



Article Investigating the Influencing Factors of the Perception Experience of Historical Commercial Streets: A Case Study of Guangzhou's Beijing Road Pedestrian Street

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Abstract: Given the complex interplay between economic and cultural-historical factors, this paper explores scene perception and its mechanism in individual and collective cognition of historical commercial streets. Based on a perception model constructed from scene theory, the study utilizes user scene experience feedback from Beijing Road, a commercial pedestrian street in Guangzhou. It conducts a systematic assessment using hierarchical analysis (AHP) across three dimensions: authenticity, theatricality, and legitimacy. The findings reveal the following: (1) according to visitors, traditional cuisine, cultural and creative arts, and Lingnan's intangible cultural heritage received low ratings; (2) historical relics and traditional cuisine are dominant factors, highlighting public attention to cultural heritage, but the role of historical-cultural characteristics and festival activities is relatively marginalized; (3) cultural-historical relics and traditional cuisine are the leading factors that contribute to an authentic experience, while historical context and festival activities constitute secondary factors; (4) cultural landscapes and arts are central to theatrical experiences, with modern visual elements playing a lesser role; (5) diversified commercial formats and public services are the core factors influencing legitimacy experience, reflecting the role of market diversity and policy orientation in building consumer trust. The design of historical and cultural streets should prioritize the preferences of those experiencing them to promote cultural identity and historical continuity. Additionally, the synergy between commercial diversity and policy orientation should be strategically emphasized to form a business ecosystem supporting sustainable development. Future commercial street renewals should focus on the key role of visual narrative in shaping brand culture. This paper offers insights into the dynamic process of constructing scene experience from perspectives of spatial materialization and emotional empowerment to cultural identity, providing references for strategies in historical place renewal.

Keywords: historical commercial street; scene theory; scene experience; hierarchical analysis; Guangzhou

1. Introduction

The formation of commercial streets is a product of socio-economic development and cultural fusion, while the spatial pattern and social structure of historical commercial streets authentically reflect the historical evolution of cities [1]. Studies related to scene experience have transitioned through a process from spatial materialization to emotional empowerment and cultural identity, delving into discussions and explorations of the spirit of place, continuity of memory, and a sense of locality. Since the 1976 UNESCO recommendations regarding the conservation and contemporary role of historic areas, the restoration of historical contexts has garnered significant attention, with cultural activation becoming



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Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). a major focus [2] and attracting widespread interest [3]. In 2015, regulations by the Guangdong Provincial Government emphasized the importance of preserving heritage resources for economic transition and cultural uniqueness, specifically highlighting the key role of Beijing Road commercial street in this aspect [4]. Despite policy support and societal efforts, contradictions still exist between urban renewal and cultural heritage preservation [5]. These challenges include balancing traditional and modern functionalities [6], protecting and assessing the value of intangible heritage [7], coordinating commercial development with cultural conservation, and managing the needs of tourists while ensuring the quality of life for residents. Currently, the revitalization of historical streets faces challenges of cultural loss and a decline in homogenization trends [8]. In fact, these contradictions reflect an over-pursuit of consumerist cultural experiences and a diminishing of place identity and cultural belonging, leading to a gradual weakening of regional cultural context and a loss of value recognition [9].

Historical commercial streets bear the memory and culture of cities; their material traces witness the transformation of culture. These districts not only observe the changes in society and culture but also serve as windows to understand past social and cultural dynamics, with their static and dynamic elements acting as mediums to display past societal landscapes. In terms of research on scene perception experience, scholars have made significant progress.

Boumezoued et al. [10] and Degen and Rose [11] contend that tactile, auditory, and visual elements in material culture are vital for understanding historical sites, especially the role of sound in reconstructing memories. On an individual level, the perception of history is subjective and unique. Addressing these differences, McDonnell et al. [12] emphasized the role of cultural resonance, suggesting that a shared cultural background can strengthen an individual's connection with the environment. Tally [13] proposed three approaches to experiencing historical narratives: (1) Directly perceiving the physical environment, aiding individuals in establishing a basic understanding and emotional connection with the place; (2) Reconstructing the authenticity of historical scenes, enhancing the spiritual and social value of locations through emotional and identity symbolism; (3) Personal re-enactment of historical narratives, a process influenced by individual experiences, knowledge, and cultural background.

On the other hand, Orianne and Eustache [14] pointed out that individual identity often intertwines with collective memory and the spirit of place, perpetuated through historical narratives and cultural activities. Heersmink [15] emphasized the resonance of individual and collective memories as critical to cultural identity, offering a sense of historical continuity and cultural belonging. Karimi et al. [16] analyzed the multidimensional construction process of individual identification with historical commercial streets, considering it an outcome of the interaction between cultural traditions and social interactions. They also noted significant differences in the formation of a sense of identity among various age groups, genders, or cultural backgrounds, highlighting the complexity and diversity of cultural identity and deepening our understanding of the interaction between social–cultural elements and individual cognition.

Related studies have focused on the role of multi-sensory experiences in the interpretation of cultural heritage, integrating perceptual psychology with cultural geography. The interaction between material and intangible culture has been incorporated as an influencing factor in cultural scene perception, leading to two topics of discussion: (1) how material cultural heritage through sensory narratives affects individual cognition and emotional experience; (2) the function of intangible cultural heritage in constructing social memory and identity. Although some scholars have explored the inheritance and transformation of intangible heritage in historical commercial streets, there is still a lack of comprehensive research, particularly in empirically assessing how authenticity, theatricality, and legitimacy of scene perception collectively impact individual experiences.

