Research Paper

Tourism destination images analysis and tourism development indicators evaluation based on perceived gap

Bridging Online Perceptions and Reality

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Abstract

With the rapid rise of social media, "internet celebrity cities" have emerged as significant players in tourism, driving urban tourism growth. However, social media often presents biased representations of these destinations, leading to discrepancies between online images and actual visitor experiences. This study addresses these issues by constructing a comprehensive evaluation framework for tourism development indicators based on expectancy disconfirmation theory and experience determines theory, focusing on Harbin, a prominent Chinese internet celebrity city. We assess 28 indicators across five dimensions—transportation environment, supporting services, natural environment, cultural environment, and tourism trends—using a questionnaire survey. Our findings reveal high satisfaction in the natural and cultural environments, while supporting services and transportation fall short of expectations. Principal component analysis indicates that tourists prioritize service construction, culture, and natural indicators. Despite the perceived importance of many indicators, a significant gap exists between expectations and actual experiences. This study offers a framework for prioritizing tourism indicator development, highlighting the need for improvements in supporting services, which has both theoretical innovation and practical implications for tourism management.

Keywords

Destination image, Perceived gap, Tourism management, Tourism satisfaction.

1. Introduction

With the rapid development of social media, "internet celebrity city" has gradually become a new trend in tourism. The internet celebrity city effect quickly attracts a large number of tourists, significantly promoting rapid urban tourism growth(Govers, Go and Kumar, 2007). However, social media often portrays tourism destinations in a biased or incomplete manner, leading to discrepancies between online city images and actual visitor experiences, such as "overly beautified scenes"(BBC, 2017; Hoeller, 2018; Moussalli, 2019). These issues not only hinder city tourism development but also increase visitor dissatisfaction(Smith *et al.*, 2015; Tseng *et al.*, 2015). Therefore, ensuring consistency between a city's online tourism destination image and its actual image has become a crucial consideration in tourism development practices worldwide(Henseler, Ringle and Sarstedt, 2015).

In response, this study constructs a comprehensive evaluation framework for tourism development indicators based on "expectancy disconfirmation theory" and "experience determines theory"(Lee *et al.*, 2016), taking Harbin, one of the most popular Chinese internet celebrity tourism cities, as the research area. We evaluate 28 indicators across five dimensions—transportation environment, supporting services, natural environment, cultural environment, and tourism trends—through the questionnaire survey. Here, "perceived gap" reflects the consistency between perceived online images and actual experiences, "importance" indicates subjective importance of tourism indicators to visitors, and "actual performance" represents the visitor satisfaction with their real tourism experiences.

Firstly, based on survey results, the study analyzes satisfaction levels and perceived gaps in Harbin's tourism development indicators, employing principal component analysis to understand visitors' perceptions of the importance of these indicators. Subsequently, it cross-analyzes perceived gaps and actual performances of each indicator under varying perceptions, and further examines the alignment between perceived importance and actual performances, categorizing them accordingly. Finally, integrating these evaluations, the study prioritizes development recommendations based on indicator performance.

2.Literature review

Tourist satisfaction is a critical factor for the survival and development of tourism destinations (Williams and Soutar, 2009). Therefore, understanding tourist satisfaction and expectations has been a focus in tourism research. Howard and Sheth (1969) defined customer satisfaction as the "cognitive state of being adequately or inadequately rewarded for the sacrifices made." However, more scholars prefer Oliver (1999) definition, considering satisfaction as the consumer's feelings of fulfilment, desires, and goals and describing this fulfilment as a pleasurable experience.

The expectation-disconfirmation theory is widely used to explain satisfaction, suggesting that satisfaction is formed by comparing expected returns with actual returns (Lee *et al.*, 2016). In tourism research, the formation of expectations and their impact on satisfaction is a complex process. Tourist-generated content (TGC) influences satisfaction before, during, and after travel (Narangajavana Kaosiri *et al.*, 2019). This impact ranges from the impressions formed before selecting a destination to evaluations during and after the experience (Nezakati *et al.*, 2015; Narangajavana Kaosiri *et al.*, 2019; Wang *et al.*, 2019).

Tourist satisfaction with a destination is influenced not only by the actual experience but also by the gap between the expected destination image and the actual experience. When actual experiences exceed expectations, tourists tend to feel satisfied and may even experience surprise and pleasure (Chon, 1991; Kim and Perdue, 2011; Lee, Jeon and Kim, 2011). Conversely, when actual experiences fall short of

expectations, tourists may feel disappointed and dissatisfied. This negative gap reduces satisfaction and affects tourists' overall evaluation of the destination (Yilmaz *et al.*, 2009). Furthermore, according to the loss aversion principle in prospect theory, the impact of a negative discrepancy on behavior is often greater, even when the magnitude of the negative and positive gap is identical (Levin and Gaeth, 1988; Tversky and Kahneman, 1991).

3. Study Area and Methodology

3.1. Study Area

To better reflect the Destination Image Gap, this study selects Harbin, a "top trending" tourist city in China, as a case area due to its surge in online popularity at the end of 2023. Harbin, the capital of Heilongjiang Province, covers an area of 53,076.4 square kilometres and serves as a central city in Northeast China and a national historical and cultural city. It has been designated as a "City of Music" by UNESCO and is recognized as one of China's top ten ice and snow tourist cities. At the end of 2023, Harbin gained extensive attention on the Chinese internet due to its ice and snow tourism. According to statistics, during the Spring Festival holiday in 2024, Harbin welcomed 10.093 million tourists, a year-on-year increase of 81.7%, generating total tourism revenue of 16.42 billion yuan, a year-on-year increase of 235.4% at comparable rates. Popular attractions among tourists include Central Street, Harbin Ice and Snow World, St. Sophia Cathedral, and the Flood Control Memorial Tower. This study will select some of the more popular attractions as research areas and distribute questionnaires to tourists.

3.2 Research Design and Data Collection

This study focuses on destination satisfaction. Initially, it designs and distributes questionnaires to collect data, then analyzes pre-visit expectations, post-visit satisfaction, and the importance of various elements. Following this, it examines the perceptual gaps before and after the visit and the differences in importance-satisfaction through Gap-Performance Analysis (GPA) and Importance-Performance Analysis (IPA), ultimately proposing tourism development strategies based on the comprehensive analysis.

In terms of indicator design, in order to balance the image of both online and offline destinations, a semantic network analysis combining UGC and semi-structured interviews was used to determine the evaluation elements, and an indicator system (table) was summarized, including five primary indicators of transportation environment, accommodation and catering, natural landscape, cultural landscape, and tourism trend, and 28 secondary indicators. On UGC, the study selected Xiaohongshu and Weibo, which have a wide user coverage and a large number of daily active users, as data sources. During the semi-structured interviews, various tourists across different age groups are randomly approached to gather conversational material, which is then analysed using Gephi software for semantic network analysis, identifying several clusters and key factors of interest, and constructing the final indicator system in conjunction with related research.

