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Original Paper

Harnessing Asset-Backed Securities to Solve the Financing Problem of China's Sports Venues: AHP Risk Analysis Methodology and Empirical Study

Xinyang Li[1*] & Zhiyuan Wang[1]

[1] The International College of Football, Tongji University, Shanghai, China

[*] Xinyang Li, The International College of Football, Tongji University, Shanghai, China

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Abstract

Financing sports stadiums in China is challenging due to government fiscal pressure, market competition, and risk management. This study explores an innovative financing model - Asset-Backed Securities (ABS) - and evaluates its risk factors using the Analytic Hierarchy Process (AHP). The AHP method decomposes the problem into goal, criterion, and indicator layers, constructs judgment matrices by pairwise comparisons, and calculates the weight vectors of each factor, thus obtaining the relative importance of each risk factor for ABS financing. The results indicate that cash flow instability, tax policy, and credit rating are the most important factors in operational risk, policy risk, and financing risk, respectively. This study suggests that ABS financing provides an effective and flexible financing method for China's sports stadiums, which can alleviate the government's fiscal burden, enhance the operational capacity of the venues, and promote sustainable development.

Keywords

Stadium Financing, Asset-Backed Securities (ABS), Risk Management, Analytic Hierarchy Process (AHP)

1. Introduction

Traditionally, the government has been the main source of funding for sports stadiums and facilities. As they are regarded as public goods, which can provide non-excludable and non-rivalrous benefits to the general public. In any case, relying only on the public sector to bear the financial burden of these projects is not a sustainable or efficient solution. Many studies have shown that hosting mega-events such as the Olympics or the World Cup often fails to generate significant profits or long-term economic growth for the host cities or countries (McBride & Manno, 2020). Instead, they impose substantial costs on the

taxpayers (Walla, 2017), who have to subsidize the construction and maintenance of the stadiums (Matheson, 2023), as well as cope with the environmental and social impacts of these events. Moreover, many stadiums become underutilized or even abandoned after the events (Cerezo-Esteve, Inglés, Segui-Urbaneja, & Solanellas, 2022), resulting in a waste of valuable resources.

In light of these challenges, this article seeks to examine practicable financing models for large sports stadiums. Which can relieve the government's financial pressure, enhance their operational capabilities, and stimulate sustainable economic development. Within the field of stadium financing, a global series of twelve distinct approaches is discernible, encompassing strategies such as the Government Capital Investment and Financing Model, Public-Private Partnership (PPP) Investment and Financing Model, Build-Operate-Transfer (BOT) Investment and Financing Model and so forth (Gao, P., 2018). These diverse strategies offer different avenues for funding these critical structures.

To show some practice of these models, we can find some case from different countries and regions. For example, in the United States, some professional sports leagues are highly profitable and influential, many teams have successfully lobbied public subsidies to build new or renovate existing stadiums. according to one estimate, between 2008 and 2010, three NFL stadiums were built with a total cost of $3.4 billion, and $1.7 billion was paid by local taxpayers (Wolla, 2017). However, many economists have argued that public financing of stadiums does not create great economic impact or multiplier effect for the local communities (Zimbalist, 2019). They suggest that private financing or public-private partnerships are more efficient and equitable ways to fund stadiums.

On the contrary, China's sports infrastructure development is closely linked to national strategy. The government has been the main performer in financing sports stadiums and facilities in the past. However, due to the high costs and low returns of hosting mega-events, such as the 2008 Beijing Olympics or the 2010 Shanghai Expo, the government has also experimented with BOT or PPP to attract private investment and participation (Zhang, K., 2017). these models also face various challenges and limitations, for example, legal framework, risk allocation, incentive alignment, and social acceptance, etc. (Liang, 2022).

Because of these limitations, this article attempts to find innovation strategies, which can strike a balance between resource efficiency and incentive consistency. One financing option worth considering is Asset-Backed Securities (ABS), which involves converting underlying assets into cash flows and providing investors with a degree of security.

Despite the thorough investigation into the feasibility of Asset-Backed Securities (ABS) in the sports venues, the practical implementation of this financing mechanism still encounters several notable challenges. They encompass policy risk, operational risk, and financing risk and require adept management and resolution. If these issues can be successfully addressed, it is conceivable that ABS may emerge as a reliable and viable means of financing sports venues.

In light of this situation, drawing inspiration from the Analytic Hierarchy Process (AHP), an evaluation of the risk associated with the ABS financing approach can be conducted based on the points discussed

in our previous conversation. By employing AHP analysis, it is possible to assign weights to each indicator and calculate the relative contribution of different indicators in assessing the risk of the ABS financing method. This approach will enhance the understanding of the practicality of utilizing the ABS financing approach within the sports venue domain and the potential obstacles it might confront. Consequently, it will provide a more solid and scientifically grounded basis for government's decision-making and policy-making regarding stadium financing.

2. Literature Review

There are many financing models for sports stadium financing. We aim to explore China's financing methods and the application of Asset-Backed Securitization (ABS). We also pay attention to the risks that stadium operators and financiers must carefully navigate. In this exploration, we want to find the effective way for stadium financing in the future.

2.1 Financing Approach

China's approach to sports stadium financing involves three different models: Government Capital Investment, