

Public Perception of South China Historical Trails: A Case Study of Xijing Historical Trail

LI Ziming¹, WANG Shifu², YI Zhikang³, LIU Zheng⁴

Author Affiliations 1 PhD, The Innovation School of Greater Bay Area, Guangzhou Academy of Fine Arts; 2 Professor; 3 Senior Engineer, Guangzhou Urban Planning and Design Company Limited; 4 Associate Professor, Corresponding Author, Email: liuzheng@scut.edu.cn; 2&4 School of Architecture, South China University of Technology; State Key Laboratory of Subtropical Building and Urban Science

ABSTRACT: The South China Historical Trails are being upgraded as a key aspect of new policies towards rural vitalization and targeted poverty alleviation. As an important example of linear cultural heritage, it is widely examined by local and international scholars. However, the effectiveness of their adaptive reuse is rarely evaluated due to the trails' extensive distribution, different construction contexts, and the diversity of users. In this study, the multiple benefits of adaptively reusing Xijing Historical Trail were investigated from the perspective of public perception through a case study based on the Ruyuan Section. A multiple linear regression model was applied. It is assumed that the public perception of the multiple benefits from the adaptive reuse of the South China Historical Trails would correspond with the planning objectives and expectations. Public perception was divided into three dimensions: Cultural inheritance, site usage, and economic promotion. A questionnaire survey based on a Likert scale was conducted at fixed places, supplemented by structured household questionnaire interviews in the village. A total of 230 questionnaires were collected. Results demonstrated that respondents' overall evaluation of the South China Historical Trails was positive, but they only had a vague understanding of specific functions such as cultural inheritance and economic promotion. There is a significant positive correlation between respondents' overall satisfaction and cognition of multiple benefits. According to further multiple linear regression model fitting, the regression equation between multiple benefit perception and overall satisfaction of respondents has explanatory power. As the linear heritage corridor and cultural path that carry special historical and cultural values, the South China Historical Trails are different from other recreational trails. However, this study found that site usage makes a greater contribution to improvement in respondents' satisfaction than cultural inheritance and economic promotion. To fully strengthen the cultural inheritance benefits of the South China Historical Trails, their functions of historical protection, cultural education, and recreation should be fully integrated to improve the site usage experience's comfort and interest. Meanwhile, it is necessary to explore effective ways of economic promotion in conditional and potential areas. In addition, the adaptive reuse of such heritage requires long-term, comprehensive, and multi-stakeholder participation and continuous investment. From this perspective, the adaptive reuse of the Ruyuan Section of Xijing Historical Trail as the South China Historical Trails is still in the early exploration stage. The full realization of its cultural, economic, and social benefits must be verified over a longer period. Based on this analysis, some specific improvement suggestions were proposed for the Ruyuan Section of Xijing Historical Trail: (1) Strengthen status maintenance, adopt an asset-light investment strategy, and optimize the historical trail network continuously. (2) Deepen historical exploration and show local characteristics by combining with the culture of the Yao Nationality. (3) Strengthen industrial planning, promote multiple participation, and perfect the relevant industrial chains. Moreover, some potential goals for the overall adaptive reuse of the South

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China Historical Trails were proposed: (1) Create activity-friendly designs and optimize the space by orienting to different activity preferences. (2) Implement low-cost, easy-maintenance, and inclusive strategies oriented towards sustainable long-term governance. (3) Explore historical connotations, highlight cultural heritage, and ensure sustained investment in fundamental research.

KEY WORDS: linear cultural heritage; cultural routes; South China Historical Trails; public attitude; public recognition; multiple benefits; improvement strategies

Introduction

Linear cultural heritage is one of the important concepts of international cultural heritage derived from cultural routes. It refers to the clusters of tangible and intangible cultural heritage in a linear or strip-shaped area with a special collection of cultural resources [1, 2]. It is integrated with a series of heritage protection concepts such as heritage corridors, historical routes, and cultural corridors in order to reflect the integrity and continuity of natural and human landscapes, reproduce the historical activities and migrations of humankind, as well as the exchange and interaction of material and cultural resources. It has important humanistic significance and multi-dimensional cultural connotation value [3, 4]. China's linear cultural heritage has distinct characteristics such as abundant resources, wide coverage, long history, huge span, long-lasting function, and strong vitality [5]. Represented by the Grand Canal, the Silk Road, and the Tea Horse Road, China's linear cultural heritage has become an important carrier for national ecological and cultural protection, leisure and recreation, aesthetic enlightenment, and education, for which extensive conservation work has been carried out [6–8].

As a core linear element of China's ancient regional transportation system, the historical trails bear witness to national integration and ethnic exchange, a memory of major historical events in China, and a spatial link containing regional "cultural genes," encompassing rich historical, social, economic, and cultural values. In order to implement the spirit of General Secretary Xi Jinping's important speeches on cultural confidence and "bringing the cultural heritage scattered across the vast land to life" and "preserving the roots of history", Guangdong Province has been carrying out the protection and utilization of the

South China Historical Trails since 2016 [9]. Currently, the relevant research mainly consists of three parts: First, historical research and heritage status assessment, such as research on the historical and geographical contexts and the rise and fall of the South China Historical Trails [10, 11], the composition, cultural characteristics and value assessment of heritage along the route [12, 13], etc.; second, research on planning and design strategies and methods, such as restoration and construction techniques, thematic route design methods, signage and interpretation schemes, outdoor activity planning, etc. [14–16]; and third, research on activities undertaken along the route, such as a review of the construction effects of the "cultural and creative platform" based on professional volunteers and public participation [17], a survey of the "village revitalization through the road" effect perceived by villagers [18], and a study on tourism impressions based on multi-source data [19]. However, research on the planning, revitalization, and protection of the South China Historical Trails still shows a clear phenomenon of practice taking precedence over theory, resulting in limited ability of theoretical research to guide practical work and thus constraining the current construction of historical trails.