For questionnaire design, each indicator is examined from three dimensions: pre-visit expectations, post-visit satisfaction, and importance. A five-point Likert scale is employed for the survey. Ultimately, several hundred questionnaires are distributed and collected, achieving a response rate of over 70%.

3.3 Data Analysis

This study utilizes GPA (Gap-Performance Analysis) and IPA (Importance-Performance Analysis) methods to systematically analyze the collected data, assessing the effectiveness of Harbin's tourism development indicators.

Firstly, conduct GPA analysis by calculating the perceived gap between the online image and the actual experience of tourists. This gap reflects the difference between the information tourists obtain online and their actual experience. Specifically, by comparing tourists' ratings of their "expectations" and "actual performance" for each tourism indicator in the questionnaire, areas where the online image is overly idealized or lacking can be identified. For example, if the "expected" score of a certain indicator is higher than the "actual performance" score, it indicates that the online representation of that indicator has not met the expectations of tourists. This negative gap may lead to tourist dissatisfaction, thereby affecting their overall travel experience and willingness to revisit the city. GPA analysis is a cross validation of the "perceived gap" and "importance" of each indicator to determine the key factors that affect tourist satisfaction. Among them, "importance" will use principal component analysis (PCA) to extract weights, in order to gain a deeper understanding of tourists' perceptions of the importance of various indicators.

Then perform IPA analysis, draw "importance" on the X-axis and "satisfaction" on the Y-axis to construct four quadrant partition types. This method not only helps identify areas with low tourist satisfaction, but also clarifies tourists' needs and expectations by comparing the score differences in importance and satisfaction. For example, if an indicator scores high in "importance" but low in "satisfaction", priority should be given to improvement to increase overall tourist satisfaction.

By integrating the results of both GPA and IPA, this study will propose specific strategic recommendations for Harbin's tourism development, aiming to enhance tourist experiences and satisfaction levels.

4. Analysis of Expectations, Satisfaction, Perception Gaps, and Importance

4.1 Analysis of pre-visit expectation levels

An analysis of the online expectations for the five major dimensions (Figure 1) indicates that, under the influence of online destination images, tourists express a greater interest in the cultural environment of Harbin prior to their visit. This is followed in order by the natural environment, tourism trends, and transportation environment. The dimension with the lowest expected value is supporting services, suggesting that the cultural environment is perceived as the most influential aspect of Harbin in the minds of potential visitors, while supporting services are viewed less favourably. Insights from interviews reveal that elements such as "ice and snow culture" and "European-style charm" serve as significant cultural symbols that shape tourists' impressions of Harbin during their online searches and are key factors driving their desire to visit. Conversely, concerns regarding issues such as rising hotel prices and exploitative taxi services highlight aspects of uncivilized tourism practices, negatively impacting Harbin's online destination image.

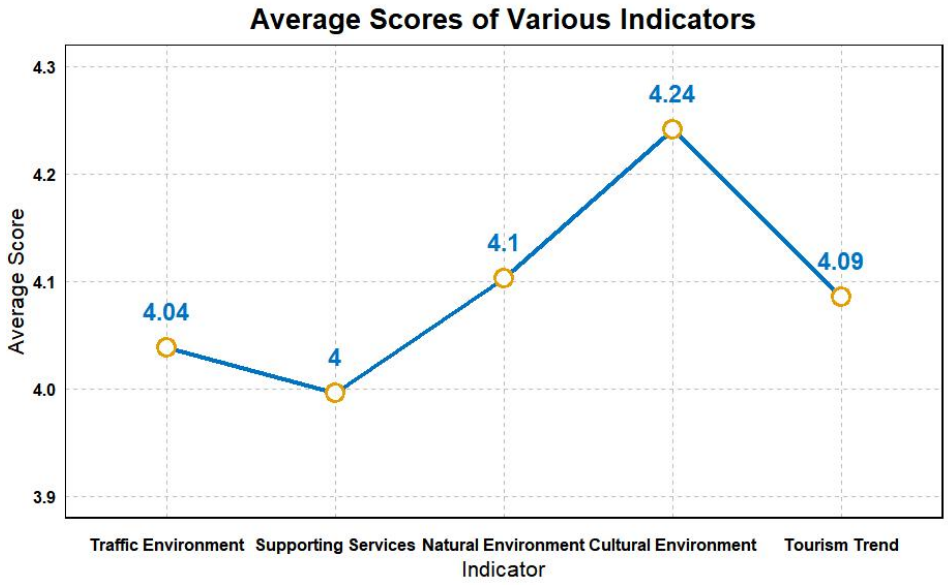

Figure 1. Average Scores of Dimensions of Online Expectations. Source: Calculated and drawn by the authors (2024).

Specifically (Figure 2) , among the various indicators of the cultural environment, the statement "architectural style is distinctive" received the highest average score, followed by "the city has a rich historical and cultural heritage." This indicates that Harbin's unique architectural style and its diverse, inclusive historical culture are more appealing to potential visitors as reflected in the online destination image. Conversely, within the supporting services category, the indicators "reasonable accommodation and dining prices" and "reasonable prices for cultural souvenirs" received noticeably lower scores. This suggests that, prior to their visit, tourists perceive accommodation and dining prices in Harbin to be relatively high, leading to lower expectations. However, the indicators "renowned traditional restaurants" and "distinctive dining experiences" scored relatively high, indicating that tourists have high expectations for Harbin's unique culinary offerings. Insights from interviews reveal that local dishes such as "Guo Bao Rou" and "Tie Guo Dun" have gained significant popularity online, while snacks like "Chimney Bread" and "Madi'er Ice Cream" have become must-try delicacies for visitors to Harbin. Furthermore, the indicator "beautiful riverside scenery" in the natural environment category also received a high score in terms of online expectations. Interviews indicated that tourists are particularly excited about the promotional content related to the Songhua River, especially the sunset views and winter ice activities along the river. In contrast, the indicator "good environmental hygiene" within the tourism trends category received a low score in terms of online expectations. This low expectation is largely attributed to negative news regarding poor hygiene maintenance at certain attractions and hotels, which has adversely affected tourists' perceptions.

