evaluate and revitalize these underpass spaces, with practical suggestions made.



Figure 2: The Space Under the Bridge is Disorderly and the Utilization Rate is Low
Source: *Photographed by the author* (2024)



Figure 3: The Space Under the Overpass is Transformed into a Graffiti Art Area and Sports Place

Source: People's Daily Online (2024) <http://cq.people.com.cn/n2/2024/0522/c365401-40852083.html>

From a theoretical perspective, an evaluation system is established in this study to enrich the research on underpass space and landscape vitality. Practically, it enhances the utilization of urban public spaces, improves the quality of life for residents, promotes public health, and supports socio-economic development. Through empirical analysis, vitality deficiencies are identified and strategies are developed for improving the utilization of underpass spaces in Chongqing.

LITERATURE REVIEW

Landscape Vitality Evaluation

Recent research has underscored the significant contribution of urban green infrastructure and public spaces to urban vitality, with ecological indices, mixed functionality, and efficient transportation identified as the key influencing factors for the vibrancy and functionality of urban areas (Niu et al., 2021; Wang et al., 2022; X. Zhang et al., 2022). At present, various advanced tools play an essential role in the evaluation of these factors, such as Geographic Information Systems (GIS) and spatial analysis now. They are applicable to assist the effort on precise urban planning and sustainable development (Miklós & Špinerová, 2019).

Space Under the Overpass

Underscoring a transformation of underpass areas into vibrant urban spaces, recent research has highlighted the role of public art in landscape enhancement and community engagement (Hassan A. Youssef, 2022; T. Liu et al., 2022). In the studies carried out in many cities like Tokyo and Kuala Lumpur, an investigation is conducted into cultural and aesthetic integration as part of urban planning (Qamaruz-Zaman et al., 2012; Sheng et al., 2018;). In some other studies, the synergy of public spaces with transportation and acoustics is examined for events (Bauer C. et al., 2015; Hauck Th. et al., 2011). In China, the relevant studies focus on the enhancement of human interaction (Kuang Hao, 2013) through plant configuration (Liu CH. et al., 2005; Qin ZC. et al., 2019),

landscape design (Li Wei, 2015; Liang Jing, 2004), and space utilization (Yang Xin et al., 2020; Zhao Xueye, 2017).

However, there is often a lack of attention paid by the current studies to the unique challenges posed by mountainous urban environments. Although complex topography affects the practice of urban design and space utilization, there remain few models constructed to address these geographic and infrastructural complexities. Moreover, the research conducted in China relies heavily on qualitative analyses, which results in a lack of robust quantitative methods. Despite the recognition given to the importance of various tools like GIS and spatial analysis in urban planning, they are still applied inadequately to the utilization of underpass spaces in mountainous regions.

Related Theoretical Foundations

Environmental behavior research focuses mainly on the interrelationship between environment, human psychology, and behavior (Xu Feng & Shen Heyong, 2005). In this sense, people, environment, and behavior are considered the fundamental elements in landscape vitality evaluation. As the urban public activity space for the daily life and leisure of urban residents, the underpass space can be analyzed in the event mode and spatial mode to determine the influencing factors for the vitality of landscape in the urban underpass spaces.

Based on previous research, the factors affecting the landscape vitality of urban public spaces are typically analyzed from natural, physical, facility, cultural, and sensory perspectives. By interpreting a series of theories such as landscape perception, Alexander's pattern language, and environmental behavior, the influencing factors of landscape vitality in underpass spaces are categorized into natural environmental factors, physical environmental factors, and event environmental factors. They involve microclimate elements, vegetation elements, external spatial environment, internal spatial environment, personal cognitive characteristics, and socio-cultural characteristics.

RESEARCH METHODOLOGY

In this study, a field research is conducted through behavioral observation, focus group interviews, and grey statistical methods in seven underpass spaces distributed in the main urban area of Chongqing. With the use of survey data, the Analytic Hierarchy Process (AHP) is followed to determine the weight of each evaluation criterion. On this basis, a scientific and rigorous landscape vitality evaluation system is constructed.