This study aims to analyze the scene perception experience of historical commercial streets and its impact on cultural memory and identity. Compared to other local cultural

landscapes, Beijing Road pedestrian street in Guangzhou is particularly exemplary in combining traditional maintenance with modern commercial activities, which is evident in the mismatch between cultural restoration and modern commercial demands. Some ancient buildings have been converted into retail stores or restaurants, with interior renovations not matching historical styles and damaging the original historical atmosphere. This phenomenon has raised public concerns about scene authenticity, leading to a separation of material and intangible cultural attributes, representing not only a physical loss but also a disruption of cultural continuity. Therefore, this paper holds significant research value and social relevance.

2. Methodology

2.1. Site Overview

Beijing Road, a historical and cultural pedestrian street, is one of the 26 designated historical and cultural districts located in the Yuexiu District of Guangzhou. This street has served as the unaltered and uninterrupted traditional central axis of Guangzhou for over two thousand years, epitomizing the political and cultural center of Lingnan and marking the origin of the Maritime Silk Road. In September 2017, the Beijing Road Cultural Tourism Area was honored as a World Outstanding Tourist Destination. By December 2018, it was selected as one of the first national pilot projects for pedestrian street renovation and enhancement. In April 2020, it was included in the scope of protection for Guangdong Province's historical and cultural districts. Subsequently, in July 2021, it was acclaimed as a "National Model Pedestrian Street".

As a commercial area rich in history, it not only preserves the city's historical memory but also serves as a pivotal region for urban cultural heritage. Following the implementation of protective policies such as the "Guangzhou Historical and Cultural City Protection Plan" and the "2021–2035 Guangdong Province Historical and Cultural Street District Guangzhou City Beijing Road Historical and Cultural Street District Protection Plan", a core protection area of 13.68 hectares and a construction control area of 8.49 hectares were delineated (Figure 1). The district houses four national key cultural relics protection units and five provincial-level cultural relics protection units, retaining multiple significant historical sites.

2.2. Advantages of Applying Scene Theory to Historical, Commercial, and Cultural Streets

The concept of 'scene' initially originated in the fields of drama and film and later developed in cognitive psychology. Using CiteSpace, a timeline cluster diagram of key terms in scene theory was created, focusing on cultural policy, macro urban development recommendations, urban cultural space creation, and cultural consumption. In Figure 2a, nodes on the timeline indicate the citation history and frequency of literature, with the change in color representing the passage of time and the thickness of the nodes indicating citation frequency.





Guangzhou City during the Song Dynasty (960–1279)

Figure 1. Cont.

Guangzhou City during the Ming Dynasty Guangzhou City during the Qing (1368–1644) Dynasty (1616–1912)

Schematic diagram of Peking Road Commercial Block in the context of urban renewal



Beijing Road North: The shops on Beijing Road

ancient road site (**d**)

Copper water-clock installation

Figure 1. Historical evolution, location and streetscape of the Beijing Road commercial block. (a). The location of the Beijing Road commercial district in successive generations of urban change. (b). Historical photographs of Beijing Road commercial street (photo credit: Guangzhou Municipal Archives). (c). Location map of Beijing Road commercial district. (d). The current appearance of the Beijing Road commercial district.

Barker [17] conducted early studies on the influence of real scenes on behavior. In 1959, Peacock [18] introduced drama theory into sociological analysis. Additionally, Gibson [19] proposed the concept of 'situational perception,' emphasizing the guiding role of the environment on behavior, laying the foundation for scene theory. With the advancement of electronic media technology, Meyrowitz [20] studied the social 'scene' structure. The urban transformation led Silver [21] to clearly define scene theory, positing that human behavior is formed in specific environments and influenced by material attributes and social meanings.

Scene theory has been widely applied in the study of scene perception in historical and cultural streets, gaining continuous attention since 1996 (Figure 2b). Research topics have expanded from cultural heritage preservation to value reconstruction, cultural tourism, and urban renewal. The figure illustrates a timeline cluster diagram of keywords related to historical streets. Recent focal points include human capital, emerging industries, changes

in consumption structures, and meeting real needs. Chinese scholars typically use the scene theory framework to analyze cultural policies and spatial resources, proposing developmental recommendations. Nevertheless, audience-centric development research for historical commercial areas remains relatively scarce.



Figure 2. Timeline clustering map based on scene theory with historical street key. (**a**). Time series analysis of literature related to scene theory. (**b**). Time series analysis of historical street-related literature.

2.3. Research Method

Given the complexity of factors influencing the cultural experience of scene perception, this study is an integrative research effort combining focus group interviews, points of interest (POI) data analysis, and the analytical hierarchy process (AHP). The focus group interview method, a qualitative research technique, involves guiding a specific group of individuals to discuss a particular topic for data collection [10]. This method facilitates the revelation of underlying group norms and cultural dynamics through encouraging interaction and discussion among participants, thereby offering profound insights into understanding the perception of cultural experiences within a scene. AHP, proposed in the 1970s by American operations researcher Saaty [22], is a multi-objective decision analysis method that combines qualitative and quantitative analyses. It constructs a multi-level analytical structural model to determine the weight of components at different levels, making decision problems quantifiable. The basic idea of hierarchical analysis is a systematic approach of decomposition followed by synthesis. Analyzing a problem involves breaking it down into different levels of components, forming a multi-level analytical structure model, and ultimately resolving the relative weight of the lowest level components in relation to the highest level. This method is now widely applied in urban spaces and cultural heritage fields [23,24].

2.4. Questionnaire Design and Evaluation Modeling

This study employed focus group discussions to construct secondary indicators for the survey questionnaire. We invited seven expert scholars, three females and four males, who aligned with the research direction and possessed in-depth knowledge about Beijing Road. The discussion revolved around three primary indicators of scene theory: authenticity, theatricality, and legitimacy, focusing on the historic commercial district of Beijing Road.