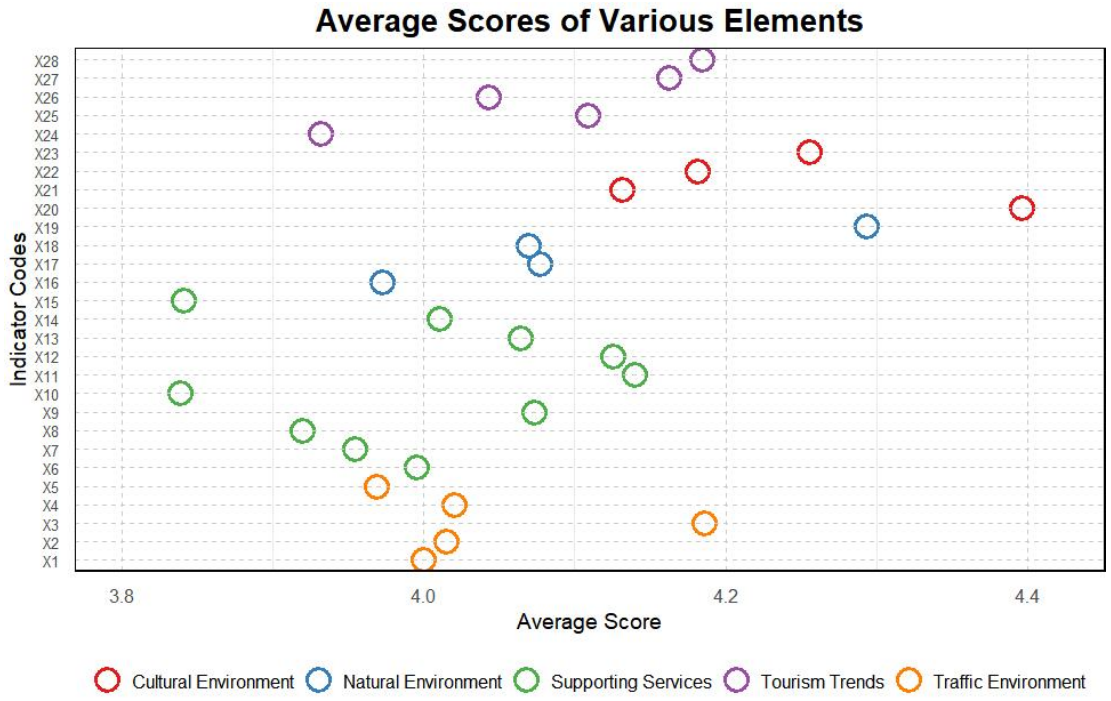

Figure 2. Average Scores of Various Elements of Online Expectations. Source: Calculated and drawn by the authors (2024).

4.2 Analysis of post-visit satisfaction levels

The analysis of post-visit satisfaction across the five major dimensions (Figure 3) indicates that tourists express the highest level of satisfaction with Harbin's cultural environment, followed by the natural environment, tourism trends, and transportation environment. The dimension with the lowest satisfaction score is supporting services. This ranking aligns with the pre-experience expectations across these dimensions, suggesting that actual experiences correspond closely with the promotional narratives presented online.

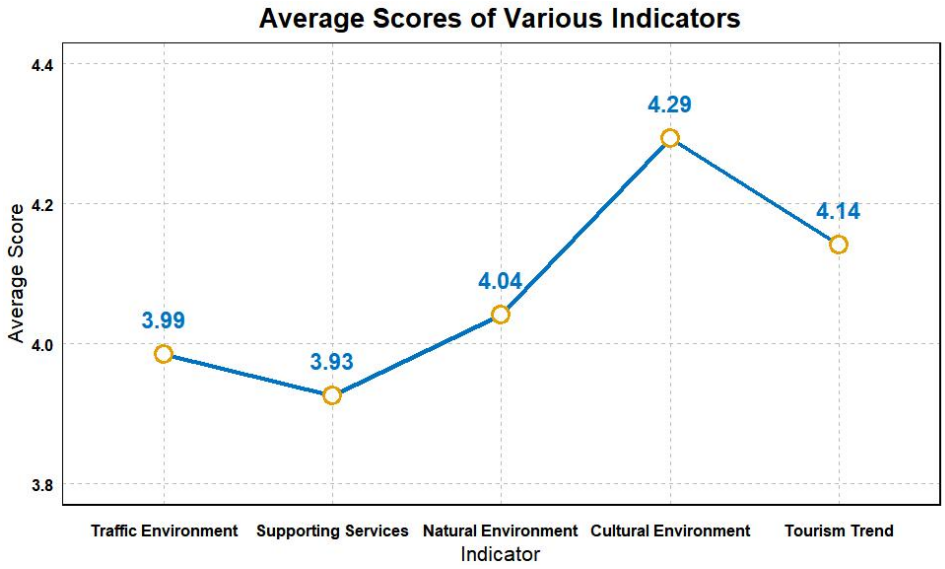

Figure 3. Average Scores of Dimensions of Post-Visit Satisfaction. Source: Calculated and drawn by the authors (2024).

Specifically (Figure 4), satisfaction with natural environment, cultural environment, and tourism trends is higher, with higher scores for indicators such as "unique architectural style", "profound historical and cultural heritage", and "beautiful riverside scenery"; In addition, in the dimension of tourism trends, the indicators of "public safety" and "enthusiasm and initiative of local residents" also achieved high satisfaction, indicating that tourists are particularly satisfied with the local safety environment and the friendly behavior of Harbin residents.

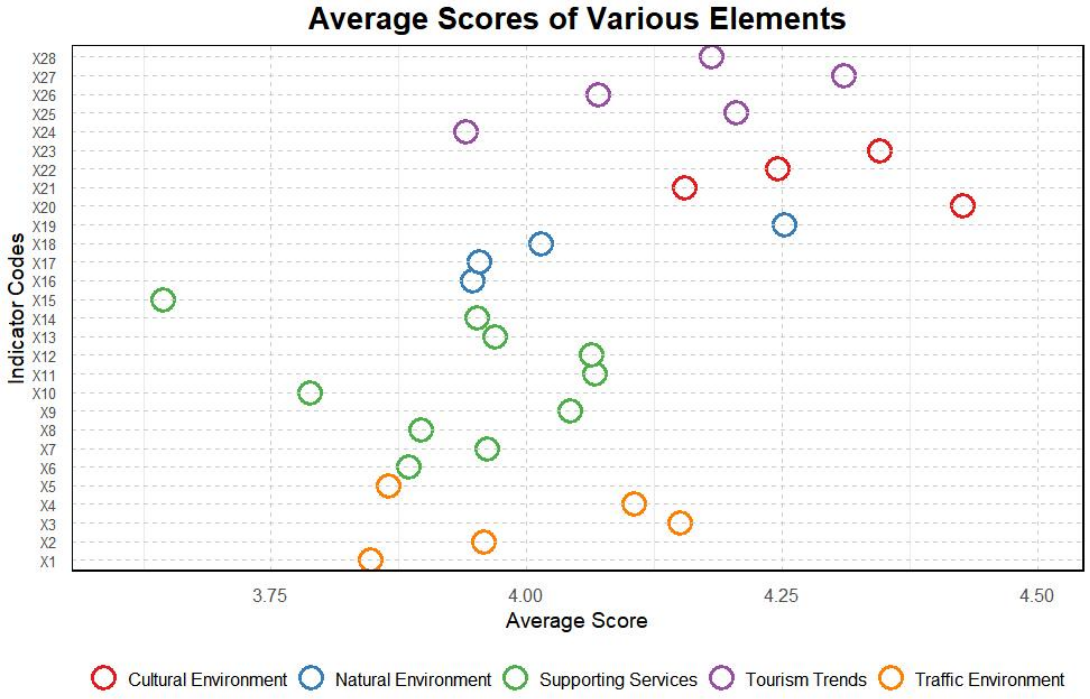

Figure 4. Average Scores of Various Elements of Post-Visit Satisfaction. Source: Calculated and drawn by the authors (2024).