The fundamental purpose of adaptively reusing the South China Historical Trails is to provide the public with meaningful linear activity spaces. This meaningfulness not only in leisure and use functions, but also in triggering users' emotions and resonance. Therefore, public attitudes are closely related to the prospects of heritage adaptive reuse [20]. It is necessary to further examine the attitudes and cognition of the public and explore the alignment between the expected goals of the action and the actual progress and effects, so as to provide a reference for future work. Public perception surveys primarily focus on respondents' perceptions of specific elements such as spaces, activities, or behaviors. These perceptions are in-

fluenced by a variety of complex factors, including personal behavioral preferences, post-use evaluations, public opinion guidance, and subjective value judgments. Currently, they are widely used in various fields such as tourism development, planning and construction, and public policy. For example, it has been used to investigate the perception of tourism impact among residents of tourist destinations in the context of tourism development [21]; it has been used to investigate the degree of support of residents along the route for planning behavior and the implementation effect of planning concepts in multi-level government governance in the context of planning and construction [22]; and it has been more widely used in public policy and health and hygiene in many complex issues such as public behavior [23], social issues [24], physical diseases [25], and policy formulation [26]. The main analytical methods used are structural equation modeling [27], Analytic Hierarchical Analysis [28], and importance-performance analysis [29]. Overall, public perception research focuses more on the attitudes, preferences, and needs of the public as the ultimate stakeholders in complex policies and behaviors. It is particularly important to point out that public perception surveys can provide an important lens for understanding the construction effectiveness of the South China Historical Trails, without being limited by the differences in context, quality, and resources between the routes. Against this backdrop, this paper, in conjunction with the expected goals of the plan, proposes multiple benefit evaluation factors for the adaptive reuse of the South China Historical Trails based on the multiple linear regression model analysis method commonly used in structural equation modeling. The first batch of demonstration sections is selected as examples to conduct an empirical survey on the public's perception of the multiple benefits of adaptive reuse.

1 Expected multiple benefits

1.1 Overall work implementation progress

Since the proposal of the South China Historical Trails, the rescue survey of historical sites and relics along

the route has been carried out rapidly, becoming an important supporting basis for the formulation of relevant plans and their adaptive reuse. In 2017, the "Overall Plan for the Conservation of the South China Historical Trails in Guangdong Province" proposed a network of historical trails covering the entire province, encompassing 21 prefecture-level cities and 103 districts and counties, and connecting more than 1,160 cultural and natural development nodes. According to statistics from the Guangdong Provincial Department of Natural Resources, by the end of 2020, the repair and construction of 18 routes with a total length of 1,200 km, 588 nodes, and more than 1,500 supporting service facilities had been completed, and a large number of outdoor sports, tourism, and study tours had been carried out.

1.2 Planning objectives and expected multiple benefits

The overall plan for the conservation of the South China Historical Trails proposes to create linear cultural spaces that meet the needs of modern life for the public, inject new momentum into the development of underdeveloped towns and villages, promote economic development along the historical trails, and realize the overall vision of the revival of historical trail culture. It also specifies three concrete goals (Table 1): First, generating cultural inheritance benefits. Through the investigation, excavation, sorting, and dissemination of the rich historical and cultural resources and connotations along the routes, it aims to inherit excellent historical culture, enhance cultural confidence, and strengthen local attachment; second, delivering site usage benefits. By adaptively reusing the route network and nodes, it aims to create venues that meet the public's needs for leisure, cultural education, and the outdoor sports industry, thereby facilitating public use, providing historical and cultural education scenarios, and promoting the development of public health undertakings; and third, providing economic promotion benefits. Relying on the historical trail network to drive the development of related industries along the routes, it aims to achieve urban-rural interaction, rural revitalization, targeted poverty alleviation, and economic development.

Table 1 Expected benefits of the adaptive reuse plan for the South China Historical Trails

Expected benefits	Corresponding planning objectives	Specific content proposed by the planning objectives
Cultural inheritance benefits	A heritage path of Chinese civilization showcasing Lingnan's historical culture and regional features	Showcase the history, culture, and regional features of Lingnan, and inherit Chinese civilization: systematically organize and explore the post road culture with its traditional cultural connotations and geographical features, make the past serve the present, innovate and bring the cultural heritage scattered across the vast land of southern Guangdong, and make it a well-known cultural brand of Guangdong Province. At the same time, connect with surrounding provinces and cities as well as the national network of historical trails, laying the foundation for the application of national heritage routes and world cultural heritage status.
Site usage benefits	A healthy path promoting outdoor sports and rural tourism in Guangdong	Provide fitness venues and promote the development of outdoor sports and rural tourism in Guangdong: Responding to the national fitness plan, utilize the South China Historical Trails routes and their nodes to carry out various forms of outdoor sports, meet the growing leisure needs of the people across the province, and drive the development of the outdoor sports industry along the route.
Economic promotion benefits	An economic path promoting the interactive urban-rural economic development in eastern, western, and northern Guangdong, and achieving targeted poverty alleviation	Promote the interactive development of urban and rural economies in eastern, western and northern Guangdong and achieve targeted poverty alleviation along the route: Seizing the opportunities of national policies such as building characteristic towns, beautiful villages and targeted poverty alleviation, promote the construction of characteristic towns and villages and poverty-stricken villages along the historical trail, and promote the balanced development of the regional economy in impoverished areas of eastern, western and northern Guangdong and the whole province.

