

СОВЕРШЕНСТВОВАНИЕ УПРАВЛЕНИЯ СЕЛЬСКИМ ТУРИЗМОМ В КИТАЕ НА ОСНОВЕ ОЦЕНКИ ЭФФЕКТИВНОСТИ

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Аннотация. С помощью аналитической схемы «измерение – декомпозиция – диагностика – управление» и метода анализа среды функционирования изучаются панельные данные из 40 туристических округов Китая за 2011–2022 гг. На основе декомпозиции технической эффективности на чистую техническую эффективность и эффективность масштаба выявляются ключевые ограничивающие туризм факторы. Делается вывод о том, что в рассматриваемый период средний уровень эффективности округов находился в пределах 50,3–61,5 % от производственной границы. Рост в значительной степени обеспечивался расширением масштаба, тогда как управленческая и технологическая эффективность оставалась в состоянии стагнации. Производится классификация округов на четыре типа: системно оптимизированные, технологически ориентированные, масштабно ориентированные и находящиеся в трансформационной дилемме. Причины выявленных различий данных типов соотносятся с ресурсной обеспеченностью государства, его ролью и уровнем промышленной интеграции. Предлагается дифференцированная модель управления, направленная на содействие переходу от масштабно ориентированного роста к инновационно ориентированному росту.

Ключевые слова: сельский туризм; экономическая эффективность; анализ среды функционирования; декомпозиция эффективности; экономика округа; эффективность масштаба; чистая техническая эффективность.

Благодарность. Работа выполнена при поддержке Государственного комитета по стипендиям Китайской Народной Республики (грант № 202208400016).

Образец цитирования:

Фу Ци, Деревяго ИП, Шао Цзыюй. Совершенствование управления сельским туризмом в Китае на основе оценки эффективности. *Журнал Белорусского государственного университета. Экономика.* 2026;1:144–154 (на англ.). EDN: ZQVCVE

For citation:

Fu Qi, Dzeraviah IP, Shao Ziyu. Improving rural tourism governance in China on the basis of efficiency assessment. *Journal of the Belarusian State University. Economics.* 2026;1:144–154. EDN: ZQVCVE

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IMPROVING RURAL TOURISM GOVERNANCE IN CHINA ON THE BASIS OF EFFICIENCY ASSESSMENT

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Abstract. Facing the issue of high investment, low return in China's rural tourism, this study employs a measurement – decomposition – diagnosis – governance framework and data envelopment analysis to examine panel data from 40 tourism counties (2011–2022). By decomposing technical efficiency into pure technical efficiency and scale efficiency, it identifies key constraints. Results indicate that average county efficiency remained at 50.3–61.5 % of the production frontier, with growth heavily reliant on scale expansion while managerial (technological) efficiency stagnated. Then counties are categorised into four types (system-optimised, technology-driven, scale-driven, and transformation dilemma) based on pure technical efficiency or scale efficiency performance, with causes linked to resource endowment, government role, and industrial integration. Therefore, a differentiated governance framework is proposed to facilitate a transition from scale-driven to innovation-driven growth. The study provides a refined tool for analysing regional tourism heterogeneity and offers practical policy insights.

Keywords: rural tourism; economic efficiency; data envelopment analysis; efficiency decomposition; county economy; scale efficiency; pure technical efficiency.

Acknowledgements. This work was supported by China Scholarship Council (grant No. 202208400016).

Introduction

The contradictory reality of rapid growth and mass closures in rural tourism in China. Rural tourism has proven to play a vital role in the development of rural areas, especially in countries such as Spain, France, Japan, and China [1–4]. By attracting urban tourists to visit rural tourism promotes the livelihood diversification of rural residents, knowledge transfer, the improvement of women's entrepreneurial ability, and the increase of villagers' income, while also optimising rural infrastructure [5–9], including transportation and living conditions. Consequently, rural tourism has emerged as a significant strategy to advance rural development, facilitate poverty alleviation, and foster rural revitalisation in China. With decades of development, rural tourism has come to prominence as a significant economic development vehicle of considerable interest to the extensive rural regions of China, particularly among county administrations. Currently, rural tourism is acting as an essential aspect of economic development especially in multiple counties that have abundant tourist attractions. However, accompanying the rapid expansion of the industry is an increasingly prominent «efficiency paradox»: the huge capital investment has not been simultaneously transformed into corresponding output benefits. Rui Song points out that although rural tourism contributes 30–40 % to poverty reduction, the wave of tourist town closures between 2016 and 2019 exposed serious resource misallocation and waste caused by blind investment [10]. This paradox raises an urgent governance issue: under increasingly tight resource constraints, how can we shift from pursuing quantity in scale to improving quality in efficiency to achieve sustainable development of rural tourism?