The survey focuses on the areas within the Inner Ring Expressway built in Chongqing, initially covering 21 typical underpass spaces with the common characteristics of underpass spaces in the main urban area (Figure 4). The scope of survey was narrowed in line with the principles shown in Table 1 for the scientific selection of evaluation criteria and the better construction and

assessment of the evaluation system. There are seven overpasses selected for in-depth research, namely Yanggongqiao Interchange, Wulidian Interchange, Panlong Interchange, Niujiatuo Interchange, Huanghuayuan Interchange, Sujiaba Interchange, and Egongyan Interchange.

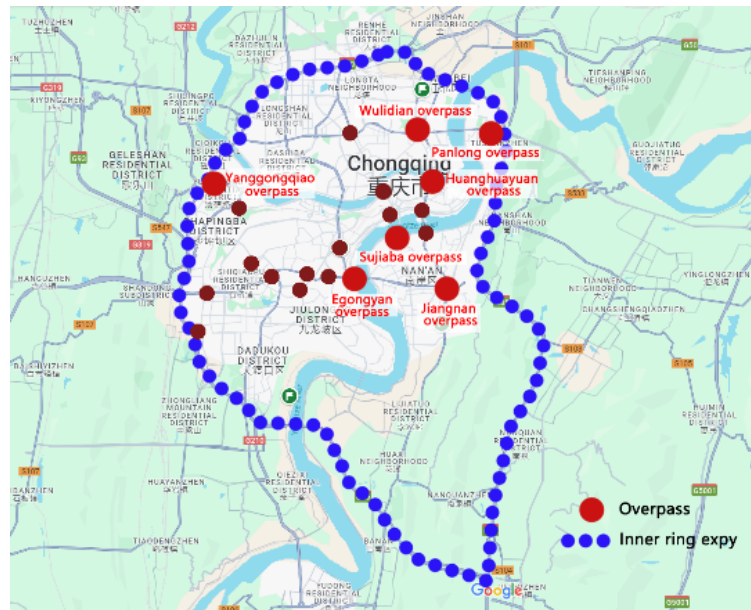


Figure 4: Distribution of Survey Respondents
Source: drawn by the author based on Google Maps

Table 1: The Selection Criteria

Selection Criteria	Description
Geographic Location	Situated in the urban core areas with high pedestrian traffic and well-developed surrounding functions.
Functional Use Type	Primarily designated for park and green space purposes, facilitating public activities.
Diversity	Selection includes overpasses with varied locations, sizes, and construction dates to enhance the generalizability of the study.

Determination and Optimization of Factors and Indicators

A literature review was conducted on the Web of Science platform using the following keywords: 'landscape vitality assessment,' 'under overpass space landscape evaluation,' and 'overpass landscape assessment.' Then, an analysis was conducted to reveal that scholars have focused on five major factors affecting the evaluation of landscape vitality, which are natural, locational, spatial, facility, and cultural elements (L. Liu et al., 2023; Wang et al., 2022b; F. Zhang et al., 2022).

The environmental indicators for urban underpass spaces were initially screened through a literature review. Subsequently, optimization and validation were performed through behavioral observation and field survey (Figure 5). Through frequency analysis, the number of relevant indicators was reduced from 57 to 42. Finally, optimization was achieved via focus group discussions, each of which consists of one moderator and four participants. Thus, the number of indicators was further reduced to 25, thus ensuring scientific rigor and specificity.

