

## EVALUATING THE LEISURE BENEFITS OF ECOTOURISM WITH DATA ENVELOPMENT ANALYSIS

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**Abstract.** When people increase the leisure time, leisure and recreation become an important industry in the economic transition under the trend of rapidly growing tourist attendance and enhancing travel expenses. To cope with such a development trend and satisfy the increasing recreational demand of the public, the government and the civil sectors have invested in the development and establishment of leisure and scenic recreation spots and facilities. Participating in ecotourism and developing ecotourism activity become the fashion. In this study, DEA is applied to measure the leisure benefits of ecotourism and properly select the input and output factors to efficiently evaluate the leisure benefits of ecotourism parks. According to the efficiency acquired with DEA and the information of variables, 1 DMU, about 10% of all DMUs, presents relatively strong efficiency on the leisure benefits, with the efficiency=1, revealing the better relative efficiency; 6 DMUs, about 60% of all DMUs, show relatively marginal efficiency between 0.9 and 1, revealing that the relative efficiency of such ecotourism parks can be easily enhanced; and, 3 DMUs, about 30% of all DMUs, reveal obvious inefficiency, with the efficiency lower than 0.9. Suggestions are proposed based on the results, expecting to promote ecotourism and achieve the sustainable development.

**Keywords:** *labor, financial, economy, attraction, performance*

### Background and motivation

The economic development, convenient transportation, and increasing national income in recent years have the people largely grow the demand for natural tourism. The tourist person-time is therefore growing rapidly. When people increase the leisure time, leisure and recreation become a primary industry in the economic transition under the trend of rapidly growing tourist attendance and enhancing travel expenses. To cope with the development trend and satisfy the increasing recreational demand of the public, the government and the civil sectors therefore invest in developing and establishing scenic spots and facilities for leisure and recreation, from the re-planning and recovery of hiking trails to the development and investment of national parks, forest recreation areas, and large amusement parks. Following the governmental promotion of national travel, some tourists do not want to repeat others' practice, but pursue novelty, knowledge, and new experiences, admire the nature, and seek for excitement. Furthermore, the propaga-

tion of news media has lots of people change the aspect to special travel activity like ecotourism so that participating in ecotourism and developing ecotourism activity become the fashion. In terms of providing local citizens with different economic opportunities, taking conservation and economic development into account is a common principle in the world to utilize ecological resources. The purpose of ecotourism is to subsidize the benefits of local communities with the profit of marketing for tourism. Since ecotourism conforms to the idea and principle of sustainable development, it becomes more critical to promote ecotourism and achieve sustainable development. Relevant issues to ecotourism, considering how to reduce the impact of ecotourism on natural environments and maintain the rights of descendants enjoying natural resources and environments, are therefore discussed domestically and internationally.

## Literature review

### *Ecotourism*

Ramdas and Mohamed (2014) mentioned about Hetzer, in Links magazine, advising culture, education, and tourism industries to re-consider the definition of recreation and the impact resulted from tourism, based on sustainable development and management, and proposing “ecotourism”. Zhou et al. (2013) regarded ecotourism as to generate the minimum environmental impact, utilize local culture to generate the maximum economic benefits for the minimum impact on tourist spots, and provide visitors with the maximum recreational satisfaction. In face of current wave of sustainable management, the carrying capacity for the continuous operation of ecosystem and the saturation point of not being able to recover are concerned from the aspect of ecologists. From the aspect of economists, the issue of continuous management from the economic activity of manufacturers and consumers and distinct resource exchange is discussed. Chiu et al. (2014) pointed out the key of ecotourism being the tourism of natural resources in which visitors did not simply pursue brand-new experiences, but searched for the assistance and guidance of interpreters and tourism businesses to enhance the understanding of local culture (covering humanities and nature) and further understand the economic benefits resulted from travel activity so as to conserve local resources. Ahmad (2015) regarded ecotourism as the travel pattern initially based on local nature, history, and intrinsic culture. Ecotourists, who visited undeveloped areas based on the spirits of appreciation, participation, and perception, would not cause expendable damage on wild creatures and natural resources in the travel process but contributed to the living economy of local citizens through employment or other economic tactics. Wong et al. (2012) indicated that local governments regarded ecotourism as a management strategy to acquire funds for building or developing the place and communities through business management. The cognitive component was referred to direct experiences, or information acquired from various channels, to form the knowledge and perception of the subject matter of attitudes. Hanington and Martin (2012) proposed the principles of ecotourism as the development without damaging resources and with attention to environmental sensitivity, offer of the first-hand cooperative and beneficial experiences, and presentation of educational value for local communities, governmental and non-governmental organizations, industries, and visitors (before, after, and during the travel).