Theoretical review. Existing literature provides multiple perspectives for understanding rural tourism, a large body of research focuses on its socio-economic impact assessment and the exploration of sustainable development pathways, while empirical research on its input – output economic benefits is relatively weak [11–14]. While a few pioneers have initiated efficiency measurement work and explored influencing factors, and their coupling with the environment, they generally suffer from two major limitations. First, the spatial scale is micro-level, mostly limited to towns, scenic spots, or enterprises, lacking a systematic examination of the broader, more policy-implementing county level. Second, the methodology is black-box, mostly outputting only a general overall efficiency value, failing to reveal the deep structure of efficiency loss – whether it stems from backward management and technology (purely technological inefficiency) or from a mismatch between investment scale and market capacity (scale inefficiency) [15–19]. This lack of diagnosis often leads policy recommendations to become generalised calls to «improve efficiency», making it difficult to formulate precise intervention policies.

Tourism efficiency refers to the ability of the tourism industry to maximise economic output (such as revenue and tourist volume) under specific inputs [20]. It is a relative indicator that measures the degree of optimisation

of resource allocation and the effectiveness of industry operation [21]. The economic efficiency of rural tourism specifically refers to the ability to maximise monetised outputs such as tourism revenue, job creation, and industrial value-added within rural areas by allocating economic factors such as land, capital, labour, and local resources [20; 22]. Its core significance lies in measuring how rural tourism obtains maximum economic benefits at minimum economic cost [20]. It is a key efficiency dimension for assessing the industry's contribution to rural economic growth and endogenous development capacity, and also the economic foundation for achieving sustainable and inclusive development of rural tourism [21; 22]. The economic efficiency of rural tourism is a multi-dimensional efficiency concept, which usually includes total efficiency (TE), which represents the production efficiency of input factors under the optimal scale, pure technical efficiency (PE), which is the ability to maximise output under the existing management and technology level, and scale efficiency (SE), which is the gap between the current scale and the optimal scale, reflecting whether the scale is economical [23].

Research approach, objectives, and value. To overcome the aforementioned limitations, this study aims to achieve a leap from phenomenon description to mechanism diagnosis. Specific objectives are following:

- to macroscopically depict the overall level and spatiotemporal evolution characteristics of rural tourism economic efficiency in Chinese counties;
- to explore whether efficiency growth is primarily due to scale expansion or modern management techniques (the core measure is to deconstruct efficiency, using data envelopment analysis (DEA), to separate the contributions of pure technical efficiency and scale efficiency, and accurately pinpoint the root causes of efficiency losses);
- to construct a county-level diagnostic classification system based on efficiency structure, and propose differentiated governance solutions accordingly.

The DEA methodology, first introduced by A. Charnes, W. Cooper and E. Rhodes in 1978, is a non-parametric method for evaluating the relative efficiency of decision-making units (DMU) based on multiple inputs and multiple outputs, with no obvious production function to aggregate the data in its entirety, and provides a mechanism for measuring DMU Pareto efficiency compared with other DMUs [24]. The methodology applied in this paper uses DEA, which can detect those DMU that are performing poorly, because of its unique advantages of not requiring a pre-defined production function form and being able to endogenously decompose efficiency, perfectly aligning with the objectives of diagnostic analysis [25–27]. The value of this paper lies in the following aspects: at the theoretical level, by constructing an integrated framework of efficiency decomposition type diagnosis-causal correlation, it deepens the understanding of the heterogeneity of regional tourism development; at the practical level, the resulting one policy for one type governance toolbox provides scientific decision-making guidance for local governments to promote the transformation of rural tourism from extensive scale growth to intensive quality development.