4.3 Analysis of gaps between online and on-site perceptions

To analyze the differences between online and on-site perceptions across five key dimensions (Table 1), the results indicate that satisfaction with both tourism trends and cultural environments in physical experiences surpasses expectations based on online information. This suggests that the development of these aspects at the destinations exceeds the online Destination Image (DI), where expectations were already high, highlighting the strong development in Harbin's tourism sector. Conversely, supporting services, natural landscapes, and transportation conditions show lower on-site satisfaction compared to online expectations, indicating that their portrayal online may be more favorable than the actual experience. Furthermore, these areas, which already had lower online expectations, have not been effectively addressed in physical development to mitigate the dissatisfaction reflected in the online DI.

Table 1. Comparison of Average Online and On-Site Scores for Primary Indicators. Source: Calculated and drawn by the authors (2024).

Primary Indicator	Average Online Score	Average On-Site Score	Online - On-Site
Transportation Environment	4.037891595	3.985103242	0.052788352
Supporting Services	3.996232166	3.926612253	0.069619914
Natural Environment	4.10310947	4.042086665	0.061022805
Cultural Environment	4.241036915	4.293309295	-0.05227238
Tourism Trend	4.085949904	4.141463415	-0.05551351

Specifically (Table 2), in the transportation sector, only the reasonableness of transportation costs achieves higher on-site satisfaction compared to online expectations, while actual experiences regarding transportation convenience, safety, and public transport accessibility still fall short. In supporting services, most experiences do not meet tourist expectations, with the exception of accommodation and restaurant locations, where the placement of facilities aligns better with tourist routes. In the natural environment category, overall tourist experiences are below expectations. However, in cultural environments and tourism trends, most experiences exceed online expectations, with only service-related experiences falling short.

Table 2. Comparison of Online and On-Site Scores for Primary and Secondary Indicators.. Source: Calculated and drawn by the authors (2024).

Primary Indicator	Code	Secondary Indicator	Online	On-Site	Online - On-Site
Transportation Environment	X1	Transportation Convenience	4	3.846689895	0.15331
	X2	High Public Transport Accessibility	4.014778325	3.958333333	0.056445
	X3	High Transportation Safety	4.185929648	4.15034965	0.03558
	X4	Reasonable Transportation Costs	4.02	4.104895105	-0.0849
	X5	Reasonable Internal Route Design	3.96875	3.865248227	0.103502
Supporting Services	X6	Variety in Accommodation and Dining Options	3.995098039	3.884210526	0.110888
	X7	Good Accommodation and Restaurant Locations	3.954773869	3.960992908	-0.00622
	X8	Clean and Hygienic Accommodation and Dining Environments	3.91959799	3.896057348	0.023541
	X9	High Accommodation Security	4.073298429	4.043010753	0.030288
	X10	Reasonable Accommodation and Restaurant Prices	3.83902439	3.787985866	0.051039
	X11	Famous Traditional Restaurants	4.140096618	4.066666667	0.07343
	X12	Unique Dining Experiences	4.125	4.063380282	0.06162
	X13	Meeting Various Shopping Needs	4.064356436	3.968641115	0.095715
	X14	Wide Variety of Cultural and Creative Souvenirs	4.010050251	3.951048951	0.059001
	X15	Reasonable Prices for Cultural and Creative Souvenirs	3.841025641	3.644128114	0.196898

Natural Environment	X16	Pleasant Climate	3.972222222	3.947552448	0.02467
	X17	Good Air Quality	4.077294686	3.954225352	0.123069
	X18	High Level of Greenery	4.069651741	4.013937282	0.055714
	X19	Beautiful Riverside Scenery	4.293269231	4.252631579	0.040638
Cultural Environment	X20	Unique Architectural Style	4.396313364	4.427083333	-0.03077
	X21	Attractive and Suitable Signage	4.131067961	4.154385965	-0.02332
	X22	Uniform Street Landscape Style	4.180952381	4.245614035	-0.06466
	X23	Rich Historical and Cultural Atmosphere	4.255813953	4.346153846	-0.09034
Tourism trend	X24	Good Environmental Hygiene	3.931372549	3.940766551	-0.00939
	X25	Safe Public Security	4.108374384	4.205574913	-0.0972
	X26	Interesting and Fun Street Activities	4.042857143	4.069686411	-0.02683
	X27	Warm and Friendly Attitude of Local Residents	4.162679426	4.31010453	-0.14743
	X28	Attentive and Considerate Service with Good Attitude	4.184466019	4.181184669	0.003281

4.4 Analysis of the importance of elements

To further understand the key factors that tourists consider important for Harbin tourism, a survey on factor importance was conducted (Table 3), and classification and ranking were performed using Principal Component Analysis (PCA). According to the results of the PCA, the 28 indicators established in the questionnaire can be extracted into four principal components. By summarizing the indicators within each principal component, they can be categorized into four major factors: service construction elements, cultural shaping elements, natural and cultural elements, and public transportation elements.

Table 3. Results of Principal Component Analysis on Factors. Source: Calculated and drawn by the authors (2024).

Principal Component	Factor	Factor 1	Factor 2	Factor 3	Factor 4
F1: Service Construction Factors	X5 Reasonable Design of Internal Tour Lines	0.128	-0.007	-0.076	0.048
	X6 Variety of Accommodation and Dining Types	0.179	-0.011	-0.065	-0.052
	X7 Good Location of Accommodation and Restaurants	0.128	-0.003	-0.013	-0.044
	X8 Clean and Sanitary Dining Environment	0.213	-0.088	-0.05	-0.001
	X9 High Safety of Accommodation	0.223	-0.102	-0.055	0.006
	X10 Reasonable Prices of Accommodation and Restaurants	0.201	-0.045	-0.07	-0.039
	X24 Good Environmental Hygiene	0.149	-0.09	0.053	-0.006
	X25 Safety and Security	0.162	-0.098	0.007	0.017
	X27 Friendly and Positive Attitude of Local Residents	0.15	0.038	-0.045	-0.081