### ***Leisure benefits***

Wu (2012) mentioned the abroad meaning of leisure benefits. Some researchers discussed from the viewpoints of physiology, psychology, sociology, and economics, while others studied from the aspects of function, education, demands, and recreation experiences. Ahmed et al. (2015) regarded benefits as profit making related to personal goals. The benefits of leisure activity could assist in the achievement of personal goals, as individuals believed that the physical and mental health could be improved to stabilize the spirits and satisfy physical, mental, and social demands by engaging in leisure activity through the achievement of goals and personal subjective leisure experiences in the process or after the activity (Lu and Stepchenkova, 2012). Ly and Bauer (2014) emphasized that benefits were the improvement of individual demands or physical environments. Literally, leisure benefits were the advantages acquired from engaging in leisure activity that it might be the achievement of goals or the assistance of the engaged leisure activity in the achievement of goals. Domestic scholars and researchers interpreted the definition of leisure benefits with various subjective feelings and effectiveness from individual or group participating in leisure activity or sports, after the demand and desire were satisfied through the participation and the physical as well as the mental conditions and social level were improved. Kang et al. (2012) integrated leisure benefits into a systematic model and indicated that people were stimulated by external factors of environment, activity, time, and mind when participating in leisure activity, to appear physiological, psychological, environmental, economic, and social effects. Such effects, after self-assessment with subjective feelings, would result in leisure benefits. Buckley et al. (2012) proposed that the achievement of leisure benefits and leisure goal included the goal achieved by the participation in leisure and leisure participants' belief in the achievement of goals. De Gusmão Pedrini et al. (2015) indicated that visitors would be willing to visit a destination or other scenic spots in a same country when they were satisfied with the external factors of environment, activity, time, and mind. Visitors would make personal evaluation with local entertainment activity, destination transportation, price level, and service satisfaction. The perceived leisure benefits of visitors would result in the revisit and recommendation intention or behaviors (Damodaran, 2014).

### ***Performance evaluation***

Husted et al. (2014) proposed that performance evaluation covered the measurement of cost efficiency, cost effectiveness, and service effectiveness and the comprehensive performance could be the overall management performance. 1. Cost efficiency discussed the resource utilization for transport service. 2. Cost effectiveness analyzed the relationship between service consumption and resource input. 3. Service effectiveness discussed consumers' use of transport service output. Lemes et al. (2014) defined performance evaluation as systematically assessing individual differences of employees' job performance in the organization or the job performance of each employee for the basis of personnel management. Chaminuka et al. (2012) indicated that effective performance evaluation should 1. stress on short-term, mid-term, and long-term benefits, 2. take qualitative and quantitative evaluation indicators into account, 3. contain controllable activity, 4. use the cost and efficiency principles in economics for the measurement, 5. focus on the efficiency effectiveness, 6. take strategic, tactic, and operational activity into consideration, and 7. emphasize the match of individual and department interests.

Paulson and Schorr (2015) covered the meanings of efficiency and effectiveness in performance. Efficiency was evaluated with the ratio of output and input, and effectiveness was referred to the achievement of corporate goals. From a different aspect, efficiency referred to doing things right while effectiveness indicated to do right things. Enterprise managers would request for efficiency as well as pursue effectiveness.

