Research on the Efficiency of "Two Funds" Invested in Rural Tourism Projects in Minority Areas in Sichuan Province

Wenyi Li[a], Xueqian Song[*], Kangli Fu[b]

School of Management, Chengdu University of Information Technology, Chengdu, Sichuan 610225, China

[a]2068614108@qq.com; [*]sxq@cuit.edu.cn;
[b]fkl02114911@sina.com

Abstract. This paper uses data envelopment analysis to measure the efficiency of "two funds" invested in rural tourism projects in 36 counties (cities) in ethnic areas of Sichuan Province. The results show that: (1) the comprehensive technical efficiency of 9 counties (cities), including Hongyuan County and Rangtang County, has reached the optimal state of efficiency under the DEA model. (2) Among them, the pure technical efficiency of 19 counties (cities) has reached an effective level, and the level of fund management is high. (3) Most counties (cities) in Ganzi Tibetan Autonomous Prefecture and Liangshan Yi Autonomous Prefecture are in a state of increasing returns to scale. In view of this, in order to improve the efficiency of "two funds" invested in rural tourism projects in minority areas, we should promote advanced management experience and eliminate the polarization of fund use. Optimize the structure of capital allocation and guide resources toward increasing areas; Put forward relevant suggestions from three aspects of implementing key investment strategies and improving the accuracy of capital investment.

Keywords: Ethnic areas, Two funds, Rural tourism, DEA model

1   Introduction

The "two funds" refer to the special funds set up by China in the early 1980s to support the development of economically underdeveloped areas and ethnic minority areas, which were later renamed the "Ethnic Minority Area Development Fund" and the "Provincial Financial Connection to Promote Rural Revitalization Subsidy Fund (Ethnic Minority Development Task)"[1]. The fund is mainly used to support the development of autonomous prefectures such as Garze Tibetan Autonomous Prefecture, Aba Tibetan and Qiang Autonomous Prefecture and Liangshan Yi Autonomous Prefecture in Sichuan Province, as well as a number of autonomous counties and counties treated in ethnic minority areas. Because of its unique culture and geographical conditions, ethnic areas face challenges in economic and social development, and rich tourism resources

make them have great potential to develop rural tourism[2]. From the promotion of rural tourism in the No. 1 Central Document in 2007 to the introduction of the guidance opinions on rural tourism in the Outline of National Tourism and Leisure, rural tourism has gradually become an important strategic means to promote rural revitalization in ethnic areas, industrial structure adjustment, and farmers' income increase[3].

Current studies on financial input efficiency in ethnic areas mainly include ecological efficiency and poverty alleviation efficiency. From the perspective of ecological efficiency in ethnic areas, Shi Jiangjiang combined the ultra-efficient SBM model based on non-expected output with the Malmquist index[4]. This paper calculates the tourism eco-efficiency in the minority areas from 2004 to 2016 and puts forward corresponding suggestions for improving the tourism eco-efficiency. Zhao Xin used the panel data of each league city in Inner Mongolia Autonomous Region to measure its ecological efficiency using the Super-SBM model and put forward relevant countermeasures and suggestions[5]. Zhang Dapeng used the county-level panel data of ethnic poor areas from 2011 to 2017 and applied stochastic frontier analysis (SFA) to measure the efficiency of tourism poverty reduction, overcoming the shortcomings of data enveloping analysis method in existing literature to measure the efficiency of tourism poverty reduction in ethnic areas[6]. Xu Shaogui estimated the efficiency of tourism poverty alleviation in Guangxi border ethnic areas from 2011 to 2017 through data enveloping analysis (DEA)[7]. Huang Ailian used the three-stage DEA model to measure and evaluate the efficiency of tourism poverty alleviation in 28 poor counties, enriching and enriching the relevant research content and methods of tourism poverty alleviation in China's ethnic areas[8].

According to relevant studies, it is found that there are few relevant studies on the financial investment efficiency of rural tourism projects in ethnic areas[9]. Taking the "two funds" in Sichuan Province as an example, this paper uses the DEA model research method to measure and evaluate the efficiency of their investment in rural tourism projects, in order to enrich and enrich the research content and methods related to government financial investment in rural tourism projects in minority areas, and put forward suggestions for the adjustment of the investment structure of the "two funds" and the efficient use of funds by the national and local governments.