Authenticity refers to the originality of entities, closely linked with identity recognition. It emphasizes the strong connection between regional identity and cultural identification. This dimension involves tourists' perception and evaluation of the historical and cultural values of the commercial district, reflecting the preservation and inheritance of regional characteristics and cultural heritage. Theatricality focuses on the impact of the spatial environment on individual perception and emotion, including interactivity of aesthetics, attractiveness, and experience. In the context of historic commercial districts, theatricality manifests through the integration of commercial activities and cultural exhibitions and the significant role of spatial design and artistic expression in creating appeal and enhancing the visitor experience. This element underscores dynamic components in the scene, such as street art, festive events, and interactive experiences, and how these collectively enhance the overall visitor experience. Legitimacy involves the equity of socio-economic factors in spatial distribution, focusing on the inclusiveness and participation of different social groups within the commercial district. It concerns the equality of capital and power spaces and the role of public policy and market forces in forming and maintaining this equality. The discussion on legitimacy highlights the role of commercial districts as social interaction spaces aimed at fostering community involvement, business diversity, and economic sustainability while ensuring equitable access and utilization of space by different social groups.

Initially, basic site information was provided to the experts, encouraging open discussions on factors influencing scene perception experience. Subsequently, these viewpoints and factors were explored in-depth to better understand the nature and mechanisms affecting the scene perception experience, thereby clarifying the specific dimensions of secondary indicators. This led to the identification of 3–5 tertiary indicators under each secondary indicator, with experts invited to score and rank these using the analytic hierarchy process (AHP) method. Finally, based on the weighted importance of each indicator layer, a scene perception measurement model framework (Figure 3) and evaluation system (Table 1) were constructed.

3 main dimensions AHP Focus groups POI Open discussion to Point of Interest of 1-9 promotional scaling identify secondary **Beijing Road Historic** method calculate the index weight of each **Commercial Districts** metrics dimensions tertiary indicators | |-----____l Questionnaire survey Likert five-point scale caculate the satisfaction average score of index layer Influencing Factors of Scene Perception Experience in Beijing Road Historic Commercial District (a) Y: Scene Perception Ha: AUTHENTICITY Hb: THEATRICALITY Hc: LEGITIMACY F1: Cultur F2 : Ge F3 : Ae F4 : Attractiv F5 : Func F6 : A etics Ha2 Hb Cultura Policy E1 Historic and Heritage E2 Traditional and Local E3 Architecture and Environment E4 Attractiveness and Creativity E5 Functional and Entertainment E6 Assurance and Participation (b)

Figure 3. Research framework and scene perception measurement model. (a) Research framework. (b) Scene perception measurement model.

Table 1. Evaluation dimensions of the scene perception measurement model.

Tier 1 Indicators	Tier 2 Indicators	Tier 3 Indicators	Questionnaire	Survey of Overall Scene Perception Issues		
		Ha1 Historical value	Neighborhood's historic appearance is better restored and presented.	F1 Peking Road Commercial Street		
	F1 Culture	Ha2 Heritage sites	Neighborhood heritage sites are protected, archived, and identified.	in terms of the display of historical appearance and the archival		
Ha Authenticity		Ha3 Cultural symbol	Cultural symbols and motifs with traditional Lingnan characteristics.	identification of cultural relics.		
		Ha4 Merchant capital character	Owns commercial stores that have been in business for over a century.			
	F2 Regionality	Ha5 Time-honored brand foods	Can eat traditional and branded food with traditional flavors.	E2 Preservation and inheritance of Lingnan regional culture and intangible culture		
		Ha6 Festivals ceremony	Temple fairs and cultural carnivals are held during traditional festivals.			
		Hb1 Architectural facade	The traditional Lingnan architectural style has been preserved.	E3 The street environment is aesthetically pleasing and has a		
	F3 Aesthetics F4 Attractiveness	Hb2 Street environment	The traditional Lingnan layout of wide streets and narrow alleys has been preserved.			
Hb Theatricality		Hb3 Greenery vegetation	The roadway and surrounding landscape is beautifully landscaped and retains old trees and plants that provide a great viewing experience.	better viewing experience.		
j		Hb4 Internet celebrity check-in point		It has attractions such as a 3D naked eye curved screen, an animation wall painting street, and art lighting in the riding building.	E4 Cultural and artistic events are held with personalized spatial nodes.	
		Hb5 Fashion animation	Organize anime and e-sports events of interest to young people.			
		Hb6 Cultural creation of art	Organize cultural bazaars and art-related cultural events.			

Scenes Theory

Tier 1 Indicators	Tier 2 Indicators	Tier 3 Indicators	Questionnaire	Survey of Overall Scene Perception Issues	
		Hc1 Shopping	It can meet the one-stop shopping needs of traditional department stores, brand flagship stores, and food, clothing, accommodation and transportation.		
	F5 Functionality	Hc2 Fast-food diet	Dining options are available at different price points and in different countries.	E5 Convenient shopping, dining, and event venues offering many types of services.	
Hc Legitimacy		Hc3 Entertainment	A place that can accommodate all kinds of activities such as watching movies, playing board games, and decompression halls.		
		Hc4 Policy assurance	A range of conservation management practices have been enacted.	E6 Covernment support staff's	
	F6 Autonomy	Hc5 Public services	The staff are attentive and friendly.	service attitude, and the	
		Hc6 Degree of participation	Local residents are enthusiastic and have a high level of activity participation.	friendliness of the public.	

Table 1. Cont.

For the various indicators listed in Table 1, this study employed a 1–9 scale method for evaluation (Table 2), resulting in the judgment matrix H. H can be calculated using Equation (1), while H_{ij} can be derived from Equation (2). The evaluation indices of the seven experts were assigned values, averaged, and rounded to ensure fair and objective results. Our aim was to calculate the characteristic vector a_i , which corresponds to the largest eigenvalue λ_{max} of the judgment matrix H, representing the weight distribution of the indicators. Subsequently, each column of the judgment matrix H was normalized using Equation (3) to obtain P_{ij} . Following this, P_{ij} was summarized using Equation (4) to derive P_i . The next step involved standardizing P_i through Equation (5) to produce a_i . Finally, the largest eigenvalue λ_{max} of the judgment matrix H was calculated using Equation (6).

$$H = \left(h_{ij}\right)_{n \times n} \tag{1}$$

$$h_{ij} \ge 0, h_{ij} = \frac{1}{a_{ij}}, h_{ij} = 1$$
 (2)

Table 2. Meaning of scales 1 to 9 in the hierarchical analysis method.

