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Article

Evaluating financing risk for forest recreation value development project—A case study focused on S National Forest Park in Fujian Province

Xiao-Li Yang[1,2,*], Thillai Raja Pertheban[2]

[1] College of Finance, Fujian JiangXia University, Fuzhou 350108, China
[2] Graduate School of Business, SEGi University, Kota Damansara, Petaling Jaya 47810, Malaysia
*** Corresponding author:** Xiao-Li Yang, SUKD2000723@segi4u.my

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Abstract: In the process of forest recreation value development, there are some characteristics, such as large amount of investment capital, long financing recovery cycle and high potential risks, which lead to limited capital source and prominent financing risks. To achieve sustainable development, forest recreational value development enterprises must solve the financing dilemma, therefore, it is very urgent to identify the financing risk factors. The research constructed financing risk evaluation index system through WSR (Wuli-Shili-Renli) methodology (from affair law, matter principle and human art dimensions), taking S National Forest Park at Fujian Province as a case study, the analytic hierarchy process (AHP) and fuzzy comprehensive evaluation method were used for empirical analysis. The results showed that for the first level indicators, operational risk should be paid close attention to, followed by political risk and environmental risk. Among the secondary level indicators, policy changes, financing availability and market demand need attention, which are consistent with the result of field survey. Based on that, countermeasures were put forward such as the multiple collaborative linkage and effective internal control; reduction on operating costs and broaden financing channels; encouragement diversification of investment entities and improvement of financial and credit support; strengthening government credit supervision, optimizing financing risk evaluation, and building a smart tourism financing information platform, to reduce and control financing risks, then promote the development of forest recreation value projects.

Keywords: forest recreation value; project financing risks; risk evaluation; Fujian

1. Introduction

Forest recreation refers to a variety of recreational activities carried out by tourists in the forest environment, including sightseeing, recuperation, camping, and adventure (Chen, 1994; Douglass, 1982). Forest recreation value refers to a comprehensive benefits attached to forest recreation resources, its value including forest environment produced by the forest resources and the economic benefits of forest landscape (Chen and Shen, 2000). The forest environment can bring ecological benefits to people, such as air purification, water and soil conservation, and social contribution benefits, whether they are perceived or not (Deng, 2017). The development of forest recreation value is in line with the vision of building a beautiful China.

According to the official report of market situations of culture and tourism during Mid-Autumn Festival and National Day holidays in 2023, during this period, the number estimated of domestic tourism trips in China was 826 million, an increase of 71.3% over the same period last year, and an increase of 4.1% compared with 2019 on

a comparable basis. Domestic tourism revenue reached 753.43 billion yuan, recovering to 88.6% of the same period in 2019, an increase of 1.5% compared with 2019 on a comparable basis (Zhou, 2023). Among them, the combination of forest tourism with intangible cultural heritage inheritance and night leisure is outstanding in Sichuan, Shaanxi, Fujian, Yunnan and other provinces (based on the relevant reports of the Mid-Autumn Festival and National Day holiday of the provincial culture and tourism departments 2023). The development of forest recreation value is in line with the vision of building a beautiful China. It can bring economic benefits to the recreation area and meet the sustainable characteristics of balanced development of local economy, society and environment (Feng, 2014). The in-depth and detailed research on the development of forest recreation value and the formulation of forest recreation resources development programs in line with national tourism needs can fully excavate and transform the economic value and ecological service value of forest recreation resources, and promote the implementation of the concept of "Lucid waters and lush mountains are invaluable assets" in practice. As an important representative of the development of forest recreation value, national forest park has a high degree of ornamental and ecological education value and cultural heritage, which has a unique appeal to tourists.

At present, the development funds of forest national parks in China mainly come from bank credit and government financial support. However, due to limited capital supply in the bank credit funds, the financing cost of that fluctuates from time to time, the same as the government financial funds, the influence of local government financial revenue and local government planning, sometimes those cannot be in place in time, and there are many uncertain factors during the development process. Because of the long investment cycle, unstable rate of return and the weak investment willingness of social capital and nongovernmental capital, the forest recreation development projects have fallen into the financing dilemma for a long time, which has become the restrictions of the forest recreation value development project in China. What factors lead to the frequent financing risks of forest recreation value development projects? How do these factors lead to financing risks? How to evaluate the financing problems in the process of forest recreation value development scientifically and expand the financing channels effectively has become urgent problems.

The objective of the study was to provide forest recreation enterprises management with a comprehensive understanding of the financing risk. It also helped them identify effective ways to reduce financing risks. In addition, for the regulators of local government, authorities and bureaus, the scientific assessment of financing risks of forest recreation projects is beneficial to exert certain binding force on enterprises financing behaviors, standardize their financing activities, and provide reference for formulating effective financing policies.

2. Literature reviews

At present, the research on project financing risk has been relatively mature, mainly focusing on case study analysis, or the analysis of certain specific financing risk factors. Financing risk evaluation research has also been conducted, involving

internal and external risk factors identification and risk management analysis. Some scholars mainly focused on the case study, for example, Gatti (2023) discussed about the value at risk of a project finance transaction, covering Italy Water System, Murcia Solar Power Plant cases analysis, etc.; Taghizadeh-Hesary et al. (2022) took the green energy projects as the research case, aimed at the financing risk of infrastructure construction projects in the transportation field. Gatti (2023) identified the financing risks of park construction projects in public projects.

Another part of the research began to explore specific financing risk points. Naumenkova et al. (2020) evaluated and alleviated the credit risk of project financing; Hesary and Yoshino (2020) identified the associated risks, a lower rate of return and higher risk of investment, then provided practical solutions and examples; Hafner et al. (2020) explored the investment barriers , such as the policy uncertainty and short-termism in the financial system; and Islam et al. (2017) identified and quantitatively evaluated the project financing risk at the international level, and constructed a project financing risk assessment model. At the same time, the project risk management steps were clarified.