2 Public perception survey

2.1 Research scope

As one of the earliest, longest, and best-preserved historical trails in the South China Historical Trails Network, Xijing Historical Trail is one of the earliest routes to undergo restoration and adaptive reuse. It is also one of the earliest restored,

most well-known, and most widely used historical trails among the South China Historical Trails. This study selected the Ruyuan Section of Xijing Historical Trail, which was among the first to be restored, as the research scope. It investigated the route characteristics and benefits perceived by users from three aspects of the South China Historical Trails: Cultural inheritance, site usage, and economic promotion (Figure 1).

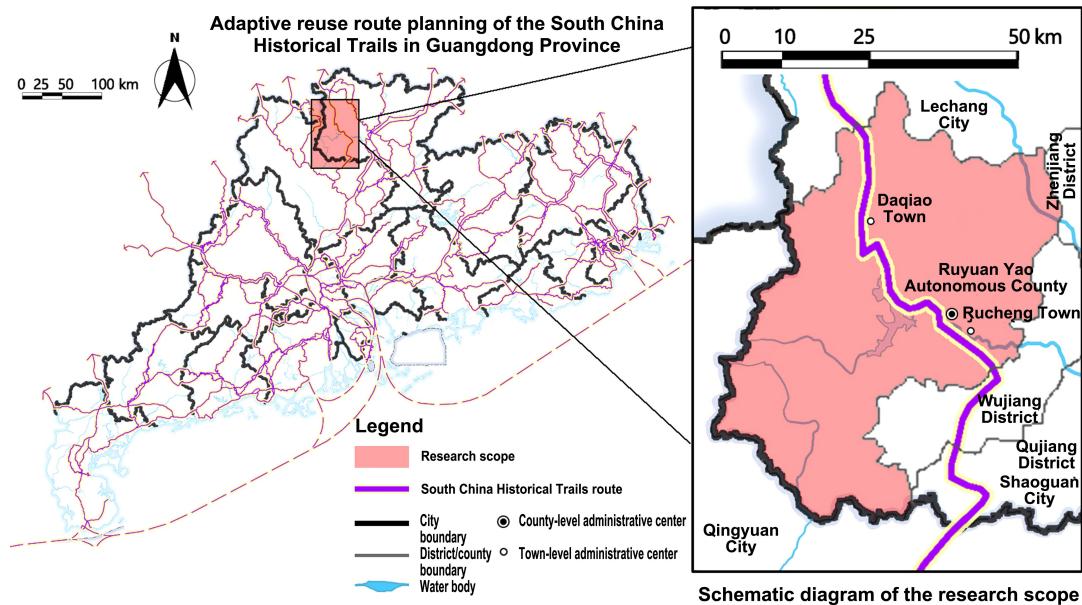


Figure 1 Research scope

Relying on the “Xijing Road” built in the second year of Jianwu in the Eastern Han Dynasty (26 AD) as the base, the Ruyuan Section was established through the restoration of the historical trail itself, the construction of connecting lines, and the restoration of heritage ruins and remains from 2016 to September 2020. It has formed a total length of 97.6 km, connecting 11 sections of the historical trail itself, 35 historical trail-related relics, 7 red cultural sites, and 10 natural resource landscapes, which cover 10 administrative villages and more than 110 natural villages within a 5 km radius along the route, forming a “colorful post-town trail”. Relying on the South China Historical Trails, about 30 large-scale events have been held in this section, including professional sports events, folk activities, leisure tourism festivals, and historical trail study tour activities. Through these activities and capital diversion, comprehensive environmental improvement and the construction of a demonstration zone for the production and marketing of characteristic agricultural products have been vigorously promoted[30].

2.2 Data collection

This study primarily employed a method of distributing and collecting questionnaires at fixed locations, supplemented by structured household interviews, to collect data. The fixed locations included 6 public activity areas within 2 km of the built South China Historical Trails in Ruyuan County, namely the center of Ruyuan County, Ruyuan Characteristic Town, the center of Daqiao Town, and the Laling section, Shimen’ao section, and Wuliqiao section of the Ruyuan Section of Xijing Historical Trail. The door-to-door interview locations included four villages or communities along the historical trail, namely the center of Daqiao Town, Laofuwu Village, Daqiao Village, and Laowu Village (Figures 2 and 3). The selection of locations for questionnaire distribution and door-to-door interviews took into account the suggestions of the local historical trail management department, and combined the differentiated composition of urban residents, township residents, and rural residents concerned in the questionnaire, as well as the spatial proximity between popular historical trail routes and survey locations, so as to avoid situations where respondents lacked activity experience and

cognitive basis regarding the historical trails.



Figure 2 Ruyuan section of Xijing Historical Trail (Daqiao Town section)



Figure 3 Ruyuan section of Xijing Historical Trail (Laling section)

A total of 230 questionnaires were distributed on-site during the three-day field survey, yielding 219 valid questionnaires, with an effective rate of 95.2%. Analysis of the respondents’ basic information (Table 2) shows that the survey has universality and representativeness, and there is no serious bias towards any particular group.