Methodology, indicators, and data

DEA. The core of this paper is to conduct a «pathological» diagnosis of efficiency, rather than a simple efficiency measurement. Therefore, the research method must possess deconstructive capabilities. DEA demonstrates irreplaceable advantages here. Compared to parametric methods (such as stochastic frontier analysis), DEA does not depend on a specific production function form, avoiding the risk of misspecification, and is particularly suitable for tourism systems with high inputs, high outputs, and complex production relations. Its most policy-insightful characteristic lies in its ability, under the assumption of variable returns to scale, to decompose TE into PE and SE, i. e. $TE = PE \cdot SE$. This mathematical decomposition has a clear economic meaning: PE reflects the efficiency of resource utilisation determined by management and technical levels at the current scale, SE measures the degree of proximity between the actual production scale and the optimal production scale (the point of minimum long-run average cost). This decomposition forms the cornerstone of the diagnostic logic in this paper, enabling us to answer the following question: is the inefficiency of a region a problem of lack of management or incorrect approach?

This study employs an output-oriented Banker – Charnes – Cooper (BCC) model for static efficiency measurement. Considering the current trend of declining GDP growth in China and the requirement to improve the quality of development, this paper chooses the input-oriented BCC model. Compared with DEA's original Charnes – Cooper – Rhodes (CCR) model, the key difference between the BCC model and the CCR model (constant returns to scale) is that it acknowledges that DMUs may be in a stage of increasing or decreasing returns to scale. Therefore, it evaluates PE, removing the influence of scale factors. The input-oriented approach, on the other hand, examines the maximum extent to which the input factors of each DMU can be reduced proportionally while maintaining the current output level. Without changing the current scale of inputs, inputs (such as human resources and capital) are variables that managers or policymakers can control more directly. One of the core tasks of management is how to allocate and use resources more economically and efficiently under

a given task objective (output). The input-oriented model directly provides a quantitative basis for this cost-saving and lean management.

Mathematical model introduced in work [18] is following:

$$\min \left[\theta - \varepsilon (e_1 s^- - e_2 s^+) \right],$$

such that

$$\begin{cases} \sum_{j=1}^n \lambda_j x_{ij} + s^- = \theta x_{ik}, & i = 1, \dots, m, \\ \sum_{j=1}^n \lambda_j y_{rj} + s^+ = y_{rk}, & r = 1, \dots, s, \\ \sum_{j=1}^n \lambda_j = 1, \\ s^+ \geq 0, s^- \geq 0, \lambda_j \geq 0, & j = 1, \dots, s, \end{cases}$$

where θ is efficiency score of DMU ($0 < \theta \leq 1$); ε is a non-Archimedean infinitesimal, ensuring the full optimisation of slack variables; e_1 and e_2 are unit row vectors used to aggregate slack variables into the objective function; s^- and s^+ are input and output slack variables, respectively; λ_j is weight of the j^{th} DMU; x_{ij} is the i^{th} input of the j^{th} DMU; y_{rj} is the r^{th} output of the j^{th} DMU; k is index of the DMU under evaluation (the DMU being assessed).

In the above equation system, θ represents the comprehensive efficiency. A larger θ value indicates higher comprehensive efficiency of the evaluated unit. When $\theta = 1$, the unit is considered effective (efficient); otherwise, it is ineffective. The smaller the θ value, the lower the comprehensive efficiency.

Conceptual model and indicator system. According to the United Nations World Tourism Organisation (UNWTO), rural tourism encompasses a broad range of products and activities rooted in rural life and nature, including nature-based activities, agricultural experiences, rural sightseeing, etc. [28]. From a systems perspective, rural tourism is a tourism industry and management system comprised of an attraction subsystem (tourism resources), a reception subsystem centred on accommodation and catering, a support subsystem supported by transportation and living facilities, and a demand subsystem primarily driven by urban tourists [29]. County-level rural tourism, by integrating resources, capital, and human resources, and leveraging market-oriented operation and management to connect with the tourism demand market, ultimately achieves multiple goals such as poverty reduction and income increase, tourist satisfaction, and environmental improvement. After long-term development, the connotation and practice of rural tourism have continuously evolved, with regional collaboration becoming an inevitable trend from early decentralised operations [30]. Under China's policy-driven development model, county-level regulatory and management policies directly influence the path and effectiveness of rural tourism [31].