Domestic academic circles in China have made many explorations on the financing risks of forest recreation value development projects. Firstly, it mainly included the research on the frequent factors of financing risks of forest recreation value development projects: some scholars, such as:

Lei et al. (2020) analyzed the forest right mortgage guarantee Loan, and presented the credit risk and mortgage property risk; Han (2019) identified the financing risks of Heishipo Forest Park project in Guangyuan, then pointed out 30 risk factors covered after sorting out the detailed risk list; further, Liu and Zhao (2017), made analysis on the financing difficulties of forest recreation development from internal and external factors. The internal factors involve natural resources, cultural resources, infrastructure and professional talents.

External factors include macro policies, regional environment, natural environment, investment and financing constraints and other factors; Han (2019) pointed out the risk factors such as unreasonable financing structure, imperfect financial market and poor project credit status. However, in the study of financing risk factors such as unstable expected returns, narrow financing channels, low project visibility, and limited marketization level, which Li and Su (2021). Shi et al., (2019); and Liu (2017) all pointed out.

In addition to forest parks, some scholars also carried out financing analysis on other projects with recreation value development besides forest parks. For example, Wang and Yang (2019) and Liu (2018) discussed the risk factors such as return, financing platform and financial support among the financing constraints of national reserve forest projects. Cheng (2020) solved the financing problem of forest health industry projects from the perspective of financial support.

The second is about the establishment of financing risk evaluation index system: Han (2021); Liu and Liu (2017) constructed a risk evaluation index system for tourism scenic spots, including natural risk, policy and social risk, economic risk, operation and management risk, and construction risk. Zhao and Wang (2019) constructed a financing risk evaluation system for towns with tourism characteristics from the aspects of natural risk, policy and social risk, economic risk, operation and

management risk, and construction risk.

Third, in terms of financing risk management countermeasures, scholars maintain consistent views on increasing government funding support, improving legal protection, and expanding the tourism market. Among them, Liu and Zhao (2017) put forward measures such as doing a good job in risk management, strengthening project operation management, increasing income, and reducing operating costs. Shi et al. (2019) put forward countermeasures to speed up legislation, standardized the industry and strengthened supervision.

In summary, the existing results and practical research on project financing risk evaluation have been relatively complete. Most scholars at home and abroad conducted empirical research and systematically evaluate project financing risk from the perspective of some cases, following the research paradigm of risk factor identification and analysis to risk management. The establishment of relevant evaluation indicators is also more practical. Some research results have also begun to analyze the financing risk factors of the current forest recreation value development projects, and put forward suggestions and recommendations, etc. However, there is limited research on comprehensive analysis on the financing risk evaluation index system, and some suggestions are macro-level, which is difficult to solve the current financing dilemma fundamentally. Therefore, based on the current research, the evaluation index system is constructed, and countermeasures and suggestions are put forward, to effectively solve the financing problems in the development of forest recreation value, and enhance the operational quality of the development project, as well as realize the resource's sustainable utilization.

3. Methodology

3.1. Construction of evaluation index system

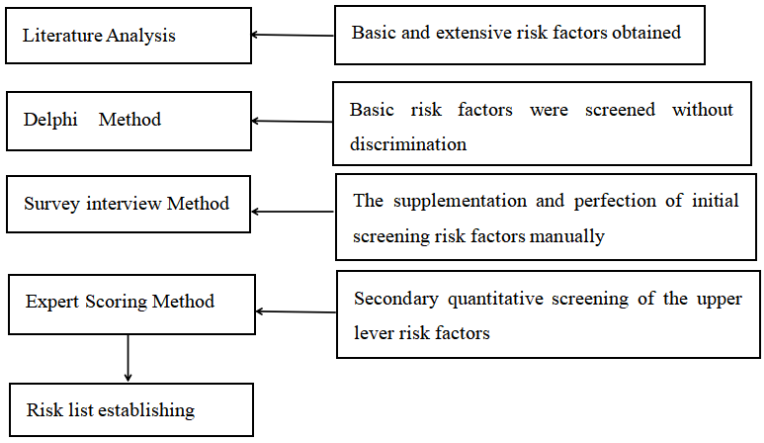

Figure 1. Financing risk identification scheme process.

Based on the basic principles of goal-oriented, scientific and objective, logical and systematic, the paper compares and contrasts the drawbacks and advantages of different risk identification methods of project financing (survey and interview method, literature analysis method, expert investigation method (Delphi method), accident tree method, Fault Tree Analysis (FTA) method, expert scoring method, etc.

After comprehensive research and evaluation of project reality, external environment, policies and systems and other factors, the following risk identification scheme is formulated. The scheme process is shown in **Figure 1**.

3.2. Analysis on financing risk formation

At present, in the financing of forest recreation value development projects in China, there are shortcomings of self-financing, limited financing from China's capital market, slow development of diversified financing channels, insufficient social capital investment, and high financing risks. In view of the characteristics of forest recreation value development project, such as large investment cost and long construction period, this paper, based on the existing literature research, the WSR methodology were used to identify effective factors from three perspectives: Wuli (affair law), Shili (matter principle) and Renli (human art), affair law refer to the objective existence of the uncertain factors of natural environment and economic and social environment during the process of forest recreation value development. Matter principle refers to the political and relevant legal policy implementation guarantee issues involved in the financing process, including related financing policies, tax policies, ecological protection policies, and administrative regulations and local regulations; human art refers to participants in the process of financing, through the organization and coordination function to deal with the relationship between people, between people and society.