Scale	Connotation
$a_{ij} = 1$	Factor i is equally important to Factor j in the above level.
$a_{ij} = 3$	Factor <i>i</i> is slightly more important than Factor <i>j</i> .
$a_{ij} = 5$	Factor <i>i</i> is more important than Factor <i>j</i> .
$a_{ij} = 7$	Factor <i>i</i> is much more important than Factor <i>j</i> .
$a_{ij} = 9$	Factor <i>i</i> is rather more important than Factor <i>j</i> .
$a_{ij} = 2, 4, 6, 8$	The importance of Factor <i>i</i> and Factor <i>j</i> is between the middle value of adjacent judgment.
$a_{ij} = 1/a_{ij}$	If the importance ratio of Factor <i>j</i> and Factor <i>i</i> is a_{ij} , then the importance ratio of Factor <i>i</i> and Factor <i>j</i> is $a_{ij} = 1/a_{ij}$.

In Equations (1) and (2), h denotes any element within the matrix, i represents the number of rows, j stands for the number of columns, and n signifies the order of the matrix. Consequently, h_{ij} symbolizes the element h located in row i and column j of the n order matrix H.

$$P_{ij} = \frac{h_{ij}}{\sum_{i=1}^{n} h_{ij}} \tag{3}$$

In the Equation (3), the elements of matrix H are normalized column-wise using the sum-product method, resulting in P_{ij} . \sum denotes the summation symbol. $\sum_{i=1}^{n}$ represents the summation starting from 1 and continuing up to *n*.

1

$$P_i = \sum_{j=1}^n P_{ij} \tag{4}$$

In the Equation (4), P_i represents the value obtained after normalizing all elements in the column.

$$a_i = \frac{P_i}{\sum_{i=1}^n P_i} \tag{5}$$

In Equation (5), a_i represents the eigenvector.

$$\lambda_{max} = \frac{1}{n} \sum_{i=1}^{n} \frac{(Ha)_i}{a_i} \tag{6}$$

In Equation (6), *H* represents the judgment matrix, λ_{max} is the maximum eigenvalue of *H*, *n* denotes the order of *H*, and a_i is the eigenvector. Within $(Ha)_i$, *i* signifies the *i*-th element of vector *Ha*.

$$CI = (\lambda_{max} - n) / (n - 1) \tag{7}$$

In Equation (7), *CI* represents the consistency index. When *CI* is less than 0.1, the judgment matrix is considered to have consistency; otherwise, adjustments are required.

$$CR = CI/RI \tag{8}$$

In Equation (8), *CR* represents the consistency ratio, while *RI* denotes the average value of the consistency index, which is related to the order of the judgment matrix.

After determining the weight values of each layer of indicators, it is necessary to conduct a consistency test on the judgment matrix *H*. The consistency index CI is calculated using Equation (7). Given that different scales have varying random consistency indices, the consistency ratio CR, an indicator for evaluating consistency, is calculated using Equation (8), where RI represents the random consistency index. Regarding the consistency ratio, generally, when CR = 0, it is considered that the judgment matrix *H* is consistent; if CR < 0.1, then *H* can be regarded as a completely consistent matrix; if CR > 0.1, then the judgment matrix *H* is deemed inconsistent. When the judgment matrix has satisfactory consistency, λ_{max} is slightly larger than the matrix order n, while the other eigenvalues are close to zero. Finally, based on this, a hierarchical total ranking, comprehensive evaluation, and graded study of each evaluation element are conducted.

2.5. Questionnaire Distribution Process

The distribution of the survey took place between March and May 2022. On weekdays, data collection occurred from 7 pm to 9 pm, while on holidays, it extended from 2 pm to 8 pm, aligning with peak periods for sightseeing and shopping. The respondents included visiting tourists, local residents, and individuals employed in the area (Figure 4). The survey primarily focused on the impact of various factors on the on-scene experience, including historical sites, traditional architecture, time-honored brands, intangible cultural heritage, digital experiences, night economy, and cultural–creative spaces. For elderly tourists experiencing difficulties understanding the questionnaire, survey personnel provided one-on-one assistance to explain and complete data collection to ensure its authenticity.



(a)

(b)

(c)

Figure 4. Data collection and the questionnaire interview process. (**a**) Process of completing the residents' questionnaire. (**b**) Process of completing the visitors' questionnaire. (**c**) Process of completing the staff questionnaire.

3. Results

3.1. Descriptive Statistical Analysis

Descriptive statistics involve the depiction of quantitative characteristics of observed phenomena, including sample mean, standard deviation, skewness, and kurtosis [25]. A higher mean value indicates a higher level of respondent approval for the measured items, while a smaller standard deviation suggests greater consistency among respondents regarding the measured items. During the survey, a total of 360 questionnaires were distributed (115 online and 208 offline), 323 were collected, and 293 were deemed valid, resulting in a collection rate of 89.7%.

The survey results depicted in Figure 5 indicate a slight predominance of female respondents, constituting 57% compared to 43% of male counterparts. A significant proportion of the respondents, 63%, falls within the younger age demographic, signaling a heightened interest in touristic and commercial activities in Beijing Road's historic district among this group. Additionally, a noteworthy 83% of participants have attained university-level education or higher, with a substantial portion currently enrolled in university studies, followed by corporate employees. Half of the survey participants are local residents of Guangzhou, suggesting their familiarity with the basic context and characteristics of Beijing Road, which is beneficial for the accuracy and reliability of the survey data. Overall, these findings suggest that the primary visitor segment to Beijing Road's historic district comprises young, well-educated locals with a strong interest in experiential aspects of the scene.

