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Sustainable carrying research of tourism environment in nandaihe international amusement center tourism area based the perspective of management innovation

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ABSTRACT

Tourism environment problem increases prominent and overload is becoming more and more serious. This paper analyses the problems of city tourism environment sustainable carrying capacity to provide competitive advantage and sustainable source of competition. When related to tourism sustainability, the coupling relationship of tourism environment carrying capacity and tourist number of destinations or tourist areas must also be considered form the perspective of management innovation. This paper provides a new perspective for tourism enterprises through the analysis of Nandaihe International Amusement Center tourist area. It aims to provide a new perspective for the carrying capacity of the tourism environment, promotes tourism environment from the "latent capacity" to "carrying strength" transformation to achieve transformation from sustainable carrying to carrying sustainability of tourism destinations.

KEYWORDS

Management innovation; Tourism environment carrying capacity; Nandaihe international amusement center tourism area.



INTRODUCTION

Nandaihe Tourism Area is located in the north-eastern Hebei province, China. It was assigned the title of “4-A Scenic Area” and is distributed in six scenic zones: Happy World Zone, Huaihua Lake Zone, Sea and Sand Zone, Gloden Gragon Mount Zone and Zhonghua Heyuan Zone and Grand Theatre (Figure 1). The tourist number (TN) is increasing (Figure 2). Its business periods are from April to October. Fluctuation of tourism environment carrying capacity (TECC) and tourists are combination with city-planning growth. The area has benefited from rational spatial planning, the opening of Happy World Zone(1996), Sea and Sand Zone(1996), Gloden Gragon Mount Zone(1998), Zhonghua Heyuan Zone(2002) and Huaihua Lake Zone(2008) and Grand Theatre(2011) in turn. With the dynamic monitoring, the values of TECC and tourist number have been fluctuating from (1996) to (2013).