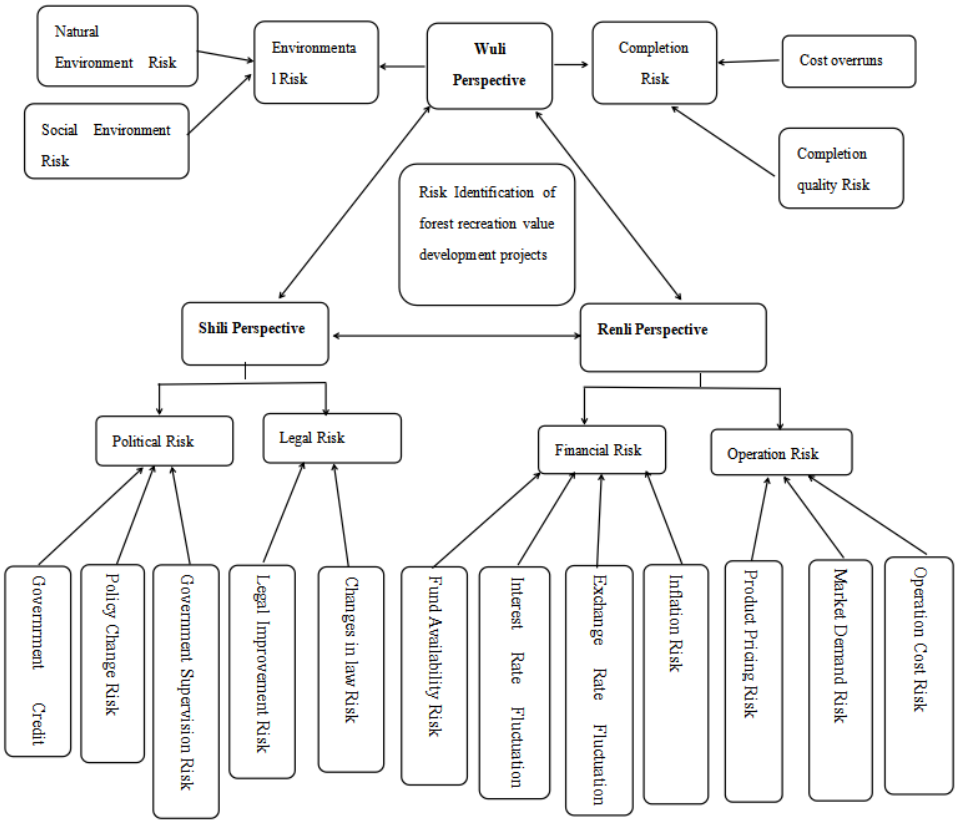

Figure 2. Framework diagram of financing risk formation of forest recreation value development.

The financing risk of forest recreation value development project involves many fields and includes many aspects. Under the guidance of WSR theory, this study preliminarily screened out risk influence factors based on field survey of national forest parks, and explored the relationship framework of project financing risk formation under the premise of scientific, comprehensive, relevant and logical, as shown in **Figure 2**.

3.3. Construction of financing risk index system

According to the risk formation relationship analysis in **Figure 1**, this study will build a preliminary financing risks evaluation system. In order to ensure the academic rigor and practical maneuverability of the evaluation system, 21 experts from the government, financial Institution, enterprises, universities and related fields were invited in this study, those are 5 experts from scientific research institutions, 5 scholars from related research fields in universities, 5 staff from financial institutions who carry out financing business related to forest recreation value development including executive and managers, and 6 enterprise managers from forest recreation value development enterprises. Experts' opinions and suggestions were collected mainly through the combination of online information collection via email and face-to-face interviews, and then summarized and merged. The time for collecting opinions is from May 2022 to October 2022. Affected by the epidemic, there are 15 experts the information collected mainly via telephone interviews and emails, and 6 experts were conducted on-site interviews. A total of three rounds of consultation were conducted. After the end of the first round, the evaluation system was adjusted and improved, and then the second round of consultation and then the third round. After the feedback of the three rounds of evaluation is summarized, the weighted average method is used to determine. Finally, according to the principles of combining qualitative and quantitative, information optimization and maneuverability, the repetitive indexes are eliminated and the risk evaluation indexes of forest recreation value development projects are screened out.

In this study, S National Forest Park at Fujian Province was selected as the case to conduct field survey. Since it has been completed and started operation, the criterion layer of completion risk was excluded. According to the results of investigation and expert consultation, this study continued to evaluate these indicators by Delphi method, screened many indicators at various levels, and finally determined the financing risk evaluation index system of forest recreation value development projects, which covered 5 first-level indicators and 14 second-level indicators. The index system covers the political, financial and social risks that may arise in the process of recreation value development, which is in line with the characteristics of a wide range of risks, a long return period and many uncertain factors in the process of forest recreation value development. The details are shown in **Table 1**.

Table 1. Financing risk evaluation index system of forest recreation value development projects in S National Forest Park in Fujian Province.

Target tier	Criterion tier	Index tier	Explanation
Forest recreation value development project financing risk	Political risk B1	Government credit risk C11	Contract extension, industrial policy support and cash flow risk caused by government investment delay.
		Policy change risk C12	Environmental protection and risk protection requirements change, financing policy support change.
		Government supervision risk C13	Changes in the operation status of scenic spots and changes in senior management personnel caused by government supervision.
	Financial risk B2	Fund availability risk C21	Availability of financing, cost of financing, diversity of financing channels.
		Interest rate fluctuation risk C22	The change of interest rate causes the increase of financing cost and the change of credit capital supply.
		Exchange rate fluctuation risk C23	The foreign exchange income of recreation increases and decreases and the increase of the debt cost caused by the exchange rate fluctuation.
		Inflation risk C24	Changes in cash flow and the increase of the cost of loans caused by changes in inflation.
	Operation risk B3	Product pricing risk C31	The unreasonable ticket prices and recreation related derivative products pricing leads to the loss of tourists.
		Operation cost risk C32	Poor management of operation organization; The project is unprofitable;
		Market demand risk C33	Loans can't return on time. Market share, the position in the same level of recreation market declined.
	Legal risk B4	Legal improvement risk C41	Relevant industry standards and market access rules are constantly revised and improved.
		Change in law risk C42	Changes in relevant laws, regulations and preferential tax policies.
	Environmental risk B5	Natural environmental risk C51	Natural disasters, ecological environmental damage, geological conditions, landform changes, etc.
		Social environmental risk C52	Destruction of cultural landscape; the integration with local customs and habits.

