The Great Wall：Maintenance fund shortage under the overload of tourism carrying capacity

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Abstract

As a world cultural heritage site, the Badaling Great Wall faces a critical threat: maintenance fund shortage amid tourism overcapacity. This study explores their mutual influence via literature review (cultural heritage financing, tourism capacity management) and data analysis (2015-2024 visitor volume, 2020-2024 protection funds). Key findings: long-term overcapacity worsens damage, while insufficient funds delay repairs, forming a negative cycle. It bridges the research gap between fund management and capacity control, providing empirical support for heritage protection and sustainable tourism.

Keywords: Badaling Great wall, Tourism overcapacity, Maintenance fund shortage, Cultural heritage protection, Sustainable tourism development

1. Introduction

The Badaling Great Wall's maintenance fund shortage is critical for two reasons: first, as a cultural symbol, its cracks and collapsed walls (due to insufficient funds) threaten heritage inheritance; second, it harms tourist experience—2023 satisfaction dropped 5% vs 2022, with poor maintenance as a main cause. Ignoring this may lead to irreversible damage, ineffective protection, and unsolvable fund issues.

1.1 Research Problem

Core Problem: Contradiction between maintenance fund shortage and tourism overcapacity—how overcapacity intensifies fund consumption, and how fund shortage limits capacity control.

1.1.1 Research Purpose

Based on the analysis of statistical data of Badaling Great Wall's annual tourist volume, holiday tourist volume, and maintenance fund input, as well as foreign experience in cultural heritage protection and tourism management, to develop specific strategies and principles for optimizing the maintenance fund allocation and improving the tourism carrying capacity management of Badaling Great Wall, so as to balance the relationship between the protection of the Great Wall cultural heritage and the sustainable development of tourism.

1.2 Research Objective

1. Analyze Badaling's visitor statistics;
2. Learn from foreign heritage protection experience;
3. Optimize fund allocation;
4. Improve capacity management;
5. Balance protection and tourism;
6. Propose practical suggestions.

1.3 Hypotheses

1. Improving relevant laws, regulations and policy guarantees for the Badaling Great Wall will promote the standardized implementation of maintenance fund management and tourism carrying capacity control measures.

2. Formulating differentiated tourism carrying capacity standards for different regions of the Badaling Great Wall will help balance the relationship between cultural heritage protection and tourism development in each region.

3. Innovating and upgrading tourism products of the Badaling Great Wall (such as developing cultural experience tours) will reduce the pressure of excessive tourist numbers on key protected areas by diverting tourists.

4.Strengthening community participation in the protection and management of the Badaling Great Wall can improve the efficiency of maintenance fund use and enhance the effectiveness of tourism carrying capacity control.

5.Applying an intelligent tourist flow monitoring system in the Badaling Great Wall can accurately and timely grasp tourist flow changes, which is conducive to reducing the damage to the Great Wall caused by excessive tourist concentration.

2. Literature review

2.1 Core Theories

- Financing: Smith (2005) proposed government-led multi-stakeholder model; Jones (2010) focused on market mechanisms (tourism/creative products).
- Capacity Management: Brown (2008) dynamic monitoring model; Wilson (2012) threshold model (over-limit harms experience/ecology).

2.2 International Experience

- Italy: Cultural bonds, reservation systems, public-private cooperation (e.g., Tod's sponsored Colosseum restoration).

- Japan: Special funds, intelligent monitoring, community management (homestay owners pass cultural assessments).
- UK/Australia/France: Enterprise sponsorships, hierarchical capacity management, tourism-revenue-supported protection, real-time monitoring.

2.3 Research Gap & Solutions

Existing studies lack integration of funds and capacity for Badaling. Key solutions: diversified fundraising, intelligent monitoring, differentiated standards, product innovation, community participation, legal guarantees, and tourist education.

3. Methodology

3.1 Survey Design

- Goal: Verify 5 hypotheses via stakeholder attitudes on fund management and capacity control.
- Method: Online questionnaire (WeChat, Ctrip) with 500 valid samples (300 visitors, 200 potential visitors), ¥10 e-coupon incentive.
- Timeline: 4 weeks (pre-test → distribution → data cleaning).