As the basic administrative unit for the implementation of rural tourism policies and the overall planning of resources in China, counties possess complete subsystems for tourist attractions, reception services, facility support, and market demand, meeting the requirements of DEA for homogeneity and functional comparability of DMUs. Their standardised statistical system ensures the availability and consistency of input – output data, while their appropriate spatial scale reflects the regional integration characteristics of rural tourism and avoids interference from internal heterogeneity in efficiency assessment. Thus, it is possible to effectively measure the resource allocation efficiency and policy effectiveness of county-level rural tourism under the guidance of regional coordinated development.

This paper, grounded in production economics theory, conceptualises county-level rural tourism as a mechanism for transforming production elements into economic value. A conceptual model is developed based on the traditional three-factor model, adapted to the tourism sector, incorporating three primary input factors as capital, labour, and resources alongside two principal output factors as market size and economic benefits. The selection of each indicator has been subjected to thorough theoretical verification (table 1) to guarantee the model possesses sufficient economic rationale. The metric of county fixed asset investment signifies capital input, as it covers the long-term physical capital stock required for tourism services (such as accommodation, transportation, and entertainment facilities), forming the foundation of tourism supply capacity. The rural tourism employment indicator represents the industry's capacity to accommodate employment and supply services, hence serving as a labour input indicator. The measure of number of scenic spots or attractions serves as a distinctive production factor that differentiates tourism from other sectors, reflecting the region's resource endowment and fundamental appeal, and is utilised to assess resource input. In the economic output indicator

system, total number of visits is used to measure market scale, which reflects the industry's market penetration, attractiveness, and activity scale, serving as the flow basis for sustainable development. And total rural tourism revenue serves as an indicator of economic benefit, reflecting the industry's financial performance and core value generation. It is directly associated with the income of rural residents and local government revenue, representing an extremely obvious measure of rural tourism's role in poverty alleviation and sustainable economic development.

Table 1

**Indicator system, data sources, and supporting literature
for county-level rural tourism inputs and outputs**

Variable type	Dimension	Specific indicator	Theoretical basis and role	Data source	Supporting literature
Input	Capital input	County fixed asset investment (10 000 yuan)	Represents the physical infrastructure capital stock required for tourism services	China County Statistical Yearbook	[32]
	Labour input	Rural tourism employment (persons)	Represents the core human resource input for industrial development	GTA database, Statistical Communiqué on the National Economic and Social Development	[33]
	Resource input	Number of scenic spots or attractions (units)	Proxies the core resource endowment for regional tourism development	Annual POI data from Amap application (deduplicated)	[34]
Output	Market scale	Total number of visits (10 000 times)	Reflects the market appeal and activity scale of the industry	County statistical bulletins (missing values interpolated)	[35; 36]
	Economic benefit	Total rural tourism revenue (10 000 yuan)	Reflects the final economic output and value creation capacity of the industry	County statistical bulletins (missing values interpolated)	[35; 36]

Note. Compiled based on a literature review and the rural tourism economic system.

Sample and data. To illustrate the general characteristics and variations in the development of rural tourism in China, we choose counties from «National demonstration county of leisure agriculture and rural tourism» in China as the primary objectives. By thoroughly evaluating aspects like county-level rural tourism trends, resource endowments, geographic conditions, and competition levels to guarantee sample variety, while ensuring data availability, this study ultimately selected 40 counties in China from 2011 to 2022 as our sample. This sample comprises some of the top ten counties from the «Top-100 counties in tourism competitiveness of China» list over the years, along with outstanding county-level cases from the official website of the Ministry of Culture and Tourism of China, illustrating the leading edge and typicality of rural tourism development in Chinese counties.

Descriptive statistics (table 2) show significant differences among variables, which is beneficial for the DEA model to effectively identify the best practice frontier. To avoid the sensitivity of the DEA method to outliers (especially positive outliers), prevent the frontier from being distorted by individual extreme high values, and reduce the influence of extreme values in the measurement of differences within counties, this paper performs tail reduction processing on the first 1 % quantiles of the original data (i. e., only processing the extreme maximum values). Efficiency was measured using *DEAP 2.1* software.