Table 2 Summary of respondents’ basic information

Item	Category	Proportion/%
Gender	Male	57.99
	Female	42.01
Age group	Under 18 years old	17.34
	18 – 25	15.07
	26 – 30	10.96
	31 – 40	21.92
	41 – 50	11.87
	51 – 60	12.79
	Above 60	10.05
Education	Primary school and below	9.59
	Junior high school	21.46
	High school/vocational school	29.22
	Junior college	21.46
	Bachelor’s degree or above	18.27

(Continued)

Item	Category	Proportion/%
Born locally	Yes	48.86
	No	51.14
Long-term local resident	Yes	61.64
	No	38.36
Household registration type	Urban household registration	43.38
	Rural household registration	56.62
Hiking/mountaineering enthusiast	Yes	55.71
	No	44.29
Profession	Government agencies/public institutions/civil servants	10.50
	General staff/workers of companies/enterprises	22.84
	Professionals in the culture, education, and health sectors	1.37
	Self-employed/freelancer	13.24
	Farmers and rural migrant workers	10.50
	Student	23.74
	Unemployed or retired	10.96
	Other	6.85

2.3 Research methods and contents

At present, the evaluation of the effectiveness of linear landscape planning, including greenways, historical trails, and blueways, is often constrained by differences in spatial scale and usage frequency [31–33]. For example, historical trails are characterized by their wide spatial distribution, complex built and natural environmental elements along the route, and significant differences in the dominant functions and spatial quality of the linear landscapes themselves. Moreover, due to differences in the usage methods, purposes, and frequencies of the user groups, different groups of people will have significant inherent differences in their perception of linear landscapes across different regions and under different conditions, making it difficult to reflect the overall construction effectiveness of the historical trail. To address this issue, this study focuses on the perceptions of local residents along the Ruyuan Section of Xijing Historical Trail. By distributing questionnaires and conducting door-to-door interviews at multiple typical locations, it expands the diversity of respondents in terms of economic and social conditions, places of

residence, activity preferences, and frequencies of historical trail use, thereby ensuring the representativeness of the survey.

In terms of the analytical model, a multiple linear regression model was adopted. It is assumed that residents' perception of the multiple benefits from the adaptive reuse of the South China Historical Trails and the planning goal expectations correspond to three dimensions: The perception of cultural inheritance benefits, the perception of site usage benefits, and the perception of economic promotion benefits. Consequently, the residents will thereby form an overall understanding and evaluation of the adaptive reuse work. This study first analyzes the planning objectives of the South China Historical Trails by combining relevant government documents. Then, it determines the factors influencing each dimension by combining specific sub-planning objectives. The Likert scale was used to measure the main factors of public perception, and calculations and tests were performed to achieve a detailed analysis of the cognition of multiple benefits from the adaptive reuse of the South China Historical Trails and public satisfaction. Among them, Likert scales have 4, 5, 6, and 11 levels. Generally, the more levels there are, the more refined the measurement [34]. Considering the respondents' experiences and information validity, this paper selected the 5-level scale and the 11-level scale for questionnaire design. The specific research steps were as follows:

(1) Understanding the public's overall satisfaction with the Ruyuan Section of Xijing Historical Trail. Since this perception is relatively abstract and emotional, an 11-point Likert scale was used to improve the quality of the data, with 0 to 10 representing the degree from very dissatisfied to very satisfied.

(2) Understanding the public's cognition level regarding the benefits of the Ruyuan Section of Xijing Historical Trail in three aspects: Cultural inheritance, site usage, and economic promotion. Seventeen sub-item assumptions for the benefit dimensions were proposed (Table 3), using a 5-point Likert scale where 1 to 5 represent the public's strong disagreement, disagreement, neutrality, agreement, and strong agreement with the benefits, respectively.

Table 3 Assumptions of multiple benefits of the adaptive reuse of the South China Historical Trails

Benefit dimension		Sub-items of each benefit dimension	
x ₁	Cultural inheritance	E1	Conducive to cultural preservation and development
		E2	Enabling the public to understand local culture better
		E3	Making the public proud of their local area
		E4	Making the public optimistic about the future development prospects of the historical trails
		E5	Making the public proactively visit here for activities again
		E6	Making the public recommend others to visit here for activities
x ₂	Site usage	E7	The current state of construction making the public satisfied
		E8	The current state of maintenance making the public satisfied
		E9	The activity arrangements along the route making the public satisfied
		E10	The natural scenery viewed along the route making the public satisfied
		E11	The cultural landscapes viewed along the route making the public satisfied
		E12	The historical and cultural knowledge gained along the route making the public satisfied
		E13	The preservation status of historical relics along the route making the public satisfied
x ₃	Economic promotion	E14	Bringing new job opportunities to the local area
		E15	Increasing local residents' income
		E16	Attracting more investment to the local area
		E17	Promoting local industrial development

(3) Analyzing the current public perception and satisfaction with the benefits achieved by the Ruyuan Section of Xijing Historical Trail through the obtained questionnaire survey data, and conducting confirmatory factor analysis (CFA) (validity verification). Constructing a multiple linear regression equation (Equation 1) to model the impact of the public perception of the site usage, cultural inheritance, and economic promotion benefits on their satisfaction regarding the adaptive reuse of the South China Historical Trails, and performing data fitting verification.