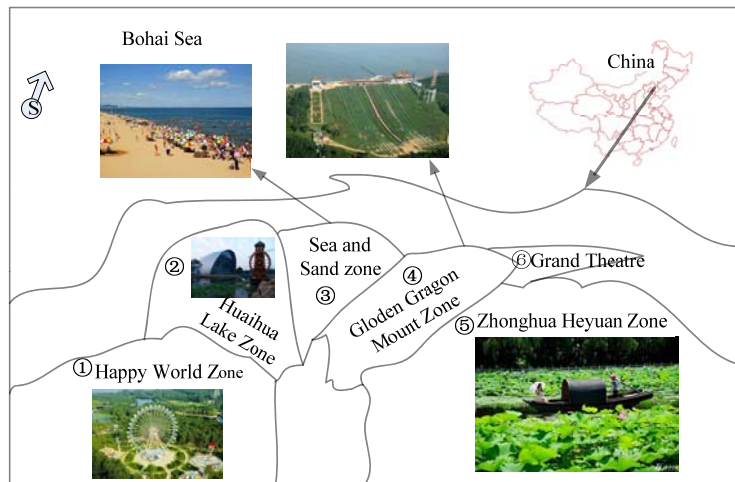


Figure 1 : Location of the tourism area

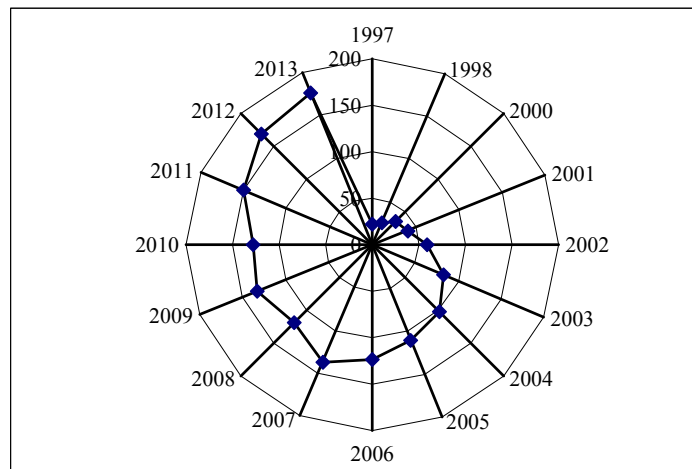


Figure 2 : Fluctuating of tourists of tourism area

FORMATION MAP OF NANDAIHE TOURISM AREA

The ability of sustainable development is a kind of latent capacity. Nandaihe Tourism Area has been guided by the concept of sustainable development to create sustainable development ability. The management innovation ability is implicit explicit, contributed to the process of knowledge innovation group spiral and enhance the competitiveness of the “positive energy”. In order to prevent a single topic or theme scenic spots “Meteor Phenomenon”, the southern brigade group to integrate the three major scenic resources, to create the associated theme, by means of multi-topic linkage, achieving competitive advantage transformation and transition and developing “sustained competitive path”. It means “Step Type” steady development (Figure 3).

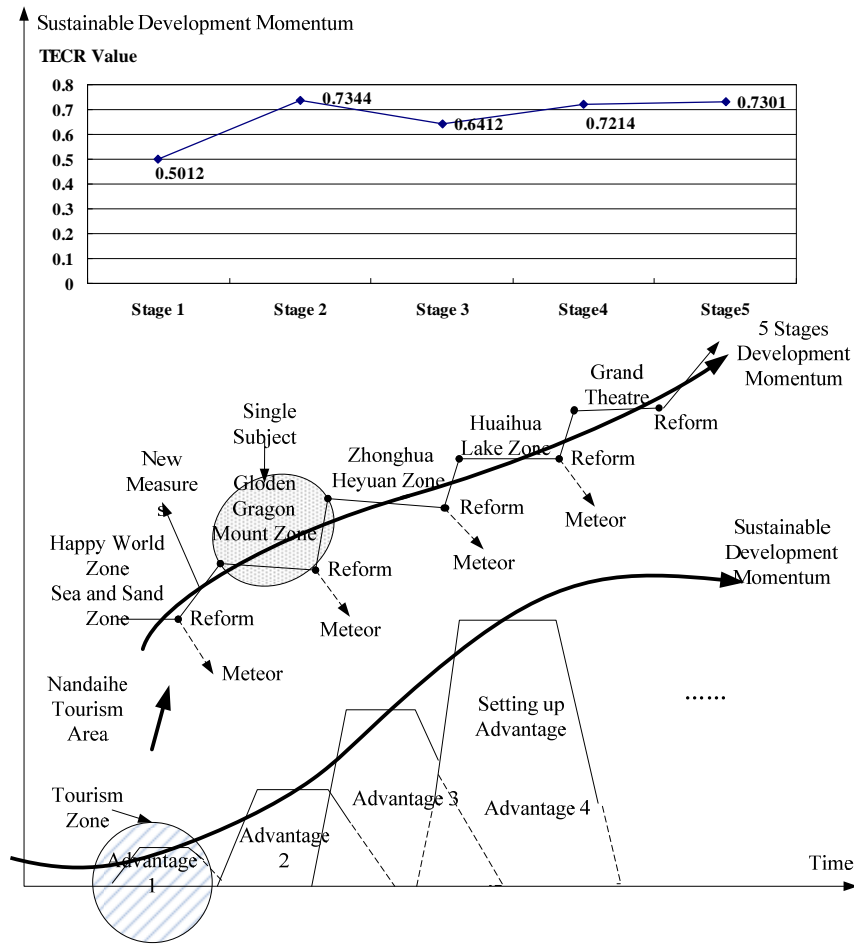


Figure 3 : Formation map of TECC in nandaihe international amusement center tourism area

CALCULATIONS THE CARRYING CAPACITY

Index system of carrying capacity

Due to the complexity of the tourism environment system, the experts of domestic and foreign do not form a single authoritative definition to the TECC. Firstly, based on system analysis and reasonable comprehensive of the selected factors, this paper uses method of experts to investigate and select indicators and get important limiting factors of the TECC. Secondly, this paper combines the indicators with the opinions of experts, visits and monitors. Finally, removes some relatively small impact factors in traditional TECC indicator, and complements the index appropriately, respectively include the natural environment carrying capacity (F_1), economic environment carrying capacity (F_2) and social environment carrying capacity (F_3), where x_1, x_2, \dots, x_{13} is corresponding base indicators (TABLE 1).