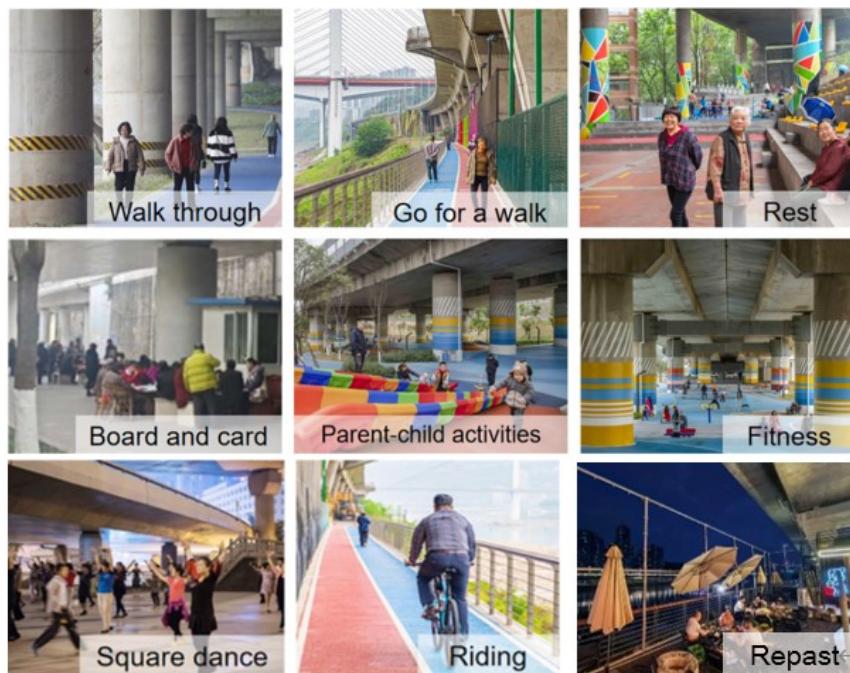


Figure 5: Activity Types in the Attached Space Under the Overpass
Source: Photographed by the author (2024)

The grey statistical method was adopted to quantify the importance of indicators, which minimizes the compromises caused by differing opinions and prevents the influence of outliers. Thus, the scientific integrity of weight calculations is ensured (Zhao Guodong, 2020). This method was then applied to identify the factors affecting the vitality of underpass spaces. Initially, the indicators were listed in a survey form. A total of 30 postgraduate students used a Likert scale of 1-7 to rate each indicator based on their understanding and perception, with the importance levels divided into high, medium, and low grey classes. With grey relational grade functions constructed for each class, decision vectors were calculated for each indicator.

For calculation, $f_k(ij)$ represents the whitening function value of the j -th evaluation indicator with importance level i , where k is the number of grey classes ($k=1, 2, 3$); d_{ij} indicates the score for the importance level i of the j -th evaluation indicator. The formulas used to calculate $f_k(ij)$ for high, medium, and low are expressed as Equations (1), (2), and (3), respectively. In these equations, i ranges from 1 to 7 and j ranges from 1 to 25 (Figure 6).

$$\begin{array}{ccc}
 \text{High} & \text{Medium} & \text{Low} \\
 k = 1 & k = 2 & k = 3 \\
 f_1(ij) = \begin{cases} 1 & d_{ij} \geq 7 \\ \frac{d_{ij}-4}{7-4} & 4 < d_{ij} < 7 \\ 0 & d_{ij} \leq 4 \end{cases} & f_2(ij) = \begin{cases} 0 & d_{ij} \leq 1 \\ \frac{d_{ij}-1}{4-1} & 1 < d_{ij} < 4 \\ 1 & d_{ij} = 4 \\ \frac{7-d_{ij}}{7-4} & 4 < d_{ij} < 7 \\ 0 & d_{ij} \geq 7 \end{cases} & f_3(ij) = \begin{cases} 0 & d_{ij} \geq 4 \\ \frac{4-d_{ij}}{4-1} & 1 < d_{ij} < 4 \\ 1 & d_{ij} \leq 1 \end{cases}
 \end{array}$$

Figure 6: Construct the whitening function

In the grey class decision-making model, the decision coefficient $n_k(j)$ = $n(ij)f_k(ij)$, where $n_k(j)$ represents the decision coefficient of the j -th factor within the k -th grey class; $n(ij)$ denotes the number of experts evaluating the importance level i of the j -th factor. Comprised of the grey class decision coefficients $\{n_3(j), n_2(j), n_1(j)\}$, the decision vector of each indicator represents the importance levels "Low," "Medium," and "High," respectively. The selection of indicators is based on the highest coefficient in the decision vector, with only those deemed "High" retained, and those rated "Medium" or "Low" discarded.