3.4. AHP analysis of project financing risk evaluation index weight

The financing risk of forest recreation value development involves many fields, numerous evaluation indicators are presented while cannot be quantified. Therefore, this study uses the Analytic Hierarchy Process (AHP) to determine the weight of financing risk evaluation indicators. This method needs experts in relative research fields to evaluate and score, and quantify some subjective evaluation, which is widely used in risk evaluation (Xing and Dong, 2020).

3.5. Determination of the weight of first-level indicators

Table 2. One-nine scales method.

Scale	Meaning
1	The two indicators are equally important
3	The former indicator is slightly more important
5	The former indicator is obviously more important
7	The former indicator is much more important
9	The former indicator is extremely more important
2, 4, 6, 8	The median of neighboring judgments
The reciprocal of the scale	If the scale of indicators i and j is ∂_{ij}, the scale of indicators j and i is $\frac{1}{\partial_{ij}}$.

As shown in **Table 1**, the financing risk evaluation system of forest recreation

value development projects is divided into three levels, including target level, criterion level (primary index) and index level (secondary index). Using the nine-level scaling method (see **Table 2**), the relative importance of political risk, financial risk, operational risk, legal risk and environmental risk to financing risk is compared in pairs, and the comparison matrix is obtained. Then the weight vector for each evaluation indicator is calculated by normalizing the vector.

Next, a consistency test is performed. The maximum characteristic root $\lambda_{\max}$ can be calculated from the following Equation (1), and then it can be substituted into the formula $CI = (\lambda_{\max} - n)/(n-1)$ to calculate *CI*; According to the standard *RI*, as shown in **Table 3**, and according to the formula $CR = CI/RI$, it can be obtained that this index *CR* which represents the consistency ratio. If $CR \leq 0.1$, pass the consistency test; After data calculation and consistency test on the judgment matrix of the 21 experts one by one, it is found that the value of the judgment matrix *CR* of 20 experts is less than 0.1, which has consistency and conforms to the judgment logic, and has passed the consistency test.

$$\lambda_{\max} = \frac{1}{n}\sum_{i=1}^{n}\frac{(A\omega)_i}{\omega_i} \tag{1}$$

Table 3. Consistency test *RI* value standard.

Rank	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7	Rank 8
RI	0	0	0.52	0.89	1.12	1.16	1.32	1.41

In the comparison matrix $R - B$ and its weights, the calculation results are shown in **Table 4**. $CR = 0.053 \leq 0.1$. The consistency test passes and the error is within an acceptable range. The weight vector value of the first level index to the target layer is W = (0.2680, 0.1172, 0.3134, 0.1092, 0.1922).

Table 4. The results of the first level index weight and consistency test.

R	***B*1**	***B*3**	***B*4**	***B*5**	**Weight**	**Consistency test**
B_1	1	1/5	1/3	1/9	0.2680	
B_2	7	3	5	1/3	0.1172	*CI* = 0.059
B_3	5	1	3	1/5	0.3134	*RI* = 1.12, *CR* = 0.053 ≤ 0.1
B_4	3	1/3	1	1/7	0.1092	Consistency test passed
B_5	9	5	7	1	0.1922	

3.6. Determination the weight of secondary indicators

Similarly, this study considers that 20 experts who passed the test are equally important, that is, the scoring weights are the same. Then the data of these expert questionnaires are calculated, and the paper's evaluation system weight value has been calculated. The weights of secondary indicators and comprehensive weights after processing are shown in **Table 5**.

Table 5. Financing risk evaluation index weight.

First level indicator code	First level indicator weight	Second level indicator code	Second level indicator weight	Greenery weight	sort
*B*1	0.2680	*C*11	0.4778	0.1281	3
		*C*12	0.3908	0.1047	4
		*C*13	0.1314	0.0352	9
*B*2	0.1172	*C*21	0.5638	0.0661	8
		*C*22	0.2384	0.0279	11
		*C*23	0.0686	0.0080	14
		*C*24	0.1292	0.0151	13
*B*3	0.3134	*C*31	0.1047	0.0328	10
		*C*32	0.4287	0.1344	2
		*C*33	0.4665	0.1462	1
*B*4	0.1092	*C*41	0.1688	0.0197	12
		*C*42	0.8312	0.0908	7
*B*5	0.1922	*C*51	0.525	0.1009	5
		*C*52	0.475	0.0913	6

In the comprehensive ranking, individual indicators such as market demand risk, operating cost risk, government credit risk, policy change risk, natural environment risk, social environment risk, legal change risk and financing availability risk are highly important to the overall goal of financing risk evaluation of S National forest Park project.

3.7. Fuzzy comprehensive evaluation of financing risk

The fuzzy comprehensive evaluation method can be uses to better solve the problem that fuzzy is difficult to quantify. In the specific implementation process, the first step is the determination of the evaluation index and the comment set, the second step is the determination of the weight vector set A and the construction of the weight judgment set R, and the last step is the calculation of the weight and the decision evaluation (Xu and Feng, 2019).

According to the risk evaluation index system of forest recreation value development financing, the first level indexes are identified as political risk, financial risk, operational risk, legal risk and environmental risk. According to the risk attributes of forest recreation value development financing and expert suggestions, review sets *V* is divided into five risk levels: According to the division of expert suggestions and review sets, a score set will be established.

The score value [0, 2] represents a low level of impact of the index on financing risk, resulting in little loss; similarly, [2, 4] represents a low risk, a low degree of impact of the risk, [4, 6] a general risk, the risk does exist, and will have a certain impact on the economy and society; [6, 8] represents a high risk, which may cause a large economic loss or impact, [8, 10] represents a very high risk. Once it happens, it will cause serious economic loss or social impact (Liu and Liu, 2017).

4. Results

4.1. Result of financing risk assessment

Due to the relevant official data of forest recreation value project is less available, relatively insufficient data and information transparency, the determination of risk factors can not completely rely on objective data, so this article took full advantage of the fuzzy comprehensive evaluation method, in order to guarantee the objectivity of the evaluation, avoided mentioned risk index system of expert group members, to set up the panel.