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon \quad (1)$$

In the formula, y represents the overall public satisfaction; β_0 represents a constant; x_1 represents the perceived evaluation of cultural inheritance benefits; x_2 represents the perceived evaluation of site usage benefits; x_3 represents the perceived evaluation of economic promotion benefits; ε is the random error; and β_1 , β_2 , and β_3 represent the regression coefficients of x_1 , x_2 , and x_3 , respectively.

Before fitting and verification, the overall satisfaction and benefit cognitions need to be normalized (Equation 2), and the range of values should be compressed to 0 – 1 to eliminate the analysis distortion caused by the different magnitudes of the variable values.

$$x_i = (x_{i0} - x_{imin}) / (x_{imax} - x_{imin}) \quad (2)$$

In the formula: x_{i0} is the original value of each variable; x_{imax} is the maximum value of each variable, which is 11 for overall satisfaction and 5 for the benefits of the three dimensions; x_{imin} is the minimum value of each variable, which is 1.

2.4 Data reliability verification

Reliability analysis of the 17 benefit dimensions assumptions revealed that the data reliability was high and could be used for further processing (Table 4). Through validity analysis (confirmatory factor analysis, CFA), it was found that the dimensions had good discriminant validity, but items E4 and E13 needed to be removed (Table 5). After removal, the data were re-validated. The standard loading coefficients were greater than 0.7, the P -value indicated significance, and the MI index values were all less than 10. The total of 15 multiple benefit assumptions constructed across the three dimensions met the statistical data quality requirements and could be further analyzed.

3 Empirical findings

3.1 Public perception and satisfaction with the multiple benefits of the adaptive reuse of the Ruyuan Section of Xijing Historical Trail

(1) Overall satisfaction was high, with Promoters be-

ing the majority of evaluators

The survey on the public's overall satisfaction with the adaptive reuse of the Ruyuan Section of Xijing Historical Trail showed an average score of 8.43 and an NPS of 40.18%. The respondents were generally satisfied, with the majority being Promoters (Figure 4).

Table 4 Data reliability analysis

Benefit dimension		Dimension sub-items	Cronbach's α if item deleted	Cronbach's α coefficient
x ₁	Cultural inheritance	E1	0.909	0.923
		E2	0.908	
		E3	0.909	
		E4	0.909	
		E5	0.909	
		E6	0.907	
x ₂	Site usage	E7	0.945	0.949
		E8	0.942	
		E9	0.937	
		E10	0.940	
		E11	0.939	
		E12	0.940	
		E13	0.944	
x ₃	Economic promotion	E14	0.896	0.907
		E15	0.872	
		E16	0.871	
		E17	0.88	

Table 5 Data validity analysis

Dimension sub-items	Factor loading coefficient analysis	MI index analysis		
	Standard load factor	Cultural inheritance	Site usage	Economic promotion
E1	0.814**	—	1.986	2.43
E2	0.806**	—	9.811	0.869
E3	0.814**	—	3.039	3.11
E4	0.819**	—	2.286	2.258
E5	0.824**	—	13.58	0.245
E6	0.822**	—	0.76	4.611
E7	0.795**	2.167	—	1.257
E8	0.818**	0.002	—	0.189
E9	0.890**	0.72	—	0.044
E10	0.880**	8.89	—	5.126
E11	0.893**	0.379	—	0.569

(Continued)

Dimension sub-items	Factor loading coefficient analysis	MI index analysis		
	Standard load factor	Cultural inheritance	Site usage	Economic promotion
E12	0.884**	0.497	—	0.114
E13	0.818**	10.921	—	9.279
E14	0.757**	0.377	0.134	—
E15	0.817**	0.502	0.177	—
E16	0.903**	0.014	0.258	—
E17	0.888**	1.348	0.188	—

** $p < 0.01$. Note: The MI index test for items E4 and E13 yielded values greater than 10, so they were removed.

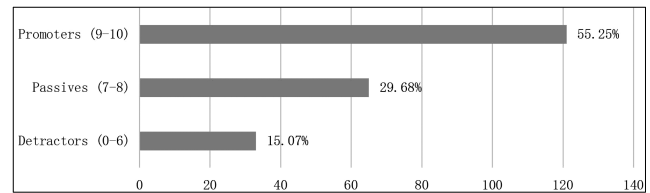


Figure 4 Distribution of overall satisfaction evaluation types

(2) The public rated the benefits of cultural inheritance the highest and the benefits of economic promotion the lowest

A detailed evaluation across three dimensions revealed that the public tends to approve of the multiple benefits of the adaptive reuse of the Ruyuan Section of Xijing Historical Trail, and their expectations for it are optimistic. The cultural inheritance dimension received the highest score, followed by site usage, while economic promotion received the lowest (Table 6). Regarding the economic benefits, it was found that the impact was not significant in terms of either overall industrial development or personal income increase. In particular, respondents held a neutral attitude toward the increase in personal income. In terms of site usage benefits, the evaluation of the site maintenance status and the arrangement of activities along the route was obviously lower than the mean value.

3.2 Linear regression analysis of multiple benefit perceptions and satisfaction

(1) The public multiple benefit perception and overall satisfaction scores are significantly correlated

After normalizing the data on overall satisfaction and multiple benefit perceptions, correlation analysis was per-

formed using SPSS software. The results showed a significant positive correlation among the four variables. That is, the higher the perception of a certain benefit dimension,

the higher the perception of the other dimensions, and the higher the benefit perceptions, the higher the overall satisfaction rating, and vice versa (Table 7).