2.Research methods and model construction

(1) Research methods

Data Envelopment Analysis (DEA) was first proposed as a method of performance evaluation in 1978 by American professors A. C. harnes and W.W. C. Oper[10]. There are two main models in evaluating efficiency: CCR (constant returns to scale) and BCC (variable returns to scale)[11].This paper selects the DEA-BCC model with variable returns to scale under the input-oriented approach to analyze the efficiency of "two funds" invested in rural tourism projects in ethnic areas in Sichuan Province. The DEA-BCC model is expressed as follows:

$$\min \theta$$

$$s.t.\begin{cases} \sum_{j=1}^{n} \lambda_j x_j + s^- = \theta x_0 \\ \sum_{j=1}^{n} \lambda_j y_i - s^+ = y_0 \\ \sum_{j=1}^{n} \lambda_{j} = 1 \\ s^- \geq 0, s^+ \geq 0, \lambda_j \geq 0, j = 1,2,\cdots,n \end{cases} \qquad (1)$$

(2) Index construction

This study classifies and summarizes the capital input and output of the "two funds" related rural tourism projects in ethnic areas from 2019 to 2022 on the website of Sichuan Ethnic and Religious Affairs Commission (referred to as Sichuan Ethnic Ethnic Committee), and constructs the efficiency analysis DEA evaluation index system of "two funds" invested in rural tourism projects in ethnic areas, as shown in Table 1:

Table 1. Efficiency analysis index system of "two funds" invested in rural tourism projects in minority areas

Primary index	Secondary index	unit
Input index	Amount of investment	Ten thousand yuan
	Number of projects invested	a
Output indicator	Rural tourism infrastructure	a
	Rural tourism reception facilities	a
	Rural tourism resources	a

(3) Data sources

The data in this study are all from the filing form of the "Two Funds" project from 2019 to 2022 on the website of Sichuan Provincial Ethnic Minority Committee. According to the requirements, 36 counties (cities) in Sichuan Province are finally selected as decision-making unit samples. In the DEA model, the number of decision-making units, the number of input indicators and the number of output indicators should meet the requirements $n \geq \max[m \times s, 3 \times (m + s)]$ [12] The number of decision-making units in this study is 36 cities and counties, with 2 input indicators and 3 output indicators, which meet the requirements of the formula and can ensure the reliability of the results. In order to eliminate the influence of non-uniform output index units, according to the treatment method of Huang Guanhua[13] and other scholars, the output index of "two funds" is standardized and the value of comprehensive output variable is calculated[14].

3.Outcome analysis

The two major input indicators and three output indicators of "two funds" invested in rural tourism projects of 36 counties (cities) in ethnic areas of Sichuan Province were

imported into DEAP2.1 software for efficiency analysis, and the comprehensive technical efficiency, pure technical efficiency and scale efficiency of each city and county were calculated respectively. The specific empirical analysis results are shown in Table 2.

Table 2. DEA efficiency evaluation results of "two funds" invested in rural tourism projects in ethnic areas

number	district	crste	vrste	scale	Returns to scale
1	Hongyuan county	1	1	1	-
2	Xiaojin County	0.841	1	0.841	drs
3	Wenchuan county	0.706	1	0.706	drs
4	Jinchuan county	0.501	0.72	0.696	drs
5	Songpan county	0.412	0.543	0.759	drs
6	Marcon	0.811	1	0.811	drs
7	Zoige County	0.517	0.641	0.807	drs
8	Li County	0.472	0.845	0.559	drs
9	Jiuzhaigou County	0.6	0.937	0.64	drs
10	Rangtang county	1	1	1	-
11	Heishui county	0.579	0.813	0.712	drs
12	MAO County	1	1	1	-
13	Aba county	0.74	1	0.74	drs
14	rural-city-county	0.63	0.992	0.634	drs
15	Shiqu county	0.514	1	0.514	irs
16	Derong County	1	1	1	-
17	Daofu county	0.748	0.797	0.939	irs
18	Daocheng county	1	1	1	-
19	Danba County	0.601	0.687	0.874	irs
20	Jiulong county	0.901	1	0.901	irs
21	Ganzi county	1	1	1	-
22	Luding county	0.648	0.65	0.997	irs
23	Luhuo County	0.604	0.646	0.935	irs
24	Litang county	0.313	0.391	0.799	irs
25	Derg County	0.478	1	0.478	irs
26	Serda county	0.308	0.409	0.754	irs
27	Batang county	0.816	0.97	0.842	irs
28	Kangding City	0.488	0.608	0.802	irs
29	Baiyu county	1	1	1	-
30	Leibo County	0.827	1	0.827	irs
31	Muli Tibetan Autonomous County	0.658	1	0.658	irs
32	Xichang City	1	1	1	-
33	Xide county	0.919	0.931	0.987	irs
34	Huili City	1	1	1	-

| 35 | Beichuan Qiang Autonomous County | 0.546 | 0.571 | 0.956 | irs |
| 36 | Mabian Yi Autonomous County | 0.493 | 1 | 0.493 | irs |

Note: "irs", "-" and "drs" indicate increasing, constant and decreasing returns to scale, respectively.