The participants of the group, including relevant regulators and researchers from financial institutions, government bureaus and universities, as well as managers of forest recreation development project enterprises and forest recreation operation enterprises, communicated via telephone, online and email, and asked each participant to score according to the corresponding scores of the review matrix and compare with the indicators in an anonymous way, as shown in Appendix. Based on the fuzzy comprehensive evaluation method, the risk evaluation results are calculated as shown in **Table 6**.

Table 6. Results of financing risk evaluation of forest recreation value development projects based on fuzzy comprehensive evaluation method.

Primary index		**Secondary index**		**Risk evaluation results**				
Indicator	**Weight**	**Code**	**Weight**	**Lower risk**	**Low risk**	**General risk**	**High risk**	**Higher risk**
*B*1 Political risk	0.268	*C*11	0.3609	0.09524	0.52380	0.1905	0.09524	0.00000
		*C*12	0.4072	0.04760	0.2381	0.5238	0.1905	0.00000
		*C*13	0.2319	0.4762	0.3810	0.0953	0.04760	0.00000
*B*2 Financial risk	0.1172	*C*21	0.4889	0.000	0.3333	0.5238	0.1429	0.00000
		*C*22	0.2465	0.1429	0.8095	0.04760	0.00000	0.00000
		*C*23	0.0857	0.9524	0.0476	0.00000	0.00000	0.00000
		*C*24	0.1789	0.0952	0.7619	0.1429	0.00000	0.00000
*B*3 Operational risk	0.3134	*C*31	0.1129	0.09523	0.6667	0.28570	0.00000	0.00000
		*C*32	0.4072	0.0952	0.6667	0.2857	0.00000	0.00000
		*C*33	0.4798	0.00000	0.5455	0.5238	0.3640	0.00000
*B*4 Legal risk	0.1092	*C*41	0.3045	0.7619	0.1429	0.0952	0.00000	0.00000
		*C*42	0.6945	0.5239	0.3333	0.1428	0.00000	0.00000
*B*5 environmental risk	0.1922	*C*51	0.5433	0.14290	0.52380	0.1429	0.1910	0.00000
		*C*52	0.4567	0.04760	0.7143	0.2381	0.00000	0.00000

According to **Table 6**, the research established Fuzzy Comprehensive Evaluation matrix, the risk evaluation matrix of first-level indicators, showed as follows:

$$R_{B1} = \begin{bmatrix} 0.09542 & 0.5238 & 0.1905 & 0.1905 & 0 \\ 0 & 0.2381 & 0.5238 & 0.1906 & 0 \\ 0.4762 & 0.381 & 0.1429 & 0 & 0 \end{bmatrix}$$

$$R_{B2}=\begin{bmatrix}0 & 0.3333 & 0.5238 & 0.1429 & 0\\ 0.1429 & 0.8095 & 0.0476 & 0 & 0\\ 0.9524 & 0.0476 & 0 & 0 & 0\\ 0.0952 & 0.7619 & 0.1429 & 0 & 0\end{bmatrix}$$

$$R_{B3}=\begin{bmatrix}0.0952 & 0.6667 & 0.2857 & 0 & 0\\ 0.0476 & 0.3333 & 0.619 & 0 & 0\\ 0 & 0.5455 & 0.458 & 0.122 & 0\end{bmatrix}$$

$$R_{B4}=\begin{bmatrix}0.7619 & 0.1429 & 0.0952 & 0 & 0\\ 0.5239 & 0.3333 & 0.1428 & 0 & 0\end{bmatrix}$$

$$R_{B5}\begin{bmatrix}0.1429 & 0.5238 & 0.1429 & 0.1914 & 0\\ 0.0476 & 0.7143 & 0.2381 & 0 & 0\end{bmatrix}$$

4.2. Single risk assessment

In order to understand the political risk, financial risk, operational risk, legal risk and environmental risk in the development and financing process of the recreation value of S National Forest Park, the article presents the risk evaluation outcomes of first-level indicators using the formula based on the fuzzy matrix and weights of the indicators, as shown in **Table 7**.

Table 7. S National forest Park recreation value development index risk evaluation results.

V_B	Lower risk	Low risk	General risk	High risk	Higher risk	Risk evaluation level
V_{B1}	0.145	0.379	0.326	0.15	0.000	0.379/low Risk
V_{B2}	0.134	0.503	0.293	0.070	0.000	0.503/low risk
V_{B3}	0.03	0.39	0.458	0.122	0.000	0.458/general risk
V_{B4}	0.596	0.275	0.128	0.000	0.000	0.596/lower risk
V_{B5}	0.099	0.611	0.186	0.103	0.000	0.611/low risk

As can be seen from the single risk evaluation in **Table 7**, operational risk is "general risk", among those of secondary index, market demand risk and operating cost risk should be paid more attention to. Political risk, financial risk and environmental risk and other single risks belong to "low risk" level, but there are still single risks such as political credit and financial risk, the availability of financing will be affected by the long return cycle of the projects. It is more susceptible to changes in the supply and demand of the credit capital market, and the rise in interest rates directly leads to surge in funding costs. Natural disasters and other potential risks exist in environmental risks, and natural environmental risks cannot be ignored. Although the legal risk is a "very low risk", due to changes in environmental protection laws and regulations and tourism financing support policies, it will affect the timely availability and adequacy of financing funds, then affect the smooth development of the project. The change of taxes and financing preferential policies will also easily have influence on the enthusiasm of recreational value development and the sustainability of profits.