### ***Construction of performance indicator***

Cheung et al. (2014) stated that administration performance could be presented with the comparison with oneself on “time” and the comparison with others on “space”. The assignment of evaluation indicators therefore should consider the “representativeness” of indicators, the “consistency” and “universality” of basic data on time and space for calculating indicators, and the “simplicity” for data acquisition and calculation. For selecting indicators, it was important to assign real measurable variables, but the variables were not restricted to measurable items. A complete program evaluation should also contain non-quantitative measurement to take both subjective and objective standards into account so as to draw the effectiveness after the policy execution. The evaluation of indicators would directly affect the evaluation result that the construction of evaluation indicators should consider both accuracy and reasonableness. High-quality evaluation indicators present the following characters (Hultman et al., 2015):

- Being able to reflect the importance of certain character.
- Effectiveness to accurately measure.
- Covering statistical reliability and validity.
- Effectiveness to distinguish differences.
- Practicability conforming to time and money.
- Simplicity for easy comprehension.

Moreover, the construction of indicators should consider the specialties of experts and the fair and open opportunities for the participation and opinion expression of rates, expecting to achieve the consensus through thorough communication and generate suitable evaluation indicators (Jung et al., 2015). In sum, Delphi Method is utilized for selecting the performance evaluation indicators of local governments. Delphi Method, also called expert judgment method, is a group decision-making method with both qualitative and quantitative characteristics. Based on interdisciplinary and future orientation, it could acquire a commonly acceptable answer, when certain issues are lack of data or under unknown situations, by several runs of votes and feedback till the lowest opinion difference appears among anonymous experts.

According to the suggestions in the literature, Lo and Jim (2015) explained the so-called “expert” (1) presenting the common interest to attend the Delphi Method survey, (2) showing rich information for sharing, (3) being publically recognized the knowledge and technology in special field, (4) revealing specialties on the survey subject, including practical experiences and theoretical research, and (5) agreeing with the research results containing the special information owned. Maulidya et al. (2014) also pointed out knowledge standards, reliability, and accuracy as the key elements of experts who should know the industry deeper than laymen so that the judgment was closer to facts. The value of Delphi Method was established based on such answers.

## Research indicator and subject

### *Establishment of evaluation indicator*

Proper input and output factors should be selected when applying DEA to measure the leisure benefits of ecotourism, in order to efficiently evaluate various leisure benefits of ecotourism. To combine the input and output factors with expert opinions, reduce the input cost, and avoid fuzziness in the survey process, Fuzzy Delphi Method is utilized for selecting the input and output factors. Total 30 copies of questionnaires are distributed for this study, and 26 valid copies are retrieved, with the retrieval rate 87%. According to Sarrafzadegan et al. (2012), the public opinions of more than 5 participants could be used as the analysis basis. Moreover, the interviewed experts cover industry, government, and academia, with frequent interaction between ecotourism and leisure benefits, that they present certain representativeness.

The evaluation indicators are established based on Delphi Method. The variables are defined as below:

(1) Input variable

- Financial dimension: expenditure of an ecotourism park.
- Labor dimension: invested manpower in an ecotourism park.

(2) Output variable

- Economy dimension: net income of an ecotourism park.
- Attraction dimension: number of tourists in an ecotourism park.

## *Research method and subject*

With Delphi Method and Data Envelopment Analysis, the open statistical data in public sectors are regarded as the input and output performance to select the indicators. The data are proceeded empirical analyses for the reference of ecotourism parks making improvement. Ten major ecotourism scenic areas are selected as the research subjects, as 10 evaluated DMUs, in this study.

## **Empirical analysis of local government efficiency**

### *Analysis of local government efficiency*

The DEA efficiency evaluation results could help understand the relative efficiency of the leisure benefits of ecotourism parks. The efficiency=1 stands for the DMU achieving the relative efficiency. Contrarily, the efficiency<1 refers to the relative inefficiency of a DMU. The experimental results (*Table 1*) show that Qiandao Lake in Zhejiang is relatively efficient, with the efficiency=1, i.e. Qiandao Lake in Zhejiang achieving the ideal state, while the rest ecotourism parks appear relatively worse efficiency.

### *Slack variable analysis*

Regarding the analysis of returns to scale (*Table 2*) Qiandao Lake in Zhejiang, with fixed returns to scale, shows the optimal leisure benefits, while the rest ecotourism parks present decreasing returns to scale, revealing that the marginal return could be expanded the scale in order to enhance the efficiency.