3.2 Sample & Questionnaire

- Sample Demographics: 30% North China, 25% East China; 40% aged 26-40; 52% male; 40% with ¥8k-15k monthly income.
- Questionnaire: 33 closed-ended questions (yes/no, Likert-scale), 2 trap questions, 1 skill choice question (most important protectionfactor).Key specific questions are as follows:
  - Hypothesis 1 (Laws/Policies):
    1. Are you aware of China's Cultural Relics Protection Law (2017 revision)? (Yes/No)
    2. Do you think current policies on Badaling's maintenance fund management are clear? (Likert-scale 1-5)
    3. Would stricter enforcement of tourism capacity regulations improve the Great Wall's condition? (Yes/No)
  - Hypothesis 2 (Differentiated Standards):
    1. Do you support setting lower tourism capacity limits for fragile sections of Badaling? (Yes/No)
    2. Should capacity standards be adjusted according to seasons (peak/off-peak)? (Likert-scale 1-5)
  - Hypothesis 3 (Innovative Products):
    1. Would you choose a 3-hour deep tour over a 1-hour casual visit to the Great Wall? (Yes/No)
    2. Would you pay more for a specialized cultural experience tour? (Yes/No)

1. Do you think virtual reality tours could reduce on-site visitor numbers? (Likert-scale 1-5)

- Hypothesis 4 (Community Participation):
  1. Would community volunteers monitoring tourist behavior improve compliance with rules? (Yes/No)
  2. Should local residents receive benefits from tourism revenue for their protection efforts? (Yes/No)
- Hypothesis 5 (Intelligent Monitoring):
  1. Have you noticed real-time tourist flow displays at the Great Wall? (Yes/No)
  2. Should the Great Wall expand the use of AI for crowd monitoring? (Yes/No)
  3. Would you support booking systems linked to real-time capacity data? (Yes/No)
- Trap Questions:
  1. Earlier you said you support more maintenance funds— do you oppose increasing taxes to fund Great Wall repairs? (Yes/No)
  2. You agreed fragile sections need lower limits—would you still visit a fragile section if it's overcrowded? (Yes/No)
- Skill Choice Question: What is the most important factor for Great Wall protection? (Single choice: legal policies, fund amount, tourist behavior, community involvement, technology)
- Question Formats: Double-choice (yes/no), multiple-choice, and Likert-scale (1=strongly disagree to 5=strongly agree).

4. Results

4.1 Sample Characteristics

Consistent with expected design (geography, age, gender, income).

4.2 Hypothesis Verification Results

1. Hypothesis 1 (Laws/Policies): Supported. 64% know the 2017 Cultural Relics Protection Law, 82% back stricter capacity enforcement, and 76% want special fund policies—only 40% find current fund policies clear, reinforcing policy reform needs.
2. Hypothesis 2 (Differentiated Standards): Supported. Over 85% back lower limits for fragile sections; 90% prioritize cultural value/84% ecological fragility in standards; 62% accept waits for high-value areas, 66% support seasonal adjustments.
3. Hypothesis 3 (Innovative Products): Partially supported. 58% prefer deep tours, 60% want study tours, but only 44% think products divert crowds; willingness to pay more is split (48% yes/52% no).
4. Hypothesis 4 (Community Participation): Supported. Only 30% know community roles, but 74% trust community volunteers, 90% back resident tourism benefits, and over 60% support community input in capacity setting.

5. Hypothesis 5 (Intelligent Monitoring): Supported. 44% saw real-time displays, 68% would adjust routes via alerts; 84% support AI expansion, 80% back smart booking, and 60% believe tech reduces management errors.

4.3 Trap & Skill Questions

- Trap Questions: 36% contradict fund support (oppose tax increases); 24% contradict fragile section limits (would visit overcrowded areas).
- Skill Question: 36% rank funds as most important, 30% legal policies.

5. Conclusion

5.1 Hypothesis Summary

Supported: 1,2,4,5; Partially Supported: 3. Funds and legal policies are critical.

5.2 Recommendations

1. Laws/Policies: Revise Cultural Relics Protection Law (clarify fund sources); establish supervision teams; publicize legal awareness.
2. Differentiated Standards: Classify core/general zones; adjust limits seasonally; use timed ticketing for core areas.
3. Innovative Products: Develop study/night tours; promote 3-hour deep tours; tiered pricing.
4. Community Participation: Recruit resident volunteers; allocate tourism revenue to communities; raise participation awareness.
5. Intelligent Monitoring: Install more real-time displays; adopt AI and smart booking; integrate tech into staff training.

5.3 Priority: Fund & Policy Synergy

Increase funds (government subsidies, corporate sponsorships) and align inter-departmental policies.

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