(1) Comprehensive technical efficiency analysis

From the perspective of comprehensive technical efficiency, among the 36 counties (cities), there are 9 areas where the comprehensive technical efficiency of "two funds" invested in rural tourism projects in ethnic areas reaches DEA effectiveness. This indicates that the nine regions have made optimal use of the input and output of the "two funds" in rural tourism projects, and the governments of these regions have a high level of management and application of the "two funds". Among the remaining 27 non-DEA effective DUS, the efficiency of 18 regions did not reach the average comprehensive technical efficiency, and the lowest ones were Seda County and Litang County, which were only 0.308 and 0.313, respectively. In addition, the technical efficiency and scale efficiency of 17 regions are not as effective as DEA, indicating that there is a large room for optimization in the scale of capital investment and capital allocation management in these regions.

(2) Pure technical efficiency analysis

From the perspective of pure technical efficiency, there are 19 effective areas, accounting for 53%. Among them, the areas where pure technical efficiency is effective but comprehensive technical efficiency is ineffective are Xiaojin County, Wenchuan County, Malkang City, Aba County, Shiqu County, Jiulong County, Dege County, Leibo County, Muli Tibetan Autonomous County and Mabian Yi Autonomous County, indicating that the comprehensive technical efficiency of these 11 counties is ineffective because of the inefficiency of scale efficiency. However, the level of allocation and management of the "two funds" is relatively high. The pure technical efficiency of Jiuzhaigou County, Batang County and Xide County is close to effective, while the relatively low pure technical efficiency of Litang County, Seda County and Songpan County is 0.391, 0.409 and 0.543 respectively, and the regional values of pure technical efficiency inefficiency are significantly different. The low scores were concentrated in Liangshan Yi Autonomous Prefecture and Ganzi Tibetan Autonomous Prefecture, and were much lower than the average technical efficiency, indicating that the management level and technical level of these areas still have great room for improvement.

(3) Scale efficiency analysis

From the point of view of scale efficiency, there are 9 effective areas, which is consistent with the comprehensive technical efficiency. Daofu County, Jiulong County, Luding County, Luhuo County, Xide County and Beichuan Qiang Autonomous County are closer to the state of scale efficiency and effectiveness, among which the scale efficiency of Shiqu County, Mabian Yi Autonomous County and Dege County is 0.514, 0.493 and 0.478 respectively, indicating that the "two funds" are relatively small in the investment of rural tourism projects in these three regions. Funds are scarce. If we want to improve scale efficiency in the future, we should reasonably arrange the scale of capital investment in minority areas and adjust the amount of capital investment.

In order to further analyze the effectiveness of scale, the state of return to scale in 36 counties is summarized. As can be seen from Table 2, there are 16 counties (cities) in the state of increasing returns to scale, nearly half of the total. For these areas, the amount of investment in rural tourism projects can be appropriately increased, and the optimal use of funds can be achieved by combining the improvement of management and technical level. There are 11 counties (cities) with diminishing returns to scale. In these regions, the increment of output after increasing investment of "two funds" in rural tourism projects is not significant, and the focus of fund use and allocation should be on optimizing the efficiency of fund use. The number of counties (cities) with unchanged returns to scale is 9, indicating that the amount of capital investment in these 9 regions is reasonable, and the management mode is appropriate, so that the use of funds in rural tourism projects has reached the best scale state.

2   Conclusions

First, promote advanced management experience and eliminate the polarization of the use of funds. Through the study of pure technical efficiency of "two funds" in rural tourism projects in ethnic areas of Sichuan Province, it is found that there are obvious differences in management level and resource utilization efficiency among different regions. Among them, the Aba Tibetan and Qiang Autonomous Prefecture performs well in the use and distribution of funds, which is worthy of popularization and reference. For the areas with low pure technical efficiency of DEA, it is suggested to organize field visits and experience exchange meetings to learn the successful experience of Aba Prefecture in project management, fund allocation and risk control. At the same time, it encourages the establishment of long-term cooperation with Aba Prefecture, and improves the professional competence of managers through mutual visits and commissioned training. In addition, a performance appraisal system with the efficiency of fund use as the core should be built, and the highly efficient regions should be publicly commended, given preferential policies or given financial rewards to promote the improvement of management level with positive incentives.