Evaluation of Landscape Vitality of Attached Space Under Overpass

In the study areas, the behaviors of respondents within the observation zones were monitored. Additionally, surveys and interviews were conducted in those public spaces with a higher level of foot traffic.

Under the established evaluation system, the Likert five-point scale ranging from '1' (very poor) to '5' (very good) was adopted to rate the evaluation factors. Surveys were conducted from March to May, on both weekdays and weekends, from 8:00 AM to 8:00 PM. Suitable weather conditions were chosen to avoid the adverse effects on crowd activities. Out of 524 collected questionnaires, 517 were valid, which means a validity rate of 98% with a Cronbach's alpha of 0.884.

To score the vitality of the landscape under each overpass, the weighted scores of each indicator from user ratings were summed. A higher composite score indicates a more significant contribution to landscape vitality. The formula is presented as follows:

$$S = \sum_{i=1}^n C_i T_i$$

In the formula, S = Comprehensive score of landscape vitality of attached space under urban overpass;

C_i = The composite weight of each landscape vitality evaluation index;

T_i = The average scores corresponding to each index;

$C_i T_i$ = Evaluation score for each indicator.

Figure 7: Calculation Formula

ANALYSIS AND DISCUSSION

Data analysis and interpretation of evaluation index

Subsequent to further optimization and selection (Table 2), a comprehensive evaluation system was established for the vitality of underground spaces created by urban elevated roads. This involves five criterion levels (natural vitality, locational vitality, spatial vitality, facility vitality, and cultural vitality) and 19 indicator levels (microclimatic comfort, plant coverage, and plant aesthetics, etc.) (Figure 8). Experts were also invited to calculate and rank the importance of the existing indicators (Table 3). With the relative importance of each indicator comparatively scored, the results were analyzed to validate the rationality and feasibility of the proposed evaluation system.

Table 2: The Result of Screening Indicators for Assessing the Vibrant Landscape of Urban Overpass Subordinate Space

Dimension	No.	Index	Average value	Variable coefficient
Nature	1	Microclimatic comfort	5.53	0.13
	2	Plant coverage	5.57	0.16
	3	Plant aesthetics	5.57	0.13
Location	4	Ease of access	6.33	0.10
	5	Surrounding land use type	6.37	0.12
	6	Surrounding population density	5.93	0.17
Space	7	Spatial scale suitability	6.33	0.12
	8	Amount of active space	5.87	0.14
	9	Terrain design and processing	5.57	0.14
	10	Walking system	5.97	0.15
	11	Noise interference	5.67	0.12
	12	Site protection and safety	5.97	0.11
Facility	13	Number of open space facilities	6.10	0.12
	14	Number of active facilities	5.80	0.15
	15	Convenient service facilities	5.77	0.10
	16	Sketch construction aesthetics	5.63	0.13
Culture	17	Space management and maintenance	5.73	0.15
	18	Historical culture and urban characteristics	5.53	0.15
	19	Activity variety richness	5.67	0.17

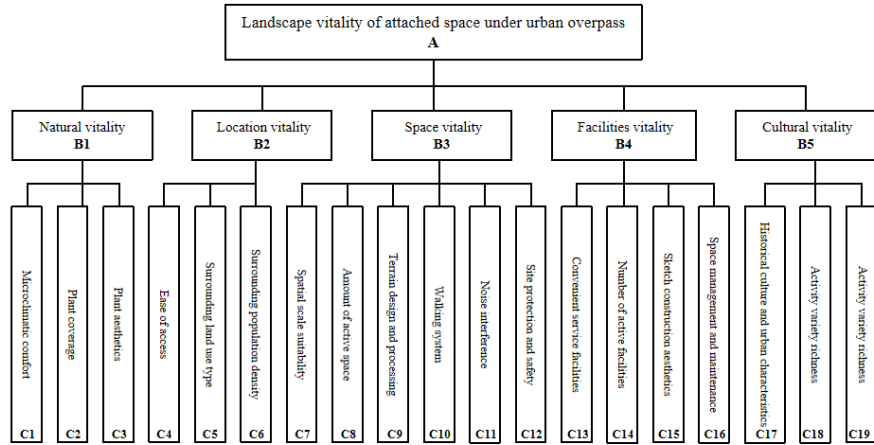


Figure 8: Construction of Evaluation Index System of Landscape Vitality of Attached Space Under Urban Overpass
Source: self-drawn by the author.