4.3. Comprehensive risk assessment

Further, according to the above first-level index (criterion layer) risk evaluation matrix, combined with the first-level index weight matrix, the second-level index (index layer) risk evaluation matrix, combined with the index weight of the index

layer, the formula can be used to obtain the first-level index (criterion layer) and second-level index (index layer) financing comprehensive risk evaluation vector R_1 and R_2:

$$R_1 = W_1 \times V_1 = (0.2680\ 0.1172\ 0.3134\ 0.1092\ 0.1922)$$
$$= \begin{bmatrix} 0.01904 & 0.4762 & 0.2857 & 0.0476 & 0 \\ 0.5714 & 0.3809 & 0.0476 & 0.0476 & 0 \\ 0.2381 & 0.3333 & 0.3333 & 0.0952 & 0 \\ 0.8095 & 0.0952 & 0.0952 & 0 & 0 \\ 0.2381 & 0.4285 & 0.2857 & 0.0476 & 0 \end{bmatrix} (0.3254\ 0.367\ 0.252\ 0.057\ 0.000)$$

$$R_2 = W_2 \times V_2$$
$$= \begin{pmatrix} 0.1281\ 0.1047\ 0.0352\ 0.06610\ 0.02790\ 0.0080\ 0.01510\ 0.03280\ 0.13440 \\ 0.14620\ 0.01970\ 0.09080\ 0.10090\ 0.09130 \end{pmatrix}$$
$$\begin{bmatrix} 0.04760 & 0.52380 & 0.33300 & 0.09524 & 0 \\ 0.04760 & 0.52380 & 0.38100 & 0.04760 & 0 \\ 0.19050 & 0.38100 & 0.38100 & 0.04760 & 0 \\ 0.04760 & 0.80950 & 0.14290 & 0 & 0 \\ 0.28570 & 0.66670 & 0.04760 & 0 & 0 \\ 0.95240 & 0.04760 & 0 & 0 & 0 \\ 0.52380 & 0.47620 & 0 & 0 & 0 \\ 0.09520 & 0.61900 & 0.28570 & 0 & 0 \\ 0 & 0.38100 & 0.6190 & 0 & 0 \\ 0 & 0.28570 & 0.7143 & 0 & 0 \\ 0.8571 & 0.1429 & 0 & 0 & 0 \\ 0.6667 & 0.3333 & 0 & 0 & 0 \\ 0.1429 & 0.5238 & 0.3333 & 0 & 0 \\ 0.0476 & 0.7143 & 0.2381 & 0 & 0 \end{bmatrix}$$

In order to better present the results, the study put the risk assessment results into **Table 8**.

Table 8. Results of risk evaluation based on fuzzy comprehensive evaluation method.

	Lower risk	**Low risk**	**General risk**	**High risk**	**Higher risk**	**Maximum degree/risk evaluation level**
Primary indicator	0.324	0.367	0.252	0.057	0.000	0.367/low risk
Secondary indicator	0.144	0.479	0.359	0.019	0.000	0.479/low risk

As can be seen from **Table 6**, the weight value of lower risk in 5 evaluation sets of primary indicators (criterion layer) is the highest (0.367), and the weight value of lower risk in 5 evaluation sets of 14 indicators in secondary indicators (index layer) is the highest (0.479). According to the principle of maximum membership degree, S The comprehensive risk evaluation of the first level index criterion level and the second level index level of national forest park project financing belong to the "low risk" level.

5. Conclusion

1) The field survey results show that the funds for the development of S National Forest Park at Fujian Province mainly come from bank credit and government financial funds, of which bank credit accounts for about 70% and the government contributes about 30%. The bank credit financing costs accounts for more than 1/5 of the total annual operating cost of the scenic spot, and the financing cost

burden is prominent. The consistency of the study's evaluation outcomes with the results of the index system established in the study, which supports the scientific nature and proper construction of the index structure.

2) At present, the results of financing risk evaluation of forest recreation value development projects show that operational risk is the most prominent risks among the first-level indicators. The reason is that the epidemic prevention and control policy restricts the flow of people to some extent, which has an impact on tourism-related industries, and the surrounding homogenization of recreational products and services and the diversion of tourists caused by market competition. Increased operating costs due to increased disaster prevention costs due to climatic and geological reasons, as well as insufficient market demand, reduced overall project revenue, highlighting the risk of increased costs. Therefore, stimulating market demand, reducing operating costs and increasing project income are the key points to promote the smooth financing availability of forest recreation value development projects.
3) Among the secondary indicators, policy change has the most significant influence on political risk, financing availability has the on financial risk, market demand has the most significant influence on operational risk, and natural environment has the most significant influence on environmental risk. Market demand and operating costs directly affect the operating income and profitability of forest parks, and policy changes will affect the continuation of relevant support and preferential policies; The availability of financing funds is easily affected by the changes of supply and demand in the credit capital market, and the rise of interest rates directly causes the surge of financing costs. The destructive power of potential risks, such as natural disasters, all these make financing more difficult.
4) The influence of political risk weights ranked after operational risk, followed by environmental risks. Moreover, external political environment and the natural environment factors for the development of forest park recreation value evaluation of project financing have greater influence than other secondary factors. The influence of financial risk and legal risk on financing risk evaluation is similar, which shows that the influence of financial credit factors and legal system on financing is equally important. Therefore, while strengthening the supervision of political credit and preventing natural disasters in advance, the study indicate improving financial credit support and enhancing the policy and legal environment are crucial to promote forest recreation value development.

6. Countermeasures and suggestion

6.1. Diversified coordination and linkage to stimulate market demand

In view of the risk of market demand, in terms of land location, the radiation areas around forest recreation points should be mainly developed. In terms of recreation characteristics, forest recreation resources should be integrated to sustainable utilization of recreational resources. Forest recreation must be based on the characteristics and recreational functions of resources, and on the premise of in-depth exploration of local history and culture and protection of ecological environment, to build a complete and developed recreational product system integrating tourism,

leisure, health care and scientific research.

Firstly, financing support plan for tourism industry clusters should be implemented. S National Forest Park at Fujian Province is located in an area with developed ceramic industry, and has a Red Revolution site and meteorites. These features can be highlighted in the construction of forest recreation spots and product development (Gong et al., 2020). By setting up science exhibition halls and using modern scientific and technological means such as sound, light and electricity, information such as climate, landform and vegetation types of S National Park can be vividly displayed in detail. In addition, the special cultural elements such as "ceramic culture" and "non-body inspection tour" will enhance the cultural connotation of forest tourist attractions, effectively enhance the knowledge-based and interesting leisure experience through the intangible cultural heritage ceramic making experience tour, ceramic craft tour and other ways, promote the integrated development trend of tourism in various aspects, and appropriately implement the financing support plan for tourism industry clusters.