	X28 Attentive and Considerate Service	0.157	0.033	-0.083	-0.05
	X11 Famous Traditional Restaurants	0.007	0.109	0.087	-0.12
	X12 Unique Characteristics of Dining	-0.035	0.124	0.117	-0.117
	X13 Ability to Meet Various Shopping Needs	-0.028	0.19	-0.036	-0.024
	X14 Variety of Cultural and Creative Souvenirs	-0.074	0.275	-0.109	0.037
F2: Cultural Shaping Factors	X15 Reasonable Prices of Cultural and Creative Souvenirs	-0.014	0.25	-0.216	0.102
	X21 Appropriate and Aesthetic Signage	-0.108	0.217	0.015	0.025
	X22 Unified Style of Street Scenery	-0.097	0.259	-0.041	0.012
	X26 Rich and Interesting Street Activities	0.113	0.134	-0.133	-0.059
	X16 Pleasant Climate	-0.063	-0.05	0.28	-0.033
	X17Good Air Quality	-0.076	-0.105	0.358	0.015
	X18High Level of Greening	-0.09	-0.102	0.348	0.045
F3: Natural and Cultural Factors	X19Beautiful Riverside Scenery	-0.052	-0.062	0.276	0.011
	X20Distinctive Architectural Style	-0.032	0.098	0.107	-0.052
	X23Rich Historical and Cultural Heritage of the City	0.043	0.059	0.064	-0.08
	X1 Convenient Transportation	-0.09	0.003	-0.02	0.322
F4: Public Transportation Factors	X2Strong Accessibility of Public Transportation	-0.053	-0.017	-0.037	0.326
	X3High Safety of Transportation	-0.037	-0.047	-0.02	0.315
	X4Reasonable Prices of Transportation	-0.007	-0.037	-0.016	0.237

To quantitatively describe the impact weights of various indicators on the principal components and the weights of these components on satisfaction, Using PCA for analysis (Table 4 & Table 5). The results indicated that the weight of service construction was the highest at 0.336, followed by cultural shaping and natural cultural heritage, with transportation conditions having the least impact. Within the service construction factors, environmental hygiene, residents' attitudes, the cleanliness of accommodation and dining environments, and accommodation safety were predominant. In the cultural shaping factors, signage design, traditional restaurants, street scenery style, varieties of cultural and creative souvenirs, and street activities were predominant. In terms of natural cultural heritage, the importance was ranked as follows: air quality, greening level, riverside scenery, architectural style, and historical culture. For transportation conditions, the importance was ranked as follows: public accessibility, transportation safety, transportation prices, and convenience.

Table 4. Weight Analysis of Major Dimensions. Source: Calculated and drawn by the authors (2024).

Independent Variables	Regression Coefficient	Normalized Weight
Transportation Conditions	0.174	0.145
Cultural Shaping	0.322	0.269
Service Construction	0.402	0.336
Natural Cultural Heritage	0.299	0.25

Table 5. Weight Analysis of Secondary Indicators. Source: Calculated and

drawn by the authors (2024).

Dimension	Independent Variable	Regression Coefficient	Weight
Service Construction	X5 Reasonable Internal Tour Line Design	0.2609	0.0403
	X6 Diverse Accommodation and Dining Options	0.2641	0.0408
	X7 Good Location of Accommodation and Restaurants	0.2605	0.0403
	X8 Clean and Sanitary Accommodation and Dining Environment	0.2878	0.0445
	X9 High Accommodation Safety	0.2866	0.0443
	X10 Reasonable Prices for Accommodation and Restaurants	0.2557	0.0395
Cultural Shaping	X24 Good Environmental Hygiene	0.3116	0.0482
	X25 Safety of Public Order	0.2689	0.0416
	X27 Warm and Positive Attitude of Local Residents	0.2955	0.0457
	X28 Attentive and Courteous Service	0.271	0.0419
	X11 Famous Time-Honored Restaurants	0.2318	0.0359
	X12 Unique Dining Features	0.2177	0.0337
	X13 Ability to Meet Various Shopping Needs	0.2167	0.0335
	X14 Diverse Cultural Creative Souvenirs	0.227	0.0351
	X15 Reasonable Prices for Cultural Creative Souvenirs	0.2164	0.0335
Natural Cultural Heritage	X21 Appropriate and Aesthetic Signage	0.2347	0.0363
	X22 Unified Street Landscape Style	0.2289	0.0354
	X26 Rich and Interesting Street Activities	0.2267	0.0351
	X16 Pleasant Climate	0.1884	0.0291
	X17 Good Air Quality	0.244	0.0377
	X18 High Level of Greening	0.2389	0.0369
	X19 Good Riverside Scenery	0.2374	0.0367
	X20 Distinctive Architectural Style	0.2222	0.0344
	X23 Rich Urban Historical and Cultural Heritage	0.2114	0.0327
Transportation Conditions	X1 Convenient Transportation	0.1293	0.02
	X2 Strong Accessibility of Public Transport	0.1479	0.0229
	X3 High Transportation Safety	0.1432	0.0221
	X4 Reasonable Transportation Prices	0.1415	0.0219

5. Gap-performance analysis and importance-performance analysis

To enhance the effectiveness of perception elements in improving tourist satisfaction, this paper integrates Expectancy Disconfirmation Theory and Experience-Determining Theory to construct an assessment method for tourism perception elements that combines Gap-Performance Analysis (GPA) and Importance-Performance Analysis (IPA), categorizing various tourism perception factors and providing targeted optimization recommendations. The pathway through which tourism perception factors influence tourist satisfaction primarily operates from two perspectives: perceptual differences and key factors.

According to the theory of expectation negation, tourist satisfaction not only depends on the actual performance of perceived elements, but is also influenced by the gap between the emotional expectations established before the trip and the actual perception level. For example, when tourists have high expectations for a certain perceived element, if their actual performance is slightly worse than their expectations, even if the actual performance of that element is relatively high compared to other elements, it will lead to a decrease in satisfaction; If tourists have low expectations for a certain perceived element, and their actual performance is slightly better than their expectations, even if the actual performance of that element is relatively low compared to other elements, it will lead to an increase in satisfaction. Therefore, from the perspective of perceived differences, the impact of measurement factors on satisfaction should be evaluated by integrating perceived differences and performance.

According to the experience determination theory, tourist satisfaction is also influenced by the level of importance that tourists have in their perception of tourism elements. For example, when tourists consider a certain perceived element to be very important, even if the actual performance of that element is relatively high compared to other elements, they may not be able to improve satisfaction because they have not reached their inner perception of the importance of that element; If tourists consider a certain perceived element to be unimportant, even if the actual performance of that element is relatively low compared to other elements, it may not reduce their overall satisfaction with tourism due to its insignificance. Therefore, from the perspective of importance level, the impact of measurement factors on satisfaction should also be evaluated by integrating importance level and performance.

5.1 Gap-performance analysis

By integrating perceived differences and performance effectiveness to assess tourism perception factors, these factors are classified into four categories: " Enhancing Leadership " "Image Building" "Key Quality Enhancement" and "Steady Assurance" The specific meanings of these categories are detailed in the following table (Table 6).

Table 6. Gap-Performance Analysis of Primary Indicators. Source: Calculated and drawn by the authors (2024).