Table 3: Evaluation Weight Result

Criterion layer	Criterion weight	Index level	Index weight	Resultant weight	No.
Nature	0.0824	Microclimatic comfort	0.2395	0.0197	16
		Plant coverage	0.1373	0.0113	19
		Plant aesthetics	0.6232	0.0514	6
Location	0.2139	Ease of access	0.5889	0.1260	2
		Surrounding land use type	0.1593	0.0341	13
		Surrounding population density	0.2519	0.0539	7
Space	0.2805	Spatial scale suitability	0.1272	0.0357	12
		Amount of active space	0.3357	0.0942	3
		Terrain design and processing	0.1671	0.0469	10
		Walking system	0.2111	0.0592	6
		Noise interference	0.0619	0.0174	17
Facility	0.3386	Site protection and safety	0.0971	0.0272	14
		Number of open space facilities	0.2129	0.0721	5
		Number of active facilities	0.4425	0.1498	1
		Convenient service facilities	0.1069	0.0362	11
		Sketch construction aesthetics	0.2378	0.0805	4
Culture	0.0846	Space management and maintenance	0.1865	0.0158	18
		Historical culture and urban characteristics	0.2341	0.0198	15
		Activity variety richness	0.5794	0.0490	9

Descriptive Analysis

The survey included 284 men and 233 women, with most participants aged 30-39. Notably, there were fewer elderly participants as the survey sites were near the light rail stations. However, Yanggongqiao and Huanghuayuan attracted many participants aged over 50 for engagement in group activities.

The respondents were comprised mainly of office workers, followed by retirees, with incomes ranging from 2000 to 5000 RMB. Outdoor activities were preferred during warmer months, especially in riverside areas like Sujiaba and Huanghuayuan, with more comfort provided by abundant vegetation. Weekends were the most popular visiting times, while the morning and afternoon were the peak periods. Most participants engaged in activities for 1-2 hours. The majority of them visited these areas once daily for various activities such as resting, walking, group activities, family outings, exercise, and sightseeing.

Overall Vitality Assessment Comparison and Analysis

According to Table 4, the Egongyan underpass scores the highest in overall landscape vitality. It is followed by Huanghuayuan, Sujiaba, Yanggongqiao, and Wulidian in descending order.

From a natural perspective (Table 5), Egongyan scores the highest due to its superiority in plant coverage, comfort, and aesthetic appeal. This indicates user satisfaction with the plant design. Sujiaba and Yanggongqiao score the lowest. Yanggongqiao is disadvantaged by poor roadside greenery and a complex environment difficult to maintain. Sujiaba hampers user activities due to dense, unruly vegetation. Wulidian is more appreciated for plantings, while Huanghuayuan performs moderately.

Table 4: The Score Data of Landscape Vitality Evaluation of the Research Object

Criterion layer	Egongyan	Wulidian	Sujiaba	Huanghua yuan	Yanggong qiao
Natural Activity	0.3067	0.2734	0.2433	0.2670	0.2571
Location Activity	0.6492	0.6568	0.6934	0.7387	0.5978
Space Activity	0.8809	0.6666	0.6743	0.6716	0.7469
Facility Activity	1.1052	0.5712	0.8212	0.6848	0.5215
Cultural Activity	0.3010	0.2242	0.2320	0.2870	0.2713
Global Scoring	3.2430	2.3923	2.6442	2.6490	2.3946