Secondly, from the perspective of stimulating the demand of recreational users and the supply of recreational products, the establishment of diversified and coordinated tourism financing support and support policies are essential. Policy levers such as entrepreneurial financing and preferential policy loans can be used to leverage forest farmers and social capital along tourist routes to build forest recreation projects such as forest health care, labor experience and summer vacation leisure. Continuously enriching the product connotation, enhancing the recreation experience, and developing unique recreation projects are vital for the project's development innovation. To enrich leisure products with market orientation, it is necessary to master the consumer demand and consumption power of tourists, then achieve differentiated competition and establish brand effect.

6.2. Effective internal control to reduce operating costs

In terms of reducing operating costs, select experienced or reliable operators, as far as possible to clarify the responsibilities of social capital, social capital should have a clear business mode. To adopt flexible management and organization methods, it is necessary to pay attention to changes in the market economy and corporate environment at any time, prevent business risks, and achieve project operation objectives.

On the one hand, the responsibility of social capital should be clarified, social capital should have a clear business model, ensure that the operation project is economically feasible, protect its reasonable business interests, and assume corresponding risks to safeguard the public interest. In terms of effective implementation of internal control, by improving the internal financial evaluation system, the project operating company can also make full use of financial instruments to control market risks and reduce the overall project operational risks (Jiang, 2022). Most of the forest parks have particular geological conditions, and it is necessary to carry out regular investigation of hidden dangers of natural disasters, establish and improve the supervision and assessment mechanism of facilities and the supervision mechanism of risk responsibility. On the other hand, the realization of risk isolation

and limited financing recourse is the biggest demand for the establishment of project operating companies. The division of responsibilities is divided into risk management responsibilities and supplementary responsibilities for the project, but the responsibility cannot be extended to all project matters. Social capital should do a good job in risk identification, prediction, planning, response and monitoring to form a closed loop of risk management, so that risk management can be implemented, tracked and controlled in a timely manner, and the role of risk management can be maximized.

6.3. Encourage diversification of investment entities and expand financing channels

Under normal circumstances, if the local government's financial resources allow, it can directly invest in the infrastructure construction of forest recreation value development projects, so that the projects can operate normally. In the case of weak financial resources, the problem of insufficient development funds can be solved through state investment, social financing, investment promotion and other ways, such as expanding financing PPP model, EOD model, etc., and issuing special green bonds for forest recreation value development (Zhu and Liu, 2021). Explore the establishment of forest recreation product assets and product evaluation system, support the revitalization of cultural and tourism enterprise assets, and realize asset securitization financing. Strengthen the diversification of financing, raise funds extensively, and establish and improve the financing audit mechanism of forest recreational value development projects, so as to guarantee and accelerate the socialization process of development and project construction.

In the development and financing process of S National Forest Park in Fujian Province, the funds mainly come from the government and bank credit with great financing pressure and high cost. How to expand financing channels? Firstly, we can consider actively accepting private capital, foreign capital and joint-stock enterprises to participate in the development of forest recreational value, seeking the symbiotic development of industrial structure, and striving for win-win cooperation in market competition; Secondly, the design of asset securitization products that can develop forest recreation value, so as to increase the investment attraction and push it to the public eye in this way (Zhu and Liu, 2021); Thirdly, some new and small tourism investment projects, such as camping, grass skiing, network red theme punch points, can properly absorb private capital. As the main body of various types of investment, tourism service providers are responsible for introducing new forms of tourism, raising various types of investment required for tourism services, developing the market of new forms of tourism, bearing the investment risks of new forms of tourism, and enjoying the return on investment of new forms of tourism.

6.4. Perfect the financial credit support, strengthen the supervision of the government credit

In July 2022, the Central bank and the Ministry of Culture and Tourism jointly issued the Notice on Financial Support for the Recovery and Development of the Cultural and Tourism Industry, proposing to further broaden financing channels for cultural and tourism enterprises and increase support for eligible cultural and tourism

enterprises to issue bonds. In terms of financial support for forest recreation value development projects, innovative credit varieties and models should be developed to support various financing needs of the recreation development industry, and it can be attempted to combine with farmers' joint guarantee loans, small guaranteed loans and poverty alleviation loans to carry out bundled credit.

Expand the forest right mortgage forest recreation projects, and give them discount in such aspects as amount, term, interest rate, and perfect the financial supervision and regulation department to establish the relevant statistics of the loan system, expanding the scope of the credit system and credit reporting, establishing and perfecting a high-level forest right as soon as possible transfer of trading platform, form the financial boost project financing guarantee system for the development of forest recreation value.

In terms of financing support for forest recreation value development, the government should continue to improve the financing management rules for forest recreation value development projects, strengthen the constraints on government credit, and jointly deal with market demand risks with project operating companies. In the top-level legislative design, it is necessary to clarify the industry standards for the development of forest recreational value, attach great importance to the improvement of supporting systems in the process of institutional change, clarify the responsibility investigation and treatment of illegal acts, analyze the possible risks of existing projects that have been abandoned, and cooperate with professional institutions and personnel to evaluate and revise projects in a timely manner to reduce the risks to an acceptable level. At the same time, the government should also set up a special department for environmental protection and financing risk, responsible for government credit supervision, and continuous supervision of the market of recreational value development related products, emphasizing the concept of public management and collaborative innovation, and standardizing and creating a good market atmosphere and environment (Han, 2019).

6.5. Strengthen the organizational guarantee and optimize financing risk assessment

The financing risk factors of forest recreation value development projects are widely distributed in time and space, so traditional risk assessment techniques are not complete for achieving the expected effect. However, there is lack of scientific and sound financing risk assessment system, which is not conducive to promoting the scientific construction and sustainable development of risk prevention system. Therefore, in the process of practice, it is necessary to first improve the organizational structure of risk management under the background of internal control system and improve the organizational guarantee of financing risk evaluation, which requires forest recreation operation enterprises to independently establish risk management departments or positions, so as to refine the division of labor in operation and financing risk information collection, risk list preparation and risk assessment report issuance. Finally, ensure that the operating enterprises can effectively control the financing risk.