TABLE 1 : Indicators of the TECC

F	F ₁ : natural environment carrying capacity	x ₁ : ecological environment carrying capacity	
		x ₂ : tourism resources space carrying capacity	
	F ₂ : economic environment carrying capacity	F ₂₁ : Infrastructure carrying capacity	x ₃ : water supply and drainage facilities carrying capacity
			x ₄ : power supply facilities carrying capacity
			x ₅ : communication facilities carrying capacity
			x ₆ : transport infrastructure carrying capacity
			x ₇ : accommodation carrying capacity
			x ₈ : dining facilities carrying capacity
			x ₉ : recreational facilities carrying capacity
			x ₁₀ : shopping facilities carrying capacity
F ₃ : social environment carrying capacity	x ₁₁ : carrying capacity of the management level of scenic spots managers		
	x ₁₂ : capacity of local residents mental endurance situation		
	x ₁₃ : tourism aesthetic perception carrying capacity		

Quantitative evaluation method

These indicators are not simultaneously considered in AHP, so these will affect the correctness of the evaluation results. This paper puts forward to the analysis of dynamic improving hierarchical process (DIAHP), adding to the conception of changing weight based on the relative importance scale. Due to seasonal characteristic of tourism destination, hypothesis three the state: off-season (K_1), shoulder-season (K_2), busy-season (K_3), calculates the weight W_i in state K_i . According to the “important”, “equally important” and “not important”, “2”, “1” and “0” three numerical scale quantitative representation (TABLE 2), matrix C so that the nominal “three scale” matrix, shown (1).

TABLE 2 : Numerical value table of important extent

C_{ij}	Significance
2	The i element is more important than the j elements
1	The i element and the j element are equally important
0	The j element is more important than the i elements

$$C = \begin{bmatrix} c_{11} & c_{12} & \dots & c_{1n} \\ c_{21} & c_{22} & \dots & c_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ c_{n1} & c_{n2} & \dots & c_{nn} \end{bmatrix} = (c_{ij})_{n \times n} \tag{1}$$

$$r_i = \sum_{j=1}^n c_{ij} \quad (i=1, 2, \dots, n) \tag{1}; \quad r_{\max} = \max\{r_i\} \tag{2}; \quad r_{\min} = \min\{r_i\} \tag{3}$$

$$b_{ij} = \begin{cases} \frac{r_i - r_j}{r_{\max} - r_{\min}} (b_m - 1) + 1, & r_i > r_j \\ 1, & r_{\max} = r_{\min} \\ \left[\frac{r_j - r_i}{r_{\max} - r_{\min}} (b_m - 1) + 1 \right]^{-1}, & r_i < r_j \end{cases} \tag{4};$$

$$B = \begin{bmatrix} b_{11} & b_{12} & \dots & b_{1n} \\ b_{21} & b_{22} & \dots & b_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ b_{n1} & b_{n2} & \dots & b_{nn} \end{bmatrix} \tag{5}$$

Using “three scale” matrix C and calculation of each factor of importance index r_i , finds out r_{\max} and r_{\min} , shown (2)-(3). Using b_m express the degree of importance of A_{\max} and A_{\min} , corresponding to the index is given according to some scale, can be based on the type (4) to calculate the relative importance between elements, namely the judgment matrix b_{ij} ($i=j, b_{ii}=1$). Finally, uses ordinary AHP judgment matrix B hierarchy analysis features. This paper analyses the matrix C and takes C into a common analytic hierarchy judgment matrix B hierarchy analysis features, shown (5). The basic principle of ordinary level reference American strategist T.L.Saaty in 20 Century 70 in the proposed analysis method, to calculate the maximum eigenvalue and eigenvector. The normalized vectors are gained by calculating the hierarchy and consistency checking (shown TABLE 3, TABLE 4). The value from 11756 (per-day in off-season or shoulder-season) or 17568 (per-day in peak-season) in 2005 to 18036 or 24114 in 2013 (April to October of every year) (TABLE 5). This expansive growth of the tourism area has been the main factor causing the change of carrying capacity.