This survey took multiple factors into account, fully aligning with the requirements of this research. Additionally, the data for each measurement item exhibited a normal distribution, making it suitable for subsequent empirical analysis. Utilizing SPSS21.0, the calculations yielded mean values, standard deviations, skewness, and kurtosis for each evaluation index (Table 3). Higher mean values indicate greater agreement among respondents on a given measurement item. Smaller standard deviations suggest more consistency in respondents' perceptions of the measurement item. Kurtosis assesses the peakedness of the sample frequency distribution in comparison to a normal distribution, while skewness predicts the direction and extent of the distribution skew. Figure 6 demonstrates that the data for all four variables are normal, meeting the criteria for further empirical analysis.



Figure 5. Statistics on basic information of respondents.

Tier 1 Indicators	Tier 2 Indicators	Tier 3 Indicators	AV	SD	S	К
		Ha1 Historical value	3.00	2.094	-2.079	3.511
	F1 Culture	Ha2 Heritage sites	2.98	2.101	-2.010	3.358
U. Authoritisity		Ha3 Cultural symbol	2.85	2.094	-1.880	2.921
па Ашпеписиу		Ha4 Merchant capital character	2.91	2.105	-1.926	3.048
	F2 Regionality	Ha5 Time-honored brand foods	2.69	2.101	-1.698	2.387
		Ha6 Festivals ceremony	2.98	2.139	-1.888	2.932
		Hb1 Architectural façade	3.03	2.131	-2.022	3.313
	F3 Aesthetics	Hb2 Street environment	3.09	2.124	-2.085	3.529
		Hb3 Greenery vegetation	2.95	2.101	-1.987	3.245
Hb Theatricality		Hb4 Internet celebrity check-in point	2.95	2.101	-1.983	3.249
	F4 Attractiveness	Hb5 Fashion animation	2.85	2.095	-1.914	3.011
		Hb6 Cultural creation of art	2.74	2.042	-1.908	3.093
		Hc1 Shopping	3.13	2.173	-2.012	3.220
	F5 Functionality	Hc2 Fast-food diet	2.98	2.122	-1.944	3.112
Ha Logitimo gu	-	Hc3 Entertainment	3.10	2.174	-2.014	3.168
The Legitimacy		Hc4 Policy assurance	3.20	2.219	-2.052	3.166
	F6 Autonomy	Hc5 Public services	3.02	2.140	-2.035	3.255
	-	Hc6 Participation	3.03	2.105	-2.051	3.511
		E1 Overall perception evaluation of cultural	3.11	2.118	-2.114	3.661
		E2 Overall perception evaluation of locality	3.01	2.107	-2.078	3.502
E overall perception		E3 Overall perception evaluation of aesthetics	3.10	2.124	-2.086	3.559
evaluation		E4 Overall perception of attractiveness	3.19	2.109	-2.258	4.131
		E5 Overall perception of functionality	2.96	2.136	-2.005	3.129
		E6 Overall perception of autonomy	3.13	2.120	-2.196	3.840

Table 3. Mean, standard deviation, skewness, and kurtosis values for each evaluation indicator.

Note: The mean value of the overall perception evaluation is the overall evaluation of a certain general indicator, not the average value of the sum of individual indicators. For example, the average value of the overall perception evaluation of attractiveness is the average value of tourists' overall perception of cultural creation and checkin points rather than the sum of the average value of Internet celebrities' check-in points, cultural creation of arts, and fashion animation. Abbreviations: Performance Measurement = PM; Average Value = AV; Standard Deviation = SD; Skewness = S; Kurtosis = K.



Figure 6. Comparison of distributions of mean, standard deviation, skewness, and kurtosis values.

3.2. Reliability Testing

Reliability testing is a statistical test for assessing the consistency of measurement tools. It evaluates the consistency and reliability of questionnaires, tests, or other measurement instruments across multiple measurements [26]. Reliability is commonly estimated by calculating Cronbach's alpha coefficient. A Cronbach's alpha > 0.7 is generally considered indicative of good internal consistency of the scale. Cronbach's alpha coefficient can be calculated using Equation (9), where *K* represents the number of measurement items, S_i^2 denotes the variance of the *i* measurement item, and S^2 is the variance of the total measurement score.

$$R_{\alpha} = \frac{K}{K-1} (1 - \frac{\sum {s_i}^2}{s^2})$$
(9)

In Equation (9), R_{α} represents Cronbach's alpha coefficient, *K* denotes the number of measurement items, and s_i^2 signifies the variance of the *i*-th measurement item.

Table 4 presents the results of the reliability test, while Figure 7 compares the reliability values of the variables. The analysis indicates that the overall scale's Cronbach's a = 0.906, and for the variables of authenticity perception, theatricality perception, and legitimacy perception, Cronbach's a = 0.895 > 0.75. Based on the results of the reliability test, it can be determined that the scale used in this study possesses high reliability.

Table 4. Scale reliability test results.

Variable	Cronbach's a	Number
Authenticity Perception (Ha)	0.895	6
Theatricality Perception (Hb)	0.889	6
Legitimacy Perception (Hc)	0.828	6
Overall evaluation perception (E1–E6)	0.906	6

3.3. Factor Analysis Based on KMO Value Test and Bartlett's Test of Sphericity

The Kaiser–Meyer–Olkin measure of sampling adequacy Test (KMO) is an index used to assess the suitability of factor analysis [27]. The KMO value, ranging between 0 and 1, indicates that the closer it is to 1, the lower the degree of partial correlation between variables and the more effective the factor analysis. It is generally considered that a dataset with a KMO value greater than 0.6 is suitable for factor analysis. Bartlett's test, on the other hand, verifies the existence of correlations between variables [28]. A significant test result

(*p*-value less than 0.05) suggests that the variables are correlated and appropriate for factor analysis. In this study, these two methods were employed for factor associativity analysis of variables. The test results show (Table 5) that the KMO values for all variables are greater than 0.7, and Sig. = 0 < 0.001%, indicating good test outcomes.