Category Type	Performance (Satisfaction)	Perception Gap	Description
Enhancing Leadership	High Rating	Expectations exceed actual experience	Performs well but still falls short of tourist expectations
Image Building	High Rating	Expectations are lower than actual experience	Performs well and exceeds tourist expectations
Key Quality Improvement	Low Rating	Expectations exceed actual experience	Performs poorly and falls short of tourist expectations
Steady Assurance	Low Rating	Expectations are lower than actual experience	Performs poorly but exceeds tourist expectations

Based on the analysis (Table 7), the category with the highest number of indicators is the Key Quality Enhancement type, which includes 13 indicators—nearly half of all perceived tourism elements—indicating that a majority of Harbin's tourism perception elements perform poorly and fall short of tourists' expectations. The next most common category is the Image Building type, comprising 8 indicators, suggesting that while many elements perform well, there is still a lack of effective communication in establishing appropriate tourist expectations. Following this is the Enhancing Leadership type with 5 indicators. The least common category is the Steady Assurance type, with only 2 indicators. These findings reveal that, among well-performing elements, actual experiences tend to

surpass tourist expectations, highlighting deficiencies in expectation-setting efforts. Conversely, for poorly performing elements, most fall below tourists' expectations, indicating a lack of sufficient improvement in addressing these weaker areas.

Table 7. Gap-Performance Analysis of Secondary Indicator. Source: Calculated and drawn by the authors (2024).

Primary Indicator	Code	Secondary Indicator	Type
Transportation Environment	X1	Convenient Transportation	Key Quality Enhancement
	X2	High Public Transportation Accessibility	Key Quality Enhancement
	X3	High Traffic Safety	Enhancing Leadership
	X4	Reasonable Transportation Pricing	Image Building
	X5	Reasonable Internal Travel Route Design	Key Quality Enhancement
Supporting Services	X6	Diverse Accommodation and Dining Options	Key Quality Enhancement
	X7	Good Location of Accommodation and Restaurants	Steady Assurance
	X8	Clean and Hygienic Dining and Accommodation Environments	Key Quality Enhancement
	X9	High Accommodation Safety	Key Quality Enhancement
	X10	Reasonable Accommodation and Dining Prices	Key Quality Enhancement
	X11	Famous Traditional Restaurants	Enhancing Leadership
	X12	Unique Dining Options	Enhancing Leadership
	X13	Satisfies Various Shopping Needs	Key Quality Enhancement
	X14	Rich Variety of Cultural and Creative Souvenirs	Key Quality Enhancement
	X15	Reasonable Pricing of Cultural and Creative Souvenirs	Key Quality Enhancement
Natural Environment	X16	Pleasant Climate	Key Quality Enhancement
	X17	Good Air Quality	Key Quality Enhancement
	X18	High Level of Greenery	Key Quality Enhancement
	X19	Beautiful Riverside Scenery	Enhancing Leadership
Cultural Environment	X20	Distinctive Architectural Style	Image Building
	X21	Appropriate and Aesthetic Signage	Image Building
	X22	Unified Street Landscape Style	Image Building
	X23	Rich Historical and Cultural Heritage	Image Building
Tourism trend	X24	Good Environmental Hygiene	Steady Assurance
	X25	Public Safety	Image Building
	X26	Diverse and Interesting Street Activities	Image Building
	X27	Friendly and Warm-Hearted Locals	Image Building
	X28	Thoughtful and Attentive Service	Enhancing Leadership

From the perspective of enhancing overall satisfaction (Figure 5), the primary focus should be on the "key improvement" factors, which include three transportation-related elements, three natural environment elements, and seven supporting service elements. Based on the outermost envelope model, the relatively most urgent factors are identified as X16 (pleasant climate), X8 (sanitary conditions of accommodation

and dining), X10 (accommodation and dining prices), X15 (prices of cultural and creative souvenirs), X1 (transportation convenience), X17 (air quality), X13 (variety of shopping options), X18 (level of greening), and X9 (accommodation safety). Among these, the first three issues are predominantly associated with low satisfaction, while the remaining six reflect an excessive gap between high expectations and actual performance.

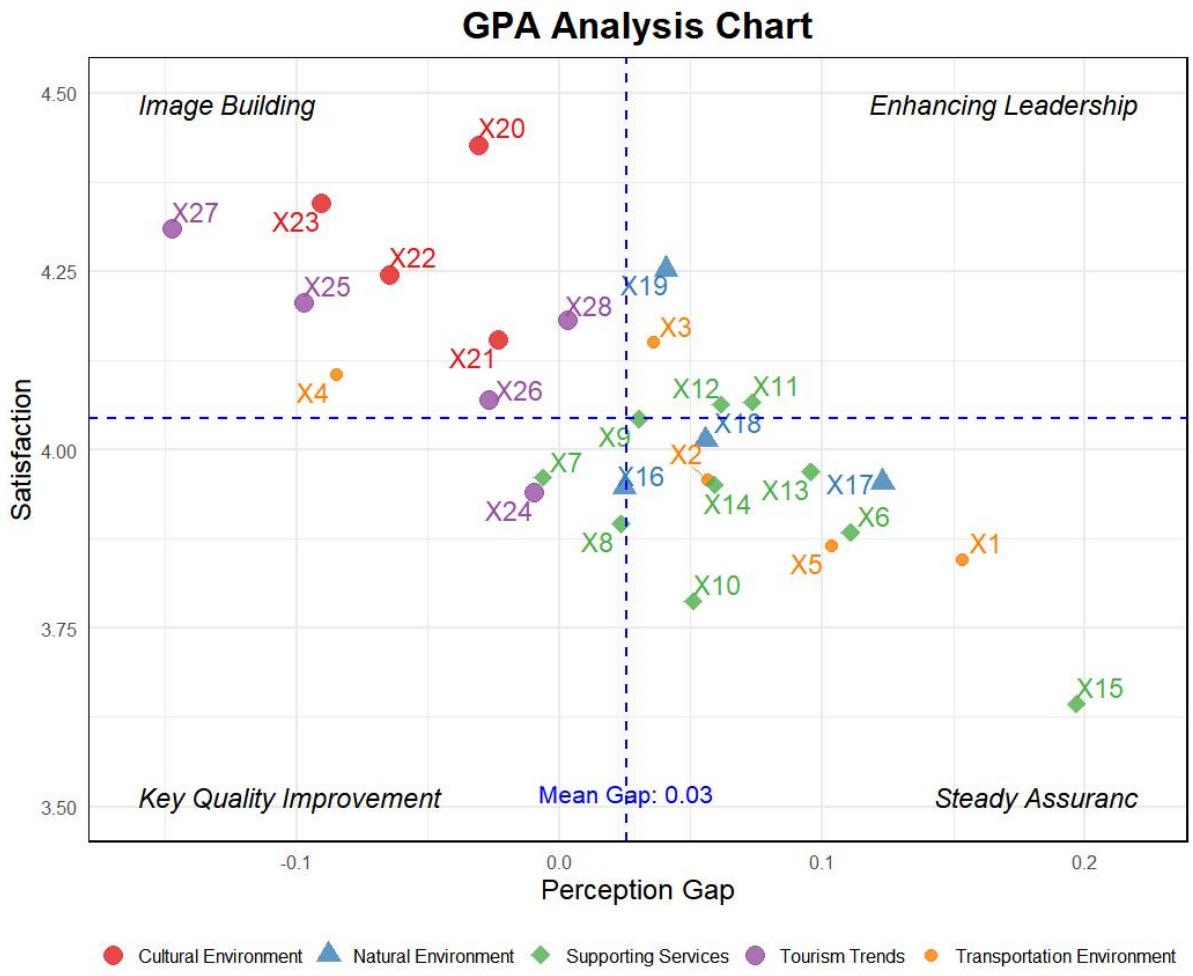

Figure 5. GPA Analysis Chart. Source: Calculated and drawn by the authors (2024).