TABLE 3 : Weight of Z_2 - Z_{2j} level in tourism peak season

	C_{21}	C_{22}	C_{23}	C_{24}		b_{21}	b_{22}	b_{23}	B_{24}	W	
C_{21}	1	0	0	2	$b_m=4$	b_{21}	1	1/2	1/3	2	0.160
C_{22}	2	1	0	2		b_{22}	2	1	1/2	3	0.278
C_{23}	2	2	1	2		b_{23}	3	2	1	4	0.467
C_{24}	0	0	0	1		b_{24}	1/2	1/3	1/4	1	0.095

TABLE 4 : Weight of Z_2 - Z_{2j} level in tourism common and low season

	C_{21}	C_{22}	C_{23}	C_{24}		b_{21}	b_{22}	b_{23}	b_{24}	W	
C_{21}	1	0	0	2		b_{21}	1	1/3	1/5	3	0.117
C_{22}	2	1	0	2	$b_m=7$	b_{22}	3	1	1/3	5	0.264
C_{23}	2	2	1	2		b_{23}	5	3	1	7	0.564
C_{24}	0	0	0	1		b_{24}	1/3	1/5	1/7	1	0.055

TABLE 5 : Synthesis account of TECC

Z_{ij}	Carrying Capacity in Busy Season			Carrying Capacity in off-season and shoulder season		
	Value I_i	W_i	$W_i \times I_i$	Value I_i	W_i	$W_i \times I_i$
Z_{11}	18 600	0.106	1 971.60	9 300	0.074	688.20
Z_{12}	20 024	0.213	4 265.11	15 417	0.147	2 266.30
Z_{21}	11 278	0.035	394.73	15 000	0.037	555.00
Z_{22}	19 600	0.061	1 195.60	10 973	0.084	921.73
Z_{23}	20 220	0.103	2 082.66	8 816	0.180	1 586.88
Z_{24}	17 500	0.022	3 85.00	10 000	0.018	180.00
Z_{31}	23 200	0.115	2 668.00	15 700	0.153	2 402.10
Z_{32}	13 349	0.345	4 605.41	10 278	0.307	3 155.35
Total		17568 p/d			11756 p/d	

Tourism environment carrying rate (TECR) can reflects the using level of TECC. For every indicator x_i and taking into account the reference points given by the decision makers, the following individual and synthetic functions of tourism sustainable carrying are considered, shown (6). For TECR can denote the degree level $Y_i^{[1]}$, shown in TABLE 6. Graded levels of sustainability are divided into five sectors of some points each, total 10 points of the value $[0, +\infty]$.

$$TECR_k = \frac{TN_k}{TECC_k} \tag{6}$$

TABLE 6 : Graded levels of sustainable carrying in this study

Alarm Level	<i>bad</i>	<i>poor</i>	<i>medium</i>	<i>good</i>	<i>excellent</i>
(Y_i)	$[0, y_a)$	$[y_a, y_b)$	$[y_b, y_c)$	$[y_c, y_d)$	$[y_d, y_e)$
	$[y_k, +\infty)$	$[y_g, y_k)$	$[y_f, y_g)$	$[y_e, y_f)$	
Value	$[0, 0.27)$	$[0.27, 0.38)$	$[0.38, 0.46)$	$[0.46, 0.55)$	$[0.55, 0.72)$
	$[0.89, +\infty)$	$[0.80, 0.89)$	$[0.80, 0.85)$	$[0.72, 0.80)$	

Measures based on management innovation perspective

Management innovation gets rid of economic growth of the traditional view of interest, focuses tourism development and efficiency promotes tourism environment sustainable carrying to reach the environment related community collaborative governance, resolve the contradiction and conflict of the objective and share the fair-distribution of tourism resources. The study on management innovation of TESC is divided into five stages, including stimulus, changing, measures, implementing and theory^[2]. The “internal seed” to stimulate management innovation is the decision-making manager. “External seeds” are community, local residents, tourism enterprises, experts or consultants (Figure 4).