**Table 1.** Relative efficiency of ecotourism park leisure benefits

Ecotourism park	Overall efficiency	Pure technical efficiency	Scale efficiency
Sand Lake in Ningxia	0.94	0.92	0.95
Jiuzhai Valley in Sichuan	0.96	0.92	0.98
Paektu Mountain in Jilin	0.98	0.96	1.00
Qiandao Lake in Zhejiang	1.00	1.00	1.00
Qinhai Lake in Qinghai	0.99	0.99	0.99
Wuyishan in Fujian	0.95	0.93	0.98
Namtso in Tibet	0.80	0.75	0.85
Pudacuo National Park in Yunnan	0.83	0.78	0.88
Fanjingshan in Guizhou	0.86	0.83	0.89
Shennongjia in Hubei	0.90	0.90	0.91

**Table 2.** Improvement of ecotourism park leisure benefits

Decision-making unit (DMU)	Improved input		Improved output	
	Financial dimension	Labor dimension	Economy dimension	Attraction dimension
Sand Lake in Ningxia	1	1	1	1
Jiuzhai Valley in Sichuan	1	4	2	2
Paektu Mountain in Jilin	2	3	0	3
Qiandao Lake in Zhejiang	0	0	0	0
Qinhai Lake in Qinghai	3	0	1	0
Wuyishan in Fujian	0	2	2	1
Namtso in Tibet	3	3	3	2
Pudacuo National Park in Yunnan	4	4	2	5
Fanjingshan in Guizhou	2	3	1	2
Shennongjia in Hubei	1	2	2	1

Data source: Self-organized in this study.

The results of Slack Variable Analysis, regarding the improvement direction of the leisure benefits of ecotourism parks are shown in *Table 2*. By increasing input units to the items with few inputs, the leisure benefits could achieve the efficiency. Furthermore, the input resource of the leisure benefits of Qiandao Lake in Zhejiang has achieved the optimal use.

## Conclusion

The efficiency acquired with DEA and the information of variables are classified in *Table 1*, where 1 DMU, about 10% of all DMUs, presents relatively strong efficiency on the leisure benefits, with the efficiency=1, revealing the better relative efficiency; 6 DMUs, about 60% of all DMUs, appear marginal inefficiency with the relative efficiency in 0.9-1, showing that the relative efficiency of the leisure benefits of such ecotourism parks could be more easily promoted; 3 DMUs, about 30% of all DMUs, reveal obvious inefficiency with the efficiency lower than 0.9, among which Namtso in Tibet appears the lowest efficiency 0.80. The DEA evaluation results reveal high proportion of leisure benefits not achieving the scale efficiency that the input of leisure benefits of ecotourism parks requires reconsideration and readjustment in order to enhance the competitiveness.

Apparently, Qiandao Lake with the reputation of “the best water in the world”, located in Jiangnan where the landscape is as beautiful as a picture, also has the reputation of “the most beautiful lake in China” and is the first national park of China with Chinese AAAA-rated tourist attractions. Such unique geographic conditions create the scenery as beautiful as Guilin scenery. With surrounding green mountains, glittering lake, and elegant natural landscape, the different expression on the water surface of Qiandao Lake, with various peninsulas and peaks, is like a maze. Qiandao Lake has received “Qiandao Lake the best scenic spot”, “star service excellent unit”, and “reliable unit in Zhejiang Province for consumers” with the highest visitor satisfaction, the richest tourism programs, the most visitors hosted, and the best economic and social benefits.

## Suggestion

According to the research results and discussions, the following suggestions are proposed in this study:

- Information related to ecotourism should be promoted, especially on the Internet, newspaper, and magazines. Detailed instruction of scenic tourist spots, transportation routes, accommodation information, hotel rankings, seasonal specialties, and mass transit schedule and pick-up locations should be provided. Besides, the most accurate and complete tourism information should be regularly updated for the public to be able to easily and completely planning the tours.
- In addition to interpreters, personnel in visitor service centers should present some knowledge of ecotourism so as to increase visitor intention to participate in ecotourism.
- Distinct ecotourism itineraries could be arranged for different seasons, allowing visitors understanding local culture and life. Moreover, the cooperation with schools for field trips could enhance national literacy of ecology, increase ecological experiences, and know local culture. The premise is that the ecotourism principles must be actually practiced to achieve the educational effectiveness by matching with the ecological culture education policy of the government.

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