Table 2

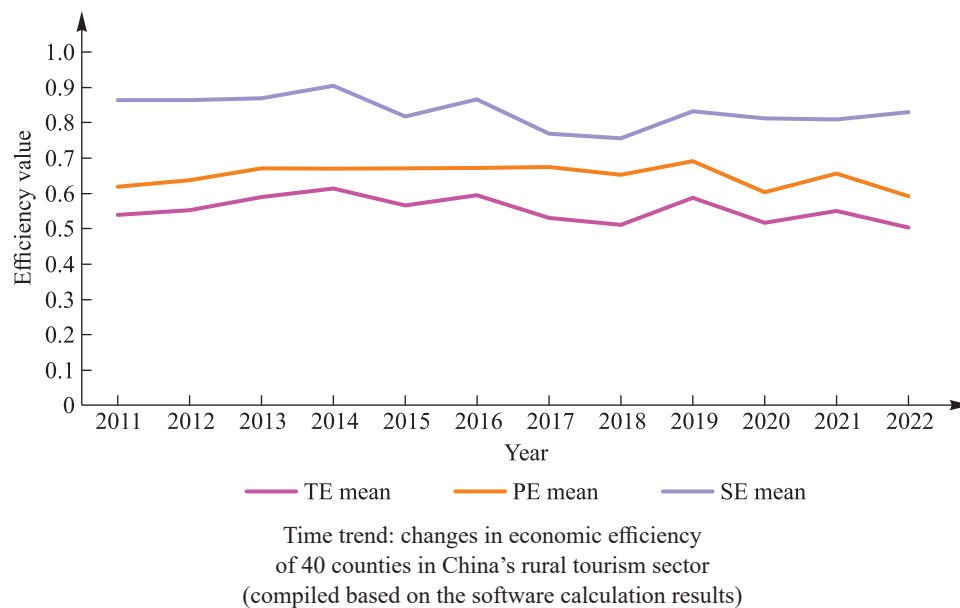
Descriptive statistics of main variables for the period of 2011–2022

Variable	Mean	Standard deviation	Minimum value	Maximum value
Tourist arrivals, 10 000 persons	701.8	538.878 8	12.3	3095.1
Tourism revenue, mln yuan	5925.7	6276.154 0	29.8	33 050.0
County-level fixed asset investment, mln yuan	14 980.9	11 473.890 0	403.7	62 514.3
Tourism industry workers, persons	234 077.3	178 467.700 0	28 532.0	751 668.0
Number of tourist attractions	5.8	4.112 4	0.5	21.0

Notes: 1. $N = 480$. The table examines the data from 40 counties over 12 years. 2. Missing values were filled using interpolation. This table shows the abbreviated information.

Empirical findings

Overall characteristics. The efficiency measurement results reveal an overall picture that urgently needs attention. As shown in figure, between 2011 and 2022, the average TE of the sample counties hovered at a low level between 0.503 (2022) and 0.615 (2014), which means that on average, nearly 40–50 % of resource input was wasted or misallocated. The decomposition of TE presents a clear «scissors difference» pattern: SE has always been running at a high level (mean range of 0.757–0.905), while PE has been sluggishly fluctuating below 0.7 for a long time. This empirical evidence strongly demonstrates that the so-called growth or development of rural tourism in China's counties over the past decade has essentially been an extensive scale-driven model relying on continuous increases in capital and factors of production, while an intensive efficiency-driven model centered on management and technological innovation has yet to be formed. PE results show that it has become the main factor restricting the improvement of TE. This means that for most counties, even if the size is appropriate (SE is acceptable), their internal management and technical processes have failed to achieve optimal resource conversion.



Spatially, there are significant differences between counties. To analyse the differences in TE among 40 counties, this paper categorises them into four types based on the mean and standard deviation of TE: efficient and stable (high mean – low standard deviation), efficient but unstable (high mean – high standard deviation), inefficient but stable (low mean – low standard deviation), and inefficient and unstable (low mean – high standard deviation). Specific results are shown in table 3.