5.2 Importance-performance analysis

By integrating the importance level and performance assessment of tourism perception elements (Table 8), the various elements are classified into four categories: Advantage Enhancement Type, Maintenance Type, Follow-up Opportunity Type, and Continue Improvement Type. Their definitions are provided in the table below.

Table 8. Importance-Performance Analysis of Primary Indicators. Source: Calculated and drawn by the authors (2024).

Element Classification Type	Performance (Satisfaction)	Importance	Meaning
Advantage Enhancement	High	High	Performs well and is

			important
Continuation Maintenance	High	Low	Performs well but is not important
Follow-up Opportunity	Low	Low	Performs poorly and is not important
Continue Improvement	Low	High	Performs poorly but is important

According to the analysis results (Table 9), the distribution of the various types of elements is relatively uniform. The most prevalent category is the Continue Improvement Type, which includes nine indicators, accounting for nearly one-third of all tourism perception elements in Harbin. This indicates that many of these elements are important but perform poorly. The Maintenance Type, Advantage Enhancement Type, and Follow-up Opportunity Type comprise seven, six, and six indicators, respectively, showing similar quantities.

Table 9. Importance-Performance Analysis of Secondary Indicators. Source: Calculated and drawn by the authors (2024).

Primary Indicator	Code	Secondary Indicator	Type
Transportation Environment	X1	Transportation Convenience	Follow-up Opportunity
	X2	Strong Public Transport Accessibility	Follow-up Opportunity
	X3	High Transportation Safety	Continuation Maintenance
	X4	Reasonable Transportation Prices	Continuation Maintenance
	X5	Reasonable Internal Tour Route Design	Continue Improvement
Supporting Services	X6	Diverse Accommodation and Dining Options	Continue Improvement
	X7	Good Location of Accommodation and Restaurants	Continue Improvement
	X8	Clean and Hygienic Dining and Accommodation Environment	Continue Improvement
	X9	High Safety of Accommodation	Continue Improvement
	X10	Reasonable Prices of Accommodation and Dining	Continue Improvement
	X11	Famous Time-Honored Restaurant Brands	Advantage Enhancement
	X12	Unique Dining Characteristics	Maintenance
	X13	Ability to Meet Various Shopping Needs	Follow-up Opportunity
	X14	Rich Variety of Cultural and Creative Souvenirs	Follow-up Opportunity
	X15	Reasonable Prices of Cultural and Creative Souvenirs	Follow-up Opportunity
Natural Environment	X16	Pleasant Climate	Follow-up Opportunity
	X17	Good Air Quality	Continue Improvement
	X18	High Level of Greening	Continue Improvement
	X19	Good Riverside Scenery	Advantage Enhancement
Cultural Environment	X20	Distinctive Architectural Style	Continuation Maintenance
	X21	Appropriate and Aesthetic Signage	Advantage Enhancement
	X22	Unified Street Landscape Style	Continuation Maintenance
	X23	Rich Historical and Cultural Heritage	Continuation Maintenance
Tourism Trend	X24	Good Environmental Hygiene	Continue Improvement

X25	Safety and Security	Advantage Enhancement
X26	Diverse and Interesting Street Activities	Continuation Maintenance
X27	Warmth and Positive Attitude of Local Residents	Advantage Enhancement
X28	Attentive and Thoughtful Service	Advantage Enhancement

To enhance overall satisfaction, it is crucial to prioritize the development of the Continue Improvement Type elements (Figure 6). This category encompasses one indicator from the transportation environment, one from tourism trends, two from the natural environment, and five from supporting services. In the transportation environment, particular emphasis should be placed on the design of internal travel routes. In terms of tourism trends, environmental sanitation warrants focused attention. For the natural environment, it is imperative to prioritize air quality control and the enhancement of greening levels. Within supporting services, improvements should concentrate on the diversity of accommodation and dining options, spatial layout, hygiene management, safety regulations, and price monitoring.