Table 6 Evaluation of the multiple benefits of adaptive reuse of the Ruyuan Section of Xijing Historical Trail

Benefit dimension		Sub-items of each benefit dimension		Perceived mean of	
				Sub-item score	Dimensional scores
x ₁	Cultural inheritance	E1	Conducive to cultural preservation and development	4.35	4.26
		E2	Enabling the public to understand local culture better	4.26	
		E3	Making the public proud of their local area	4.31	
		E5	Making the public proactively visit here for activities again	4.24	
		E6	Making the public recommend others to visit here for activities	4.15	
x ₂	Site usage	E7	The current state of construction making the public satisfied	4.09	4.11
		E8	The current state of maintenance making the public satisfied	4.01	
		E9	The activity arrangements along the route making the public satisfied	4.02	
		E10	The natural scenery viewed along the route making the public satisfied	4.15	
		E11	The cultural landscapes viewed along the route making the public satisfied	4.17	
		E12	The historical and cultural knowledge gained along the route making the public satisfied	4.21	
x ₃	Economic promotion	E14	Bringing new job opportunities to the local area	3.86	3.93
		E15	Increasing local residents' income	3.87	
		E16	Attracting more investment to the local area	3.99	
		E17	Promoting local industrial development	4.01	

Table 7 Correlation analysis of multiple benefit perceptions and overall satisfaction evaluation

	Overall satisfaction evaluation	Economic promotion benefit perception	Site usage benefit perception	Cultural inheritance benefit perception
Overall satisfaction evaluation	1	—	—	—
Economic promotion benefit perception	0.359**	1	—	—
Site usage benefit perception	0.506**	0.481**	1	—
Cultural inheritance benefit perception	0.421**	0.628**	0.678**	1

** p < 0.01

(2) The regression equation holds true, but only the perception of the location usage dimension significantly affects the overall satisfaction score

Further linear regression analysis revealed that the regression equation for multiple benefit perceptions and overall satisfaction was explanatory, with an R-squared of 0.276. The model did not exhibit multicollinearity, meaning that the public perceptions of cultural inheritance benefits, site usage benefits, and economic promotion benefits could explain the 27.6% change in the public's overall satisfaction with the adaptive reuse of the South China Historical Trails. As an explanatory model, it showed a good fit (Table 8). Among them, the public perception of

the benefits of site usage significantly affects overall satisfaction, while the perception of cultural inheritance benefits and economic promotion benefits has less obvious impacts. All three scores are positively correlated with overall satisfaction.

3.3 Survey results

(1) A total of 219 valid questionnaires were collected from the public along the Ruyuan Section of Xijing Historical Trail. The demographic composition was relatively even and met the requirements of the survey subjects. After the data quality inspection, sub-items E4 and E13 were removed. The reliability and validity were good, and the

data quality met the standards. This indicates that the public's multiple benefit perception of the adaptive reuse of the South China Historical Trails can be measured by establishing evaluation criteria from three aspects: Cultural

inheritance, site usage, and economic promotion. These 15 measurement indicators can reflect the public perception of the adaptive reuse benefits in the above three dimensions to a certain extent.

Table 8 Linear regression fitting results

Model	Unstandardized coefficient		Standardized coefficient	t	Significance	VIF
	B	Standard error	Beta			
Constant	0.366	0.059	—	6.237	0.000**	—
Cultural inheritance benefit perception (x ₁)	0.091	0.106	0.077	0.863	0.389	2.369
Site usage benefit perception (x ₂)	0.413	0.083	0.396	4.991	0.000**	1.866
Economic promotion benefit perception (x ₃)	0.117	0.073	0.121	1.608	0.109	1.668
R ²	0.276					
F	27.322**					
D-W value	1.973					
Dependent variable (y): overall satisfaction evaluation (Model fitting formula: y = 0.366 + 0.091x ₁ + 0.413x ₂ + 0.117x ₃)						

** $p < 0.01$

(2) The survey results show that the public has a high overall satisfaction with the South China Historical Trails, represented by the Ruyuan Section of Xijing Historical Trail, and the respondents are mainly Promoters. In specific multiple benefit perception measurements, the overall public evaluation was relatively positive. However, the perception of economic benefits was weak, especially regarding the increase in personal income, where respondents tended to be neutral ("neither agreeing nor disagreeing"). In terms of site usage benefits, the perceived evaluation of the current state of site maintenance and the arrangement of activities along the route is low, which means that the level of understanding and satisfaction regarding the spatial quality and activity planning of the historical trail is also low.

(3) Correlation analysis revealed that the public perception of the benefits of cultural inheritance, site usage, and economic promotion is significantly positively correlated with their overall satisfaction with the adaptive reuse of the South China Historical Trails. That is, the higher the public scores on the three aspects, the higher their overall satisfaction with the South China Historical Trails, and vice versa.

(4) Through multiple linear regression fitting verifi-

cation, the multiple linear regression equation of the multiple benefit perception factors affecting the satisfaction regarding the adaptive reuse of the South China Historical Trails was obtained. Based on the aforementioned survey results, although for the general public, the mean values of the perceived benefit evaluation ranked from highest to lowest as follows: Cultural inheritance, site usage, and economic promotion. In terms of the relationship between individual satisfaction and multiple benefit perception, the individual's perception of the benefits of site usage currently has the greatest impact on their satisfaction.