Table 3

**Spatial differences: classification of 40 counties
based on the mean and standard deviation of TE for the period of 2011–2022**

Type	Classification criteria	Included counties	Main characteristics
Efficient and stable	TE mean $\geq$ TE median (0.579); TE standard deviation < TE median (0.313)	Shitai, Yixian, Leishan, Liuyang City, Wenchuan, Wuyuan, Deqing, Anji	Excellent and stable performance; serving as benchmarking targets
Efficient but unstable	TE mean $\geq$ TE median (0.579); TE standard deviation $\geq$ TE median (0.313)	Xinhua, Jing'an, Dunhuang City, Yuan'an, Leiyang City, Hunchun City, Taining, Baoting Li and Miao Autonomous County, Xianfeng, Langzhong City, Nanjing, Taojiang	Potential exists but performance is unstable; reasons for fluctuations need analysis
Inefficient but stable	TE mean < TE median (0.579); TE standard deviation < TE median (0.313)	Changning, Jixi, Kaihua, Mianzhu City, Tongzi, Jingxian, Dongping, Anren, Yingshan, Jinzhai, Yuanshi, Longhui	Low efficiency with little fluctuation; weakest competitiveness and potential; requiring for focused attention

Ending of the table 3

Type	Classification criteria	Included counties	Main characteristics
Inefficient and unstable	TE mean < TE median (0.579); TE standard deviation $\geq$ TE median (0.313)	Penglai City, Luanchuan, Danzhai, Dunhua City, Ningguo City, Songxian, Qionghai City, Guangnan	Low efficiency and unstable; low efficiency with some potential; room for improvement

Note. Compiled based on the software calculation results.

Diagnostic classification. To go beyond general description and gain a deeper understanding of the micro-mechanisms of efficiency differences, we classified the 40 counties into four types based on the position of each county's PE and SE values (table 4).

Table 4

County type classification based on PE and SE

Type	Included counties	Type characteristics
System-optimised (SO)	Shitai, Yixian, Leishan, Liuyang City, Wenchuan, Wuyuan, Deqing, Xinhua	Exhibit high levels of both PE and SE; represents the benchmark with the highest overall efficiency
Technology-driven (TDr)	Anji, Jing'an, Leiyang City, Langzhong City, Changning, Penglai City, Luanchuan	Characterised by relatively high PE but low SE; indicates sound production technology, yet the operational scale requires optimisation
Scale-dominant (SD)	Dunhuang City, Yuan'an, Hunchun City, Taining, Baoting Li and Miao Autonomous County, Xianfeng, Nanjing, Jixi, Anren, Guangnan, Yuanshi	Characterized by relatively high SE but low PE; indicates operation at a near-optimal scale, yet the technical proficiency level needs enhancement
Transformation-distressed (TDi)	Dunhua City, Jingxian, Jinzhai, Dongping, Danzhai, Tongzi, Yingshan, Longhui, Mianzhu City, Qionghai City, Kaihua, Songxian, Ningguo City, Taojiang	Exhibit low levels of both PE and SE; requires comprehensive improvements in both technology and scale

Note. Compiled based on the software calculation results.

SO type (high PE and high SE). These counties are achieving synergy between effective management and appropriate scale, representing the current forefront of development. By employing comprehensive strategic planning, these eight counties have consolidated their disparate ecological, cultural, and rural resources into a cohesive, branded tourism destination system, thereby facilitating a significant transition from scenic spot tourism to destination tourism and from resource dividends to system dividends.

TDr type (high PE and low SE) includes seven counties, such as Anji and Jing'an counties. The seven counties generally did not depend on significant capital investments or a significant tourist base. Instead, they attained a high return on investment by careful cultivation, innovative transformation, and efficient management of their distinctive resources. Their great efficiency originates from the exact alignment and profound synergy among resource endowment, government regulations, and market positioning.

SD type (low PE and high SE). These counties demonstrate a large scale but weak strength in resource dependence, utilising distinctive resources to draw a significant number of tourists, yet exhibiting low value conversion and operational efficiency.

TDi type (low PE and low SE). These counties highlight the entrenched challenges confronting rural tourism development in certain regions of China, which frequently display the features of possessing resources yet failing to convert them, and having developmental potential but struggling to attain high efficiency. The essence of the issue resides in their inability to effectively connect resource, developing a competitive product framework, and establishing an efficient industrial ecosystem.