Secondly, the improvement of the financing plan supervision mechanism of tourism enterprises, and the real information communication of financing activities,

comprehensive feasibility assessment, reliable implementation of financing risk control process, are all vital to ultimately enhance the order of corporate financing activities and improve financing efficiency (Wan, 2019). Besides, timely development of financing risk assessment plans, the establishment of clear risk management objectives, risk management organization system, the development of various risk management principles, as well as risk emergency treatment principles, the establishment of risk prevention mechanisms are all important. Then a modern awareness of risk assessment should be established, and the software and hardware environment of risk information management in time should be constructed, so as to provide information technology guarantee for the risk assessment of forest recreation value development financing.

6.6. Extend the tourism ecological industry chain and build a smart financing information support platform

The rapid emergence and evolution of the digital economy has created new opportunities for the development of smart tourism cities, which are being developed using the latest technology platform and resources to improve the efficiency and effectiveness of their operations. Through the forest tourism information "three networks and one database", ("three networks" including tourism government network, tourism information network, office automation network, "one database" refers to the comprehensive tourism database) in the development of tourism e-commerce, forest recreation product marketing, tourism accommodation, hotel catering management field to play a huge role, thus extending the tourism industry chain, promote and promote the generation of new tourism formats.

Focusing on the project financing needs, an intelligent financing information support platform system should be built for forest recreation value development, which would integrate various financing service functions such as credit financing, ownership financing, and intangible asset pledge financing, and launch green project financing products independently, or innovate special financing services for forest recreation value development. Through the construction of a smart financing information service system integrating a variety of financing functions, it supports the one-stop processing of related financing applications (Liu, 2021). Through the platform, various elements, links and participants involved in the financing of forest recreational resource value development projects can be provided with convenient financing services, efficient financing information services for operating enterprises, and innovative management means and data support for the regulators of local regulators of local authorities (Dai, 2020).

Notes: This paper presents the first-hand data collected during the field survey, and at the request of the management of the park development enterprise, the name of the national forest park was removed and replaced by "S".

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Appendix

Table A1. Summary of 21 experts ratings of evaluation index system of recreation value of S National Forest Park in Fujian Province.

Criterion tier& weight	**Index tier**	**Weight for index tier**	**Results of each experts rating**																				
*B*1 0.2680	*C*11	0.12810	5.5	2.5	3.5	2.5	4.5	3.0	4.0	3.5	3.0	3.0	5.0	3.0	4.5	6.0	5.0	4.0	3.5	4.5	6.0	3.0	6.0
	*C*12	0.10470	6.0	3.0	4.0	2.0	6.0	3.5	3.5	4.0	3.5	3.5	5.5	2.5	4.0	5.5	5.5	4.5	4.0	4.0	5.0	2.5	5.5
	*C*13	0.03520	5.0	2.0	3.0	2.0	5.0	3.0	3.0	3.0	2.5	2.5	3.5	2.0	3.0	4.0	4.0	3.0	3.0	3.5	3.5	2.0	3.5
*B*2 0.1172	*C*21	0.06610	3.0	5.0	3.5	3.5	3.0	5.0	3.5	2.5	4.0	2.5	3.5	5.0	3.5	2.5	2.5	3.0	4.5	3.0	2.5	2.0	3.0
	*C*22	0.02790	2.5	4.0	3.0	3.0	2.5	4.5	3.0	2.0	3.0	2.0	3.0	4.0	3.0	2.0	2.0	2.5	4.0	2.5	2.0	1.5	2.5
	*C*23	0.00800	1.0	1.0	1.0	1.0	0	1.0	1.0	0.5	0.5	0.5	1.0	0.5	0.5	1.0	0.5	0.5	1.0	1.0	1.0	0.5	0.5
	*C*24	0.01510	2.5	3.5	2.5	3.0	2.0	3.5	2.0	2.0	3.5	2.0	3.0	3.0	2.5	2.0	1.5	2.0	3.0	2.0	2.0	1.5	2.0
*B*3 0.3134	*C*31	0.03280	3.0	2.0	4.0	3.5	3.0	5.5	4.5	4.0	4.5	4.5	4.0	4.0	3.5	3.5	3.0	4.5	2.0	4.5	4.0	3.0	2.5
	*C*32	0.13440	3.0	2.5	5.5	4.5	3.5	6.0	5.5	5.5	6.0	5.5	5.0	6.0	5.5	4.0	4.0	5.0	3.5	6.0	5.0	4.0	3.5
	*C*33	0.14620	3.5	2.5	6.0	5.0	4.0	6.0	5.0	6.5	5.5	6.0	4.5	5.5	5.0	4.5	3.5	6.0	3.0	6.5	6.0	4.5	4.0
*B*4 0.1092	*C*41	0.01970	3.5	2.0	1.5	2.0	4.5	1.5	1.0	1.5	1.0	1.0	3.5	2.0	2.0	1.5	1.5	1.0	1.5	1.0	0.5	1.0	1.5
	*C*42	0.09080	4.0	2.5	2.0	2.5	4.0	2.0	2.0	1.5	1.5	1.5	4.0	2.5	2.5	2.0	2.0	2.0	2.0	1.5	1.0	1.0	2.0
*B*5 0.1922	*C*51	0.10090	2.0	6.0	4.0	6.0	3.5	4.0	4.5	4.0	2.0	4.5	2.0	3.0	3.0	3.5	6.0	3.5	5.5	3.0	2.5	5.0	4.0
	*C*52	0.09130	2.5	5.5	3.5	5.0	4.0	3.5	4.0	3.0	2.5	4.0	2.5	2.5	3.5	3.0	5.5	3.0	5.0	3.5	3.5	5.5	4.5