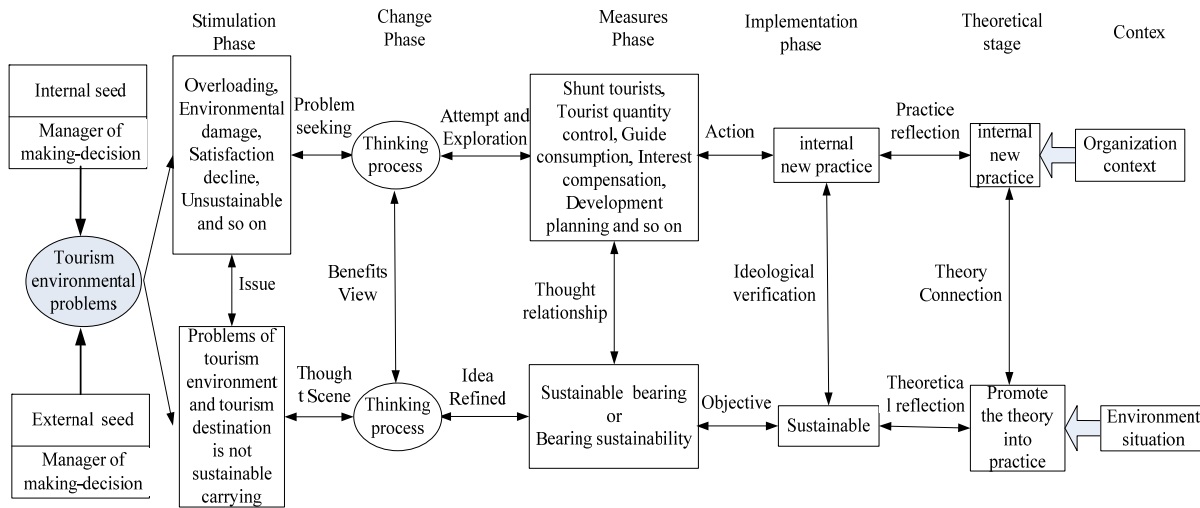


Figure 4 : Generation mechanism of management innovation about TESC

“Stimulus phase” emphasizes what propulsion elements or environmental factors leads to consider the management innovation, emphasizes the stimulation of tourism environment sustainable carrying premises management innovation and promotes factors. “Change stage” emphasizes external pressure to prompt the tourism environment response, dynamically change, and implement measures to verify the outstanding into management practice. “Implementation” refers to the organization in response by the attempt and the exploration stage to maturity in the course of experience activities, forms in the process technology of process management innovation value. Finally, the management innovation theory stabilizes through the “theoretical stage” of innovation.

Mode of management innovation

According to the tourist area cycle^[3], the concept of dynamic capability highlights the tourism destination should be continuously updated, integrate, reset and recycle resource capability to meet the need of internal and external situation through the rapid creation of new knowledge matching and internal and external situation to get tourism sustainable and sustain competitive advantage.

Government as “engine” in management innovation

Management innovation idea of Qinhuangdao government is the inevitable requirement of tourism industry sustainable development. The management innovation is a creative process, through the system construction of tourism destination related group behavior, improving the tourism activity participation enthusiasm, focusing on its utility satisfaction degree. Local government through the reasonable guide gradually forms in the main culture atmosphere, conducive to the formation of the tourism destination culture. Therefore, the government mechanism is the basis in the implementation of the tourism environment sustainable management innovation process (Figure 5).