Table 5: Natural Vitality Level Index Score

Evaluation Object	Type	Microclimatic comfort	Plant coverage	Plant aesthetics	Natural vitality
Egongyan	Average	3.15	4.06	3.86	0.3067
	Composite	0.0622	0.0460	0.1985	
Wulidian	Average	3.12	3.62	3.32	0.2734
	Composite	0.0616	0.0410	0.1708	
Sujiaba	Average	3.14	3.15	2.83	0.2433
	Composite	0.0620	0.0357	0.1456	
Huanghua yuan	Average	3.14	3.72	3.16	0.2670
	Composite	0.0620	0.0421	0.1629	
Yanggong qiao	Average	3.16	3.90	2.93	0.2571
	Composite	0.0624	0.0441	0.1506	

Regarding location, Sujiaba and Huanghuayuan score significantly higher as their accessibility is improved by the sharing of entrances with light rail stations. Egongyan scores high for surrounding land use but low for entrance setup, making it hard to find for non-residents. There is no significant difference in population density score across all five sites. (Table 6)

Table 6: Location Vitality Level Index Score

Evaluation Object	Type	Ease of Access	Surrounding Land Use Type	Surrounding Population Density	Location Activity
Egongyan	Average	2.08	5	4	0.6492
	Composite	0.2631	0.1705	0.2156	
Wulidian	Average	3.11	3	3	0.6568
	Composite	0.3928	0.1023	0.1617	
Sujiaba	Average	2.98	3	4	0.6934
	Composite	0.3755	0.1023	0.2156	
Huanghua yuan	Average	3.06	4	4	0.7387
	Composite	0.3867	0.1364	0.2156	
Yanggong qiao	Average	1.95	4	4	0.5978
	Composite	0.2458	0.1364	0.2156	

According to Table 7, Egongyan scores highest due to its clear functional zoning and excellence in management and maintenance. Sujiaba and Huanghuayuan follow it closely, providing diverse and well-defined activity areas. Yanggongqiao, despite its large activity area, is monotonous and noisy. Despite its ample space, Wulidian is greened mainly with limited activity areas.

Table 7: Space Vitality Level Index Score

Evaluation Object	Type	Spatial scale suitability	Amount of active space	Terrain design and processing	Walking system	Noise interference	Site protection and safety	Space vitality
Egongyan	Average	3.29	3	3.24	3.09	3.26	3.24	0.8809
	Composite	0.1176	0.2826	0.1522	0.1834	0.0568	0.0883	
Wulidian	Average	3.11	1	3.09	3.05	3.03	3	0.6666
	Composite	0.1113	0.0942	0.1453	0.1811	0.0529	0.0819	
Sujiaba	Average	3.20	1	3.02	3.05	3.36	3.08	0.6743
	Composite	0.1145	0.0942	0.1421	0.1811	0.0585	0.0840	
Huanghua yuan	Average	3.22	1	2.99	3.03	3.23	3.14	0.6716
	Composite	0.1152	0.0942	0.1402	0.1799	0.0563	0.0856	
Yanggong qiao	Average	2.83	2	3	3.09	2.93	3.21	0.7469
	Composite	0.1011	0.1884	0.1407	0.1782	0.1510	0.0875	

Egongyan scores the highest at 1.1052 due to its abundance of rest facilities, convenience amenities, and culturally themed structures. Reflecting the traditional customs in Chongqing, this attracts visitors for rest and interaction. Also, many tourists are drawn to its wartime-themed buildings and exhibits. Sujiaba and Huanghuayuan follow it. Sujiaba offers sports and fitness facilities for daily activities, while Huanghuayuan scores high in aesthetic appeal. (Table 8)

Table 8: Facility Vitality Level Index Score

Evaluation Object	Type	Number of open space facilities	Number of active facilities	Convenient service facilities	Sketch construction aesthetics	Facility Activity
Egongyan	Average	4	3	3	3.21	1.1052
	Composite	0.2884	0.4494	0.1086	0.2589	
Wulidian	Average	1	1	3	2.99	0.5712
	Composite	0.0721	0.1498	0.1086	0.2407	
Sujiaba	Average	1	3	2	2.82	0.8212
	Composite	0.0721	0.4494	0.0724	0.2273	
Huanghua yuan	Average	3	1	2	3.05	0.6848
	Composite	0.2163	0.1498	0.0724	0.2463	
Yanggong qiao	Average	1	1	2	2.82	0.5215
	Composite	0.0721	0.1498	0.0724	0.2272	