Figure 7. Results of the reliability test of the scale.

Table 5. Results of scale-based KMO value test and Bartlett's test of sphericity.

	Bart				
Variable Dimension	Approximate Chi-Square X2	Degree of Freedom df	Significance Sig.	KMO Value	
Ha Authenticity perception	1068.986	15	0.000	0.869	
Hb Theatricality perception	934.014	15	0.000	0.865	
Hc Legitimacy perception	644.439	15	0.000	0.794	
Overall evaluation perceptions (E1–E6)	4137.726	15	0.000	0.935	

3.3.1. Authenticity Perception Factor Analysis

Upon testing, the data for authenticity perception was found suitable for factor analysis, with KMO = 0.869 > 0.7, and Sig = 0.000 < 1, indicating strong correlations among variables. Subsequently, factor analysis and principal component analysis were conducted for this dimension. Table 6 shows the eigenvalues of authenticity perception factors and the cumulative explained variance. Since the first two components (cumulative contribution rate: 78.515%) summarize nearly 80% of the initial variable information, they can replace other variables. All variables have at least one factor loading above 0.5 after rotation, proving their validity. Regression methods were applied to analyze the relationship between each indicator variable and the main factor, yielding factor component score coefficients (Figure 8). The following calculations reflect the fact that the factors Ha2 (heritage sites) and Ha5 (time-honored brand foods) have the largest coefficients and are decisive for the authenticity perception factor.

Table 6. Eigenvalues and cumulative explained variance of perceived authenticity factors.

Component -	Initial Eigenvalues			Extracted Loading Sum of Squares			Rotated Loading Sum of Squares		
	Total	PV	Cumulative %	Total	PV	Cumulative %	Total	PV	Cumulative %
F1 F2	3.987 0.724	66.449 12.066	66.449 78.515	3.987 0.724	66.449 12.066	66.449 78.515	2.451 2.260	40.846 37.669	40.846 78.515

Abbreviations: Percentage Variance = PV;. Extraction method: principal component analysis.



Figure 8. Matrix of coefficients of main factor scores of perceived authenticity factors.

Based on the main factor score coefficient matrix, the linear combination of each component's main factors can be determined as follows:

$$F1 = 0.540Ha1 + 0.549Ha2 + 0.091Ha4 + 0.141Ha3 - 0.382Ha5 - 0.128Ha6$$

F2 = -0.272Ha1 - 0.279Ha2 + 0.219Ha4 + 0.175Ha3 + 0.671Ha5 + 0.411Ha6

3.3.2. Factor Analysis of Tourists' Theatricality Perception

After testing, the theatricality perception data was suitable for factor analysis, with KMO = 0.865 > 0.7, and Sig. = 0.000 < 1%, indicating significant correlations between variables. Further factor analysis and principal component analysis were conducted for this dimension (Table 7). The cumulative contribution rate of the first two components being 76.651% indicates they represent nearly 80% of the original information. The rotated factor loadings of each indicator variable all have at least one value greater than 0.5, showing their correlation and validity. Regression methods were applied to analyze the relationship between each indicator variable and the main factor, yielding factor component score coefficients (Figure 9). The following calculations reflect the largest coefficients for the factors Hb2 (street environment) and Hb6 (cultural creation of art), which are decisive for the authenticity perception factor.

 Table 7. Theatricality perception factor eigenvalues and cumulative explained variance.

Comment	Initial Eigenvalues			Extracted Loading Sum of Squares			Rotated Loading Sum of Squares		
Component	Total	PV	Cumulative %	Total	PV	Cumulative %	Total	PV	Cumulative %
F3	3.860	64.338	64.338	3.860	64.338	64.338	2.307	38.452	38.452
F4	0.739	12.313	76.651	0.739	12.313	76.651	2.292	38.199	76.651

Abbreviations: Percentage Variance = PV. Extraction method: principal component analysis.

Based on the main factor score coefficient matrix, the linear combination of each component's main factors can be determined as follows:

F3 = -0.231Hb1 - 0.227Hb2 - 0.089Hb3 + 0.468Hb4 + 0.456Hb5 + 0.514Hb6



F4 = 0.523Hb1 + 0.531Hb2 + 0.381Hb3 - 0.176Hb4 - 0.161Hb5 - 0.227Hb6

Figure 9. Matrix of principal factor score coefficients for theatricality perception factor.

3.3.3. Tourists' Legitimacy Perception Factor Analysis

Upon testing, the legitimacy perception data was found suitable for factor analysis, with KMO = 0.794 > 0.7, and Sig. = 0.000 < 1%, indicating significant correlations between variables. Subsequent factor analysis and principal component analysis were conducted for this dimension (Table 8). The cumulative contribution rate of the first two principal components, which reached 68.668%, encompasses nearly 70% of the initial information. Thus, these components suffice to replace other variables. All variables exhibit at least one factor loading above 0.5 after rotation, affirming their validity. Regression methods were applied to analyze the relationship between each indicator variable and the main factor, yielding factor component score coefficients (Figure 10). The following calculations reflect the fact that the factors Hc1 (shopping) and Hc5 (public services) have the largest coefficients and are decisive for the authenticity perception factor.

Table 8. Legitimacy perception factor eigenvalues and cumulative explained variance.

Common ont	Initial Eigenvalues			Extracte	Extracted Loading Sum of Squares			Rotated Loading Sum of Squares		
Component	Total	PV	Cumulative %	Total	PV	Cumulative %	Total	PV	Cumulative %	
F5 F6	3.257 0.864	54.277 14.392	54.277 68.668	3.257 0.864	54.277 14.392	54.277 68.668	2.161 1.959	36.017 32.652	36.017 68.668	

Abbreviations: Percentage Variance = PV. Extraction method: principal component analysis.

Based on the main factor score coefficient matrix, the linear combination of each component's main factors can be determined as follows:

F5 = 0.544Hc1 + 0.354Hc2 + 0.529Hc3 - 0.158Hc4 - 0.171Hc5 - 0.115Hc6

F6 = -0.182Hc1 - 0.025Hc2 - 0.216Hc3 + 0.434Hc4 + 0.486Hc5 + 0.437Hc6



Figure 10. Matrix of factor score coefficients for legitimacy perception.

4. Correlation Analysis: Linear Regression of Overall Tourists' Perceptions on Dimensional Perception Factors

Subsequent linear regression analysis was conducted to explore the correlation between six perception factors of tourists towards Beijing Road historical street and their overall evaluation, including cultural, regional, aesthetic, attractiveness, functional, and autonomy aspects. The results indicated significant correlations between these factors and the overall perception evaluation, with no significant multicollinearity (Table 9). Using the overall perception of tourists as the dependent variable and the six perception factors as independent variables, the linear regression analysis yielded an R-square value of 0.747, signifying that the model can effectively predict 75% of tourist perceptions (Table 10). The significance of the constant term being 0.004 < 0.05 implies its significant role in the model, with a coefficient of 1.780. The significance of all six perception factors was below 0.005, indicating their significant role in the predictive model, with standard regression coefficients of 0.227, 0.192, 0.264, 0.169, 0.183, and 0.284, respectively (Table 11).

Table 9. Correlation analysis between visitors and overall perception ratings.

		Culture	Regionality	Aesthetics	Attractiveness	Functionality	Autonomy
Overall perception evaluation	Pearson correlation	0.707 **	0.633 **	0.770 **	0.683 **	0.716 **	0.685 **
	Significance (two-sided)	0.000	0.000	0.000	0.000	0.000	0.000
	Sample size	293	293	293	293	293	293

** indicates a significant correlation at the 0.01 level (two-tailed).

Table 10. Summary of dimensional perception factor models and overall perception evaluation factors.

	Model	R	R ²	Adjusted R ²	Error in Standard Estimation	Durbin-Watson			
	1	0.864a	0.747	0.742	1.92191	1 1.332			
-	a Predictor variables: (constant) autonomy cultural attractiveness regionality functionality aesthetics								

a. Predictor variables: (constant), autonomy, cultural, attractiveness, regionality, functionality, aesthetics.

Therefore, the standard linear regression equation between the perception factors of Beijing Road historical street and the overall perception score is as follows:

The overall perception evaluation = 0.227^* cultural + 0.192^* regional + 0.264^* aesthetic + 0.169^* attractiveness + 0.183^* functionality + 0.284^* autonomy.

	N 11		UC			Significance	Covariance Statistics	
r	Models —	В	Standard Error	Beta	t	Significance	Tolerances	VIF
	Constants	1.780	0.611		2.915	0.004		
	Culture	0.448	0.090	0.227	5.006	0.000	0.429	2.330
	Regionality	0.168	0.090	0.192	1.862	0.004	0.363	2.756
1	Aesthetics	0.524	0.107	0.264	4.887	0.000	0.302	3.311
	Attractiveness	0.324	0.082	0.169	3.965	0.000	0.489	2.047
	Functionality	0.364	0.101	0.183	3.603	0.000	0.341	2.929
	Autonomy	0.545	0.073	0.284	7.428	0.000	0.606	1.650

Table 11. Coefficients of perception factors for each dimension and overall perception evaluation factors ^a.

^a. Dependent variable: Overall perception evaluation factor. Abbreviations: Unstandardized Coefficient = UC; Standardization Factor = SF.

5. Discussion

Descriptive analysis indicates that visitors have moderate overall satisfaction with Beijing Road, with scores for each perception element being medium, suggesting that the overall experience of the historical street needs enhancement (mean scores of each perception element range between 2.6 and 3.5, i.e., between 'average' and 'relatively satisfied'). Among different perception dimensions, visitors are more satisfied with policy protection (3.20) but rate traditional foods lower (2.69), indicating an inadequate experience of regional characteristics. The attractiveness of cultural activities scores relatively high (3.19), while the functionality score of the shopping experience and commercial services is lower (2.96), indicating a need for improvement in commercial services. The regression analysis reveals that culture, regionality, aesthetics, attractiveness, functionality, and autonomy collectively form the perceptual evaluative dimensions of a cultural scene. Beyond fulfilling basic functional needs, aesthetics (with a coefficient of 0.770) and cultural perception (0.707) substantially contribute, signifying their decisive role in enhancing the overall quality of visitors' scene perception.

In the dimension of authenticity, heritage sites and time-honored brand foods emerge as key elements, underscoring the importance placed on historical and cultural heritage [29]. While historical and cultural characteristics of the district, intangible cultural heritage projects, and festive activities play a role in augmenting perceptual experience [30], further integration and deepening of these elements are necessary. In the theatricality dimension, the street environment and the cultural creation of art are identified as primary factors, reflecting an emphasis on artistic forms and environmental ambiance [31]. The visual effects and popular elements of social media, though secondary, play a specific role in enhancing experiences. In the legitimacy dimension, the diversity of commerce and public services is found to be crucial in shaping experiential perceptions, being pivotal in building consumer trust [32]. Recreational dining, entertainment, public services, and community participation, while secondary, contribute to enhancing a sense of community belonging and cultural identity.