4 Conclusions and discussion

As a linear heritage corridor and cultural route carrying special historical and cultural value, the South China Historical Trails have historical and cultural value as their core characteristic that distinguishes them from other types of leisure trails. An empirical survey of the Ruyuan Section of Xijing Historical Trail showed that, among the three dimensions of cultural inheritance, site usage, and economic promotion, respondents had the highest perception of cultural inheritance and the lowest perception of economic promotion. Statistical analysis further shows that, compared with cultural inheritance and economic promotion, site usage contributes the most to improving satisfac-

tion. That is, improving the quality of the site and the user experience will effectively enhance the public satisfaction with the adaptive reuse of the South China Historical Trails. To address this issue, we should fully integrate the historical preservation, cultural education, and leisure and recreation functions of historical trails, enhance the comfort and interest of the user experience, and explore effective ways to promote economic development in areas with suitable conditions and potential. It must be pointed out that the adaptive reuse of cultural routes is not something that can be accomplished overnight, but rather a long-term undertaking that requires comprehensive, multi-faceted, and sustained investment from various stakeholders. From this perspective, the adaptive reuse of the Ruyuan Section of Xijing Historical Trail and even the South China Historical Trails are still in the early exploratory stage, and the full realization of their cultural, economic, and social benefits requires a longer period of time to verify. In addition, the empirical evidence from the Ruyuan Section of Xijing Historical Trail further demonstrates the need for differentiated improvement of the local and universal characteristics of the South China Historical Trails.

4.1 Problems and optimization suggestions for the Ruyuan Section of Xijing Historical Trail

The Ruyuan Section of Xijing Historical Trail is highly representative among the South China Historical Trails, mainly due to its comprehensive planning and construction, rich historical and cultural resources, excellent historical relics, an active series of themed activities, and proactive government action. However, its adaptive reuse work still faces urgent pressure, mainly manifested in some design and operational issues that still need to be resolved. For example, some sections of the route are of low quality, with unclear signage and unknown routes; the use of the route for historical and cultural education relies too much on irregular activities and lacks regular operation; and the relatively low level of local economic development leads to high maintenance and management costs, and the investment in activity planning relies on special government funds while social participation is limited.

These objective conditions directly affect its future sustainable development. Interviews with community management departments, residents, and hotel management in Daqiao Town revealed that, despite being an advanced area in the construction of the historical trail, it has not yet generated a large-scale tourism economy, and its interaction with surrounding hot spring resort hotels needs to be strengthened. In response to the above problems, this study proposes three specific suggestions.

First, we should strengthen the status maintenance, adopt a light-asset investment strategy, and continuously optimize the historical trail network. Considering the local financial situation and the objective condition that Xijing Historical Trail is long and extends deep into the mountains, we should attach importance to its current state maintenance and conservation, and adopt a strategy of light asset investment, refined management, and micro-renovation to promote its sustainable development of adaptive reuse. For example, by reviewing the current construction status, we can conduct detailed designs for key nodes, optimize the existing network of the historical trail, enhance the continuity of the route, improve the signage system, and propose feasible low-cost maintenance solutions. On the other hand, it is necessary to fully integrate existing financial, material, and human resources. For example, we should vigorously integrate special funds such as rural living environment improvement funds, subsidies for traditional rural building renovation projects, and subsidies for ethnic minority infrastructure construction, and promote the integration of the historical trail network with the environmental improvement of towns and villages along the route; and widely attract and accept technical support from professional volunteer activities, targeted poverty alleviation work, etc.

Second, we should deepen historical exploration, closely integrate it with Yao culture, and showcase local traditional characteristics. Ruyuan is a Yao Autonomous County. The adaptive reuse of the South China Historical Trails must fully explore the historical value of the historical trail resources in the development of ethnic and local

culture, and further integrate them with local customs, culture, and history in the process of further construction, maintenance, and operation. For example, conducting in-depth historical research along the route, exploring local characteristic historical activities, folk customs and stories, folk specialties and skills, etc., so that the construction content and activity themes of the South China Historical Trails can be deeply connected with the history of surrounding ancient villages, the Yao ethnic folk culture along the route, and resources such as red culture. Tourism projects can be developed or promoted with historical stories, figures, and historical concepts as the center, and art projects that connect historical heritage with contemporary culture can be encouraged. Take the famous European cultural route “Destination Napoleon” as an example. This route spans 10 countries and 50 cities. Although people have different opinions about Napoleon along the way, his personal deeds and local history are still undeniably deeply connected. To this end, the route has developed an experiential project by revitalizing and interpreting Napoleon’s deeds, using it as a historical landmark of the route, thus deeply exploring the historical and cultural value of the route itself.