Table 9: Cultural Vitality Level Index Score

Evaluation Object	Type	Space management and maintenance	Historical culture and urban characteristics	Activity variety richness	Cultural Activity
Egongyan	Average	4.02	3.93	3.25	0.3010
	Composite	0.0637	0.0778	0.1595	
Wulidian	Average	3.29	3.28	2.18	0.2242
	Composite	0.0520	0.0650	0.1071	
Sujiaba	Average	3.14	3.23	2.41	0.230

Evaluation Object	Type	Space management and maintenance	Historical culture and urban characteristics	Activity variety richness	Cultural Activity
	Composite	0.0497	0.0641	0.1182	
Huanghua yuan	Average	3.80	3.69	3.13	0.2870
	Composite	0.0601	0.0731	0.1538	
Yanggong qiao	Average	3.74	3.19	3.03	0.2713
	Composite	0.0591	0.0633	0.1489	

Culturally, Egongyan ranks the highest, followed by Huanghuayuan, Yanggongqiao, Sujiaba, and Wulidian. In the top three sites, cultural themes are integrated. Egongyan is the most prominent, but the other two lack cultural and regional elements. The top three sites are excellent in management and activity diversity. Notably, Sujiaba scores significantly lower in these aspects, requiring more attention. (Table 9)

In this study, the space in Egongyan showed a greater natural vitality due to excellent plant coverage and aesthetic design. This highlights the importance of well-designed natural environments. In contrast, Yanggongqiao and Sujiaba perform poorly in organized vegetation, affecting aesthetics and functionality. Sujiaba and Huanghuayuan, near light rail services, have a higher level of locational vitality due to enhanced accessibility. This is distinct from Egongyan with its inadequate entryway design. Egongyan also excels in facility and cultural vitality for providing extensive amenities and integrating the cultural themes reflective of Chongqing's heritage, which highlights the importance of strategic planning and investment in underpass areas for vibrant, functional, and culturally enriched urban spaces.

CONCLUSION

Under-overpass spaces can improve natural, locational, spatial, facility, and cultural vitality. Beneficial in creating visually appealing environments, high-scoring spaces excel in plant aesthetics, activity space suitability, rest facilities, small structure aesthetics, and urban cultural reflection. In contrast, low-scoring spaces are characterized by poor plant aesthetics, inadequate entrance accessibility, insufficient activity spaces, noise interference, and a lack of facilities. Poor management and maintenance, combined with an absence of urban and cultural elements, lead to underutilized environments. For better user experiences and functionality, it is necessary to enhance these aspects.

In this study, strategies are proposed to enhance the vitality of underpass space based on indicator weights, field surveys, and site evaluations. Also, it is proposed to improve natural vitality with vertical greening and suitable plants, optimize the entrances and integrate underpass spaces into the urban framework. Spatial vitality can be enhanced by improving utilization, introducing

diverse functional areas, and improving comfort. Facility vitality can be enhanced by adding seating, lighting, amenities, and small structures. Cultural vitality can be enhanced by improving management, increasing resident participation, incorporating historical elements, adding art installations, and introducing commercial operations.

LIMITATIONS AND FUTURE PROSPECTS

There is a necessity to improve the evaluation criteria developed for landscape vitality in urban underpass spaces. The initial criteria are subjective and biased, despite expert input. In the future, these should be refined using more scientific methods and diverse underpass types should be included for broader applicability. As the optimization strategies proposed in this study are not comprehensive, multidisciplinary theories should be applied to develop more detailed and applicable strategies.

ACKNOWLEDGEMENT

We appreciate the experts and survey participants for their invaluable contributions. Our special thanks are extended to Dr. Reza for his guidance and support, and to the HBP Academy for support. We also appreciate the reviewers for their thorough and constructive feedback.

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Received: 4th February 2025. Accepted: 19th May 2025