Synergistic effects of resources, governance, and integration. Rural tourism resources, as the fundamental carrier and basic condition for the sustainable development of rural tourism, are an important element in guiding and constraining the direction of tourism development, stimulating market vitality, and realising the continuous transformation of rural value, which determines the potential and unique advantages of rural tourism development in counties [37]. However, resource potential does not automatically transform into industrial advantages. As the core decision-makers and managers of rural areas, county governments, through policy formulation, resource allocation and public services, and through the development model of government-led and government-enterprise cooperation, directly or indirectly determine the degree of resource allocation and

development direction of rural tourism, and are one of the core driving forces for activating resources and creating the environment [38]. Based on resources and government support, the degree of industrial integration is the evolutionary path to improve development level and economic benefits. Deep integration of agriculture and tourism, culture and tourism can expand the value chain, enhance experience and competitiveness. This is not only key to upgrading rural tourism, but also an important mechanism for enhancing the resilience of the county economy [39]. In summary, resources are the «innate condition», the government is the «core lever», and industrial integration is the «upgrading engine». These three elements together form an organic system: effective government action can revitalise resource endowments and guide and promote industrial integration, deep integration can also spawn new business models, which in turn pose new requirements for resource utilisation and government services, thereby promoting the development of rural tourism in counties to a higher level. Comparative and inductive analysis of various county-level cases shows that their efficiency structure is not accidental, but rather the result of the synergistic effect of the three dimensions of resource base, government role, and industrial integration, forming an resource-governance-integration (RGI) explanatory framework (table 5).

Table 5

Analysis of county efficiency types based on the RGI framework

Type	Typical resource characteristics	Typical government role	Typical industrial integration status	Core challenges and risks
SO	Unique, systematically integrable	System architect, market cultivator	Deep integration, forming a local industrial ecosystem	Sustainability of innovation, over-commercialisation
TDr	Distinctive but limited in capacity	Standard-setter, environment builder	Deep yet focused, high value-added	Scale ceiling, risk of model replication
SD	Monopolistic, scarce	Resource manager, infrastructure provider	Superficial, reliant on tickets and primary consumption	«Resource curse», failure in value transformation
TDi	Fragmented, homogeneous, generally unattractive	Project investor, fragmented intervener	Weak or disconnected	System failure, low-level lock-in

Note. Compiled based on information from the government websites of 40 counties.

SO type typically possesses high-quality resources that can be integrated (such as ancient village clusters and ethnic customs). Local governments play a strong role as «system architects» and «market cultivators», integrating scattered resources into a destination system through comprehensive tourism planning, unified brand marketing, and the supply of public goods. Simultaneously, tourism deeply integrates with agriculture, handicrafts, and cultural and creative industries, forming a value cycle that jointly supports high PE and high SE.

TDr type is often based on distinctive niche resources (such as bamboo forests and ecology), the government focuses more on being a «standard setter» and «environment builder», ensuring PE by setting quality standards and protecting the ecological environment. Its limited scale (low SE) may stem from its insistence on quality, ecological red lines, or focus on niche markets in regional division of labour.

SD type extremely reliant on monopolistic, non-renewable core resources (such as grottoes and Danxia landforms), the government's role tends to lean towards «ticket administrator» and «infrastructure provider». The «ticket-based economy» mindset leads to superficial industrial integration, insufficient investment in management and innovation, and a paradox of high SE (high traffic) – low PE (poor conversion rate).

TDi type often faces the dilemma of «scattered, small, and flat» resources. Government intervention may exhibit project-based and fragmented characteristics, lacking top-level system design. The low integration of tourism with the local economy prevents the formation of endogenous driving forces, resulting in a double-low situation.

Discussion and policy implications

Based on the above classification and diagnosis, a one-size-fits-all strategy is not feasible. Consequently, based on RGI, we can explore targeted strategies based on the efficiency characteristics and development features of the four types of counties.

Quality optimisation and multi-party collaborative development. In counties of SO type such as Shitai and Yi counties, the policy emphasis must transition towards mitigating potential frontier lock-in risks

and enhancing ecological efficiency, destination image and reputation, as well as the quality of the tourist experience. This entails optimising the scale and structure of investment to attain optimal returns to scale. Conversely, it promotes their own «second growth curve», utilising digital technologies (AI, XR, big data) to reshape tourist experiences and industry management, exploring market-oriented reforms of factors such as the realisation of ecological product value and the entry of collectively owned commercial construction land into the market, and promoting the extension of tourism brands into high-quality lifestyle brands, achieving a leap from tourism destination to regional demonstration zone for a better life and source of industrial innovation.