Third, we should strengthen industrial planning, promote diversified participation, and improve related industrial chains. To further leverage the adaptive reuse of the Ruyuan Section of Xijing Historical Trail to drive rural revitalization and industrial development along the route, we should not limit ourselves to developing tourism projects based on the historical trail itself or a few cultural relic sites along the route. Instead, we should take into account all factors, including the ancient road itself, cultural relics sites along the route, surrounding ancient villages, agricultural resources, nature reserves, and national forest park resources, and make a full industrial plan to give full play to the advantages of integrating multiple resources. We should further strengthen cooperation between the government and enterprises, especially with local small and medium-sized enterprises, to promote local products while optimizing and improving the quality of the historical trail

space. For example, Ruyuan County is rich in agricultural resources and has agricultural products that are recognized as part of the national-level rice-fish integrated farming demonstration zone. It can further improve agricultural experience-themed activities by combining them with historical trail study tours, adding content on agricultural production experience, agricultural knowledge education, certification, and sales of specialty agricultural products, and extending the industrial chain. Take the famous European cultural route “Via Francigena” as an example. This route spans four countries: the United Kingdom, France, Switzerland, and Italy. One section, the “Pilgrim’s Belt”, traces the connection between pilgrimage history and local traditional foods, and discovers that the area produces a large number of “pilgrim foods” that have a long shelf life, are easy to carry, and are suitable for long-distance travel. The management of the route conducts pilgrim food certification, connects local food production workshops, and makes them the industry’s calling card for this section.

4.2 Implications for the adaptive reuse of the South China Historical Trails

Combined with the concurrent surveys on the adaptive reuse of the South China Historical Trails in Huizhou, Shanwei, Zhuhai, Zhongshan, and other places, it was found that the survey results of this study can also inspire the actual work of various cities, and provide a reference for improving the quality of space, highlighting social construction, showcasing historical culture, and strengthening event planning in the overall work.

First, we should develop activity-oriented design and optimize space quality by orienting to different activity preferences. The survey found that users of the historical trail routes include not only residents of surrounding urban and rural communities, but also tourists and outdoor sports enthusiasts, and their needs are not the same. Therefore, it is necessary to fully respect the safety, accessibility, and comfort needs of residents in their daily lives, as well as the requirements of visitors for activities that are fun, challenging, and continuous. How to integrate the differentiated needs of ordinary residents, tourists, and outdoor

sports enthusiasts should be an important consideration in formulating strategies for improving spatial quality, and should also be the basis for decision-making in the planning of route themes.

Second, a low-cost, easy-to-maintain, and inclusive strategy oriented towards sustainable and normalized governance should be implemented. As linear landscapes, historical trails, like greenways and blueways, are characterized by their wide spatial distribution, significant differences in spatial location and accessibility, and complex built and natural environmental elements along their routes. In this regard, we should fully draw on the experience of greenway construction in Guangdong, and conduct detailed design and construction in accordance with local conditions and the frequency and preferences of the main activities, avoiding excessive standardization, artificial construction, and especially emphasizing the low cost, ease of maintenance, inclusiveness and expansion potential of the construction and maintenance of historical trails, so that the feasibility and sustainability of maintenance and management become the key determining factors in planning, design and implementation.

Third, we should explore historical connotations, highlight cultural inheritance, and ensure sustained investment in basic research. Upholding the historical and cultural significance of the South China Historical Trails, we will showcase historical stories and local characteristics through more experiential and immersive innovative methods, thereby enhancing the effectiveness of cultural inheritance. It is recommended that, on the one hand, we should further strengthen the construction and research of the basic theoretical system of the South China Historical Trails, enhance local archaeological capacity building and knowledge of historical and cultural heritage protection, and conduct thorough excavation, collation and interpretation of archaeological results through in-depth work such as excavation of historical artifacts, collection and sorting of documents, and verification of historical events. On the other hand, we should further strengthen the presentation of historical points of interest, enhance the reproduction of

the historical connotation of southern Guangdong as an indispensable node connecting national, ethnic, and cultural identity, and conduct systematic research on the role and value of the South China Historical Trails as a means of connecting the Central Plains, linking southern Guangdong, and reaching the world.

Fourth, we will further strengthen the responsibilities and roles of government cultural and tourism departments in the adaptive reuse of historical trails. Compared to the housing and construction departments, whose main responsibility is construction, the cultural and tourism departments have a longer-term institutional foundation, richer social resources, and more professional technical reserves in the adaptive reuse of cultural heritage, and should become the key promoters of the adaptive reuse of the South China Historical Trails. Based on a comparison of the implementation and management of existing surveys in various regions, the cultural and tourism departments represented by Luofu Mountain Scenic Area are relatively well-developed in terms of cultural and historical resource excavation, project construction and management, signage system design, route maintenance and management, theme activity planning, financial fundraising, and long-term development planning. This is quite different from routes that rely on townships, streets, and housing and construction or natural resources departments for management. Of course, it must be pointed out that the adaptive reuse model that relies solely on government special funds and human resources has serious sustainable development problems. In the long run, the participation of social capital and the cultivation of local knowledge will always be the key driving force for the adaptive reuse of the South China Historical Trails.

Finally, since this paper is based on a questionnaire survey of a small group of people in a specific region, it has certain limitations in reflecting the overall construction of the adaptive reuse of the South China Historical Trails. Moreover, the overall work on the South China Historical Trails has only been carried out for about 5 years. It should be recognized that the multiple benefits

generated are phased and long-term, as well as the impact of other potential factors on public perception. Therefore, the adaptive reuse and improvement of the South China Historical Trails still need to be carried out in a longer and more continuous manner through operation, monitoring, and research.

Sources of Figures and Tables

Figures 1 and 4: Drawn by the author;

Figures 2 and 3: Photographed by the author;

Table 1: Compiled by the author based on the Overall Plan for the Protection and Utilization of the South China Historical Trails in Guangdong Province (Guangdong Construction Regulation [2017] No. 233);

Tables 2-8: Created by the author.

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