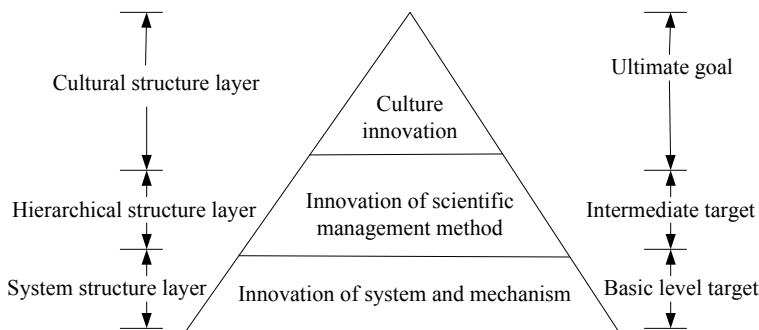


Figure 5 : Government’s engine model of management innovation

Internal seed as main body of management innovation

Internal seed is initiator, performer or valuator of management innovation to TESC. Internal seed summarizes the “stage” of action, according to internal and external situation, identifies environmental problems of tourism, try every way repeatedly to find solutions to problems to achieves the tourism environment from the “not sustainable, sustainable carrying, carrying sustainability (Figure 6)”.

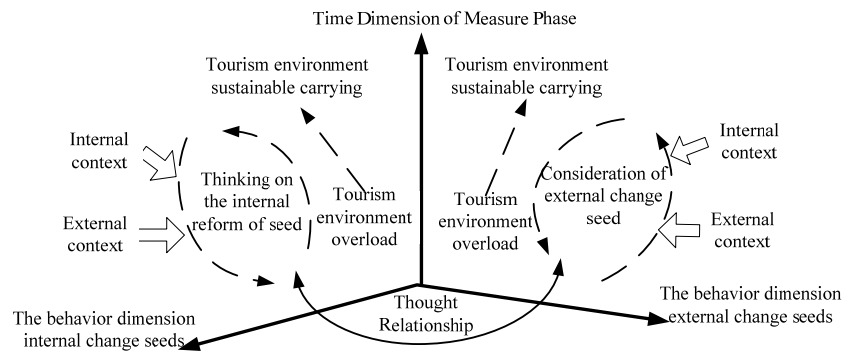


Figure 6 : 3D Map of management innovation about tourism environment

External seed as “brain” of management innovation

Counsel, experts, scholars and other external change agents pay attention to problems of TECC through active attention. External seed analyzes the problems of TECC and dialogues with the internal seed through the “Agenda Setting”. The external seed puts forward to some measures to solve the problems. The theory of tourism environmental problems are to sure development potential thought related thought situation, solve the problem of TECC to promote tourism environmental carrying sustainability. External seeds provide practical guidance for internal seed through theoretical reflection. External seed analyzes direction of carrying capacity and predict the problems of the TECC.

Pay attention to popular voice

The management innovation promotes local participatory of governance. Government layer faces the society from top to bottom empowerment and on the other hand, it depends on the local residents from bottom to top to anticipate for achieving the “good governance” of tourism environment. This paper uses four types of participatory governance model (Figure 7). Government should put forward to some standards to create equality and cooperation between the government and the local residents participating in the administration of tourism environment.

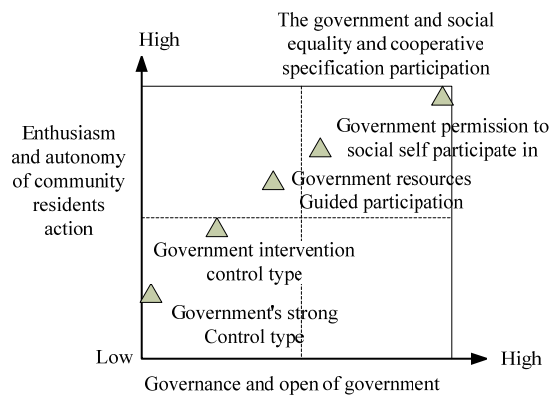


Figure 7 : Public participation types involved in government and local residents dual action structure

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