Unleashing potential. For technology-driven counties of TDr type like Anji and Jing'an (high PE and low SE), the core challenge lies in transforming their superior «point-like» management advantages into «networked» economies of scale. Policies should focus on guiding them to overcome the spatial limitations of individual high-quality projects and build a destination network. Specific pathways include planning and guiding the design of themed tourism routes across counties and townships, transforming «point-based tourism» into «linear experiences» and «networked consumption», establishing cross-administrative region alliances for brand co-construction, joint marketing investment, and profit sharing to reduce the market expansion costs for individual entities; and strengthening infrastructure connectivity to enhance seamless tourism transportation and information service interconnection between regions. The goal is to transform superior «individual technical efficiency» into «network-scale economy», breaking through scale bottlenecks without sacrificing quality.

Shifting momentum. Counties of SD type like Dunhuang City and Taining County, which are «scale-driven» (low PE and high SE), urgently need to transform their flow dependence on scarce core resources into sustainable value creation. Policies must drive their development model to resolutely shift from a scale-expansion orientation to a quality-improvement orientation. Policies should be implemented in a comprehensive manner: at the regulatory level, reform the pricing mechanism for scenic area tickets to encourage reduced reliance on ticket revenue and create space for secondary consumption; at the incentive level, establish special funds to reward the development of innovative products such as in-depth cultural experiences, high-end themed accommodations, and interactive technology projects, at the service level, the government should shift from direct management to building platforms, introducing top creative, operational, and marketing professionals to systematically enhance the industry's soft power, at the planning level, reposition the area within the regional tourism landscape, transforming it from a must-see attraction to a deep-stay destination or cultural immersion zone.

System restructuring. Counties of TDi type, such as Dunhua City and Jinzhai County, could improve efficiency by initially formulating regional rural tourism industry plans that consider resources, market demand, and their competitive advantage in rural tourism, thereby systematically creating a development blueprint. A feasible solution involves developing a profoundly value-oriented tourism plus model that intricately connects tourism routes with activities such as harvesting specialty agricultural products, participating in handicraft workshops, and engaging with intangible cultural heritage, thereby positioning tourism as a catalyst for enhancing local specialty industrial chains. A feasible solution involves developing a profoundly value-oriented tourism plus model that intricately connects tourism routes with activities such as harvesting specialty agricultural products, participating in handicraft workshops, and engaging with intangible cultural heritage, thereby positioning tourism as a catalyst for enhancing local specialty industrial chains. The fundamental assurance resides in the establishment of a novel corporate entity characterised by multi-party governance and aligned interests among the government, firms, communities, and cooperatives, hence fostering intrinsic motivation. Concurrently, it promotes the implementation of a small but beautiful and specialised and refined green development strategy, actively assimilating into provincial or national tourist routes and cultural ecological corridors, while pursuing a distinct niche within the larger context.

Conclusions and outlook

This study, through detailed measurement and structural decomposition of the economy efficiency of rural tourism in 40 counties in China, draws three progressive core conclusions:

1) rural tourism in Chinese counties is still locked in an inefficient path with low average efficiency. Furthermore, the growth over the past decade has primarily relied on the expansion of factor inputs, while the intensive development process, marked by management and technological advancements, has been slow;

2) efficiency differences have profound systemic roots. Based on the four-quadrant classification framework deconstructed by PE and SE, combined with RGI causal analysis, the inherent logic of the heterogeneity in efficiency performance among counties is revealed, providing a new analytical framework for understanding the diverse development models of rural tourism;

3) efficiency improvement requires precise governance. The differentiated governance framework proposed in this study clarifies the core contradictions and strategic priorities of the four types of counties, demonstrating the necessity and differentiated path of a comprehensive shift from scale-driven to innovation-driven development.

Theoretical contributions and practical significance. This study has certain limitations. First, the input – output indicators primarily focus on the economic dimension, and the discussion of causes is mainly based on macroeconomic data and typical case summaries. Future research could incorporate in-depth field investigations and process tracking methods to further reveal how key variables such as «government role» and «integration mechanism» specifically affect efficiency.

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Received by editorial board 10.02.2026.