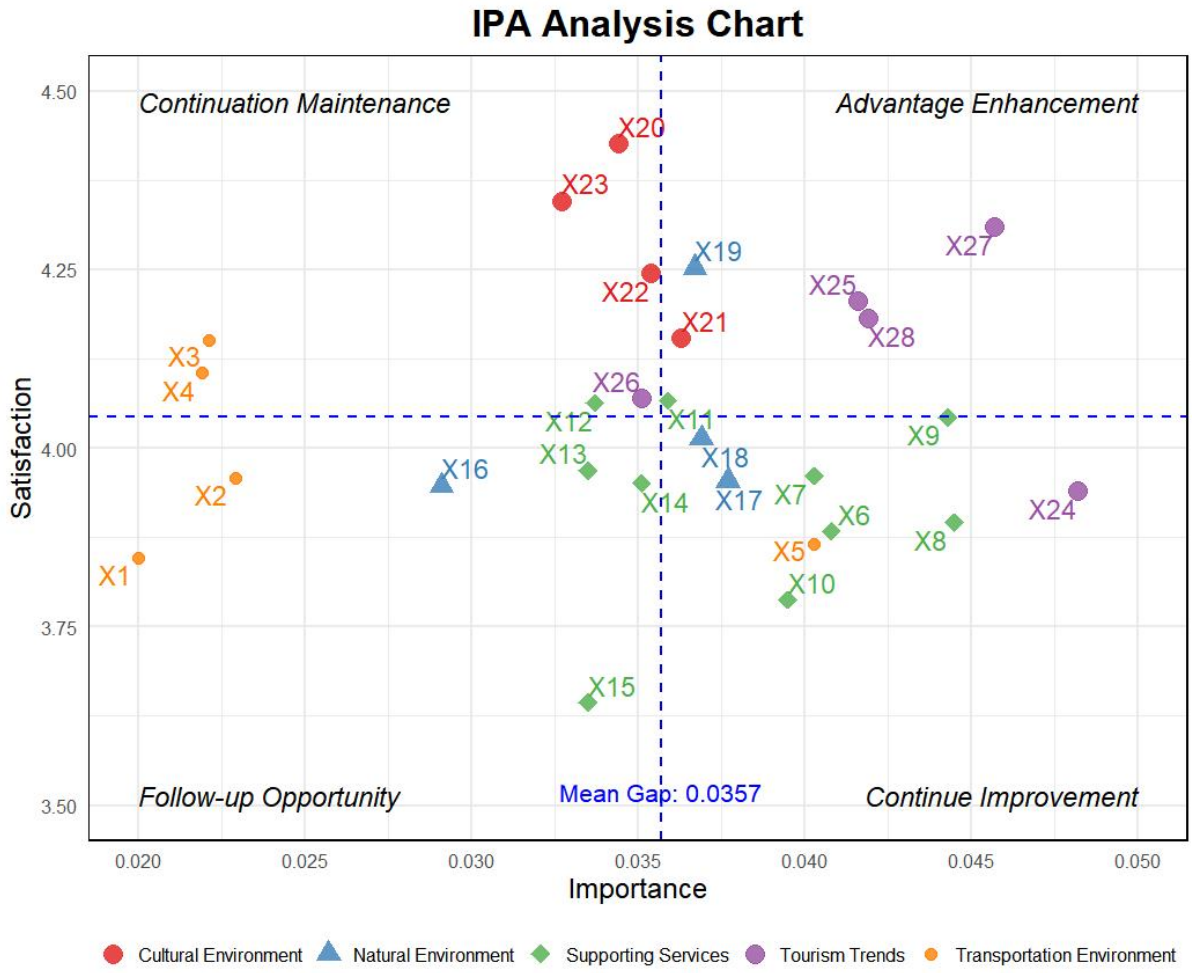

Figure 6. IPA Analysis Chart. Source: Calculated and drawn by the authors (2024).

5.3 Comprehensive Analysis of Elements

Incorporating the insights gained from both GPA and IPA analyses allows for the prioritization of element development and the formulation of targeted development strategies based on the characteristics of these elements (Table 10).

Table 10. Classification and Priority Analysis of GPA and IPA Types. Source: Calculated and drawn by the authors (2024).

GPA Classification Type	Priority	IPA Classification Type	Priority
Enhancing Leadership Type	2	Advantage Enhancement Type	2
Image Building Type	3	Continuation Maintenance Type	3
Key Quality Improvement Type	1	Follow-up Opportunity Type	4
Steady Assurance Type	4	Continuous Improvement Type	1

Based on the prioritization analysis, the highest-priority elements include six factors, all of which exhibit higher expectations than actual experiences (Table 11). Among these, four are related to supporting services, covering aspects such as the variety, hygiene, safety, and pricing of accommodation and dining services. Additionally, the rationality of internal route design and air quality also fall into this top priority category. Following these, greening levels are ranked second in priority. The third priority level includes the experience of renowned local dining establishments and service attitudes, both of which also show a discrepancy between expectations and experiences. In contrast, most indicators related to the transportation environment, supporting services, and tourism trends are categorized under the next priority level. Finally, the lowest-priority elements largely pertain to cultural environment indicators, many of which also exhibit a gap between high expectations and lower actual experiences.

Table 11. Priority Levels and Perception Differences of Key Indicators in Tourism Evaluation. Source: Calculated and drawn by the authors (2024).

Primary Indicator	Code	Secondary Indicator	Priority Level	Perception Difference
Transportation Environment	X5	Reasonable Design of Internal Travel Routes	2	0.103501773
Supporting Services	X6	Variety of Accommodation and Dining Options	2	0.110887513
Supporting Services	X8	Cleanliness of Accommodation and Dining Environment	2	0.023540642
Supporting Services	X9	High Safety of Accommodation	2	0.030287677
Supporting Services	X10	Reasonable Pricing of Accommodation and Dining	2	0.051038525
Natural Environment	X17	Good Air Quality	2	0.123069334
Natural Environment	X18	High Level of Greening	3	0.055714459
Supporting Services	X11	Renowned Local Dining Establishments	4	0.073429952
Tourism Trends	X28	Attentive and Friendly Service	4	0.00328135
Transportation Environment	X1	Convenient Transportation	5	0.153310105
Transportation Environment	X2	Strong Accessibility of Public Transportation	5	0.056444992
Transportation Environment	X3	High Transportation Safety	5	0.035579998

Supporting Services	X7	Good Location of Accommodation and Restaurants	5	-0.006219038
Supporting Services	X12	Unique Characteristics of Dining	5	0.061619718
Supporting Services	X13	Ability to Meet Various Shopping Needs	5	0.095715321
Supporting Services	X14	Variety of Cultural and Creative Souvenirs	5	0.0590013
Supporting Services	X15	Reasonable Pricing of Cultural and Creative Souvenirs	5	0.196897527
Natural Environment	X16	Pleasant Climate	5	0.024669775
Cultural Environment	X21	Suitable and Aesthetic Signage	5	-0.023318004
Tourism Trends	X24	Good Environmental Hygiene	5	-0.009394002
Tourism Trends	X25	Safety of Public Security	5	-0.097200529
Tourism Trends	X27	Warmth and Attitude of Local Residents	5	-0.147425104
Transportation Environment	X4	Reasonable Transportation Pricing	6	-0.084895105
Natural Environment	X19	Good Riverside Scenery	6	0.040637652
Cultural Environment	X20	Distinctive Architectural Style	6	-0.030769969
Cultural Environment	X22	Unified Street Landscape Style	6	-0.064661654
Cultural Environment	X23	Rich Historical and Cultural Context of the City	6	-0.090339893
Tourism Trends	X26	Rich and Interesting Street Activities	6	-0.026829268

6. Findings and discussion

This study presents a comprehensive evaluation of Harbin's tourism development indicators, revealing critical insights into the alignment between visitor expectations and actual experiences. Results indicate: 1) High satisfaction with Harbin's actual tourism experiences mainly in natural and cultural environments and tourism trends dimensions; 2) Tourism trend and cultural environment indicators surpass expectations, while supporting services, natural environment, and transportation environments fall short; 3) According to principal component analysis, tourists' subjective ranking of the importance of tourism indicators is in the order of service construction indicators, culture shaping indicators, natural and human indicators, and public transportation indicators; 4) Most of the indicators of Harbin's tourism development indicators are rated low and pre-trip expectations exceed the actual experience, indicating that the perceived gap in Harbin's tourism is mainly negative and significant; 5) Many indicators in Harbin's tourism development are deemed important but underperform, showing low alignment between importance and actual performances; 6) Overall, Harbin should prioritize developing supporting service indicators such as accommodation, dining options, hygiene, and pricing.

This study constructs a comprehensive evaluation framework of "perception gap-importance-actual performance" for tourism development indicators, takes into account the gap between the online images and actual experiences of the tourism network in the era of streaming media as well as the mismatch between the importance of the indicators and the actual development of the indicators, which has good generalizability. This framework is practiced in Harbin as an example to prioritize and classify the development of tourism indicators and put forward specific suggestions, which has certain theoretical innovation and practical value.

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