Previous studies have delved into the perceptions of authenticity, theatricality, and legitimacy among users regarding historic commercial districts. This paper employs Gaode Map to extract point of interest (POI) data from Beijing Road pedestrian street, categorizing these data into several hierarchical levels: major categories, subcategories, and minor classifications. Upon amalgamating similar categories, a total of seven major categories and twenty-six subcategories were identified. For instance, the category closely related to local residents' daily life, namely the residential and living POIs, encompasses four subcategories: residential complexes, beauty and hair salons, everyday shopping, and living services. Additionally, under the major category of Cultural Tourism, the data include subcategories such as heritage sites, historical buildings, hotel apartments, and related services. The statistical analysis of these categorized elements aids in pinpointing the critical factors that influence the experiential aspects of the street scene (Figure 11). On Guangzhou's Beijing Road commercial pedestrian street, shopping (47%) and dining (21%)

are most popular, primarily located in main streets and major malls. Life service categories comprise 12% of POIs, with beauty and hairdressing being the most (46% of life services). Though historical sightseeing and cultural education facilities account for only 2% and 3%, respectively, their distribution is even. Overall, this commercial area is dominated by shopping, dining, and entertainment, with fewer historical and educational facilities.



Figure 11. Spatial data distribution of points of interest (POI) in the historical commercial pedestrian street of Beijing Road.

Additionally, the survey respondents were predominantly young and highly educated, with 72.5% being students and employed individuals, slightly more of whom were women. In light of previous research findings, this demographic distribution reflects several phenomena: (1) young, educated individuals have heightened expectations regarding the cultural and aesthetic experiences in historic commercial districts; (2) women are more sensitive to the aesthetic and cultural elements of commercial pedestrian streets, potentially demanding higher standards for cultural and artistic experiences; (3) tourists with diverse socio-economic backgrounds have varying expectations for the functionality and diversity of commercial pedestrian streets, highlighting both challenges and opportunities in meeting the needs of different consumer groups.

By constructing a framework model of scene experience authenticity, theatricality, and legitimacy, this study enriches the research content of scene theory. It validates the applicability and effectiveness of the model using Guangzhou's Beijing Road commercial pedestrian street as a case study. Compared to the study by Hassadee et al. [33], this paper highlights the dominant role of cultural relics and traditional foods in the perception of historical continuity, embodying the specific manifestation of individual and group cultural identity construction, thereby responding to their viewpoint. Regarding the role of cultural memory, this paper aligns with the findings of Özdemir [34], acknowledging the importance of cultural activities in enhancing group cultural belonging.

Research by Sussman et al. [35–39] explored pedestrians' unconscious responses to street information from a visual attention perspective, underscoring the critical role of

environmental visual elements in urban spatial perception. They noted that pedestrians' unconscious responses are primarily manifested in the following ways: (1) visual capture by environmental cues, such as how the colors, signage, and facades of streets capture pedestrians' visual attention; (2) cognitive processing of visual information, which involves how pedestrians interpret and internalize visual information in the street environment, forming perceptions and memories; (3) the interaction between visual elements and behavior, namely how visual elements influence pedestrians' actions and route choices.

Although this study did not directly measure pedestrians' visual attention during their experience, the findings echo those of Sussman et al. In terms of authenticity perception, the lower evaluation of traditional foods and creative arts in the Beijing Road area may partly be due to a lack or deficiency in the visual narration of these elements. The visual design of the street, including architectural façades, color use, and signage, is crucial in enhancing visitors' perception of historical and cultural heritage. Regarding theatricality perception, the central role of art and cultural landscapes on Beijing Road is vital for visitors' theatrical experience, and the visual presentation of these elements likely affects their overall perception. Therefore, strengthening the visual narrative through vibrant colors, attractive storefront designs, and environmental art may enhance visitors' theatrical experience. Lastly, in the legitimacy perception dimension, the diversified commercial formats and policy safeguards on Beijing Road, as key factors influencing the legitimacy of the experience, can be reinforced through visual language.

While this paper detailedly analyzes factors such as cultural, regional, and aesthetic influences on-scene experience, their impact may vary across groups. Additionally, relying on feedback from visitors during shopping peak hours may not comprehensively reflect all visitors' perception experiences. Future research should extend the data collection period to include different seasons, holidays, and special events for a more comprehensive dataset. Further, subdividing respondent groups could explore perceptual differences among tourists of varying ages, cultural backgrounds, educational levels, and nationalities.

6. Conclusions

Our findings are as follows: (1) visitors rate Beijing Road's traditional cuisine, cultural creative arts, and Lingnan's intangible cultural heritage lower; (2) most visitors affirm policy protection measures, yet the lack of perception of local characteristics reveals inadequate communication of local cultural features in visitor experiences; (3) although Beijing Road's cultural activities are attractive, satisfaction with the functionality of commercial services and shopping experiences is low; (4) historical relics and traditional cuisine are leading factors, highlighting public attention to cultural heritage, but the role of historical cultural features and festival activities is relatively marginalized; (5) in the theatricality dimension, the district's environment and cultural arts are core elements of visitors' experience, emphasizing the importance of environment ambiance and artistic creation in creating visitor perception, yet modern visual and trendy elements contribute less; (6) in the legitimacy dimension, diversified business formats and policy support are major factors influencing scene experience, reflecting the role of market diversity and public services in building consumer trust.

This study suggests that the landscape design of historical and cultural streets should prioritize the experiential preferences of visitors to promote cultural identity and historical continuity.

Simultaneously, the synergy between business diversity and policy orientation should be strategically emphasized to form a business ecosystem supporting sustainable development. Future commercial street designs should integrate digital media with the physical environment, taking into account how digital technology reshapes consumer behavior and the key role of visual narratives in shaping brand identity and marketing strategies.

Given the inspiration of Sussman et al.'s study [35–39], in the next study, our team will try to introduce a measure of visual attention to explore the inter-relationship be-

tween environmental information and pedestrians' visual perceptual experience in historic commercial pedestrian streets.

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