Second, we should optimize the structure of capital allocation and guide resources toward increasing areas. In view of the diminishing returns to scale in Aba Tibetan and Qiang Autonomous Prefecture, it is necessary to adjust the development model and capital investment mode. Although the tourism resources in these areas are rich and the initial development results are remarkable, but with the increase of investment, the marginal benefit decreases and the phenomenon of over-exploitation of resources appears. For these areas, it is necessary to tap local cultural resources, develop folk experience, non-genetic heritage, cultural and artistic performances and other characteristic cultural tourism products. For the Ganzi Tibetan Autonomous Prefecture and Liangshan Yi Autonomous Prefecture, which are still in the stage of increasing returns to scale but have not fully realized their potential due to lack of funds, the investment of the "two funds" should be moderately increased to activate tourism resources. Investment should avoid simply copying successful models, but should be based on local characteristics, develop

differentiated tourism products, attract tourists with cultural activities, promote national culture, and enhance the charm of tourism destinations.

   Third, implement the key investment strategy of funds by classification to improve the accuracy of capital investment. In view of the insufficient output of infrastructure construction in Heishui County, Shiqu County and other areas, the first task is to comprehensively review and optimize the use of existing funds, and prioritize investment in infrastructure improvement projects. At the same time, pay attention to the construction of tourism public service facilities, such as public toilets, garbage cans, solar street lights and other details, directly affect the tourist experience, to ensure that their number is sufficient, reasonable layout, proper maintenance, in order to meet the growing needs of tourists. For Jinchuan County, Ruoergi County and other areas lacking in reception facilities, financial support should be increased, focusing on improving the quality and scale of accommodation, catering and entertainment facilities. Through financial subsidies, tax incentives and other policy incentives, to promote B&Bs, hotels and other hardware facilities and service quality, to meet or even exceed industry standards.

References

1. Sichuan Province ethnic areas economic development center. Sichuan province two funds performance evaluation method [EB/OL] (2023-07-06) [2024-04-16]. https://www.scmzzjw.cn/center/system/sys! toWork.action.
2. Yang Min, Zheng Yan. Historical evolution and action direction of common prosperity in ethnic areas in the process of Chinese-style modernization [J/OL]. Northwest Ethnic Studies :1-13[2024-03-27].
3. Liu Surong, Pan Xiaolu. The realization path of rural revitalization in ethnic areas from the perspective of the consciousness of the Chinese National Community [J]. Journal of Qinghai University for Nationalities (Social Sciences Edition),2023,49(04):27-33.
4. Shi Jiangjiang, Yang Bingbing. Spatial and temporal evolution of tourism eco-efficiency and its influencing factors in minority areas [J]. Science and Technology Industry,2020,20(02):108-114. (in Chinese)
5. ZHAO Xin, Gu Guofeng, Liu Yan. Spatial and temporal evolution characteristics and influencing factors of eco-efficiency in ethnic areas: A case study of Inner Mongolia Autonomous Region [J/OL]. Heilongjiang Ethnic Series :1-9[2024-03-27].
6. Zhang Dapeng, apply essence. Research on efficiency measurement and influencing factors of tourism poverty reduction in ethnic poor areas: evidence from Wuling Mountain Area [J]. Journal of Hubei University for Nationalities (Philosophy and Social Sciences Edition),20,38(05):58-67.
7. XU Shaogui, FANG Shiqiao, Gan Yongping et al. Efficiency measurement and spatial-temporal evolution of tourism poverty alleviation in Guangxi Border ethnic areas [J]. World Geographical Research, 2019,30(02):367-377. (in Chinese)
8. Huang Ailian, Zhu Junrong. Research on efficiency measurement and spatiotemporal differentiation of tourism poverty alleviation in poor counties in Southwest ethnic areas [J]. Journal of Xinyang Normal University (Natural Science Edition),2021,34(03):387-393+400.
9. Richardson, S.OverGinvestment of Free Cash Flow [J]. Review of Accounting Studies,2006,11(2):159-189.

10. Fan, J.P.H.,Wong,T.J.,Zhang, T.Institution sand Organizational Structure: The Case of State-Gowned Corporate Pyramids [J]. The Journal of Law, Economics, and Organization, 2013,29(6):1217-1252．
11. Li Suying, Xie Mingming. Evaluation of input-output efficiency of university research funds based on DEA model: A case study of universities in Hebei Province [J]. Research on Educational Finance and Accounting, 2019,31(2):45-51.
12. Song Xuexi, Deng Wei. Public services in mountainous areas: Spatial Differences and efficiency improvement Strategies [M]. Beijing: Science Press, 2019:85-87.
13. Huang Guanhua. Performance evaluation and difference analysis of basic public service fiscal expenditure: Evidence from 17 cities and provinces in Hubei Province [J]. Financial Supervision, 2017(13):42-47.
14. Stulz, R．The Limits of Financial Globalization [J]．Journal of Finance, 2005,60(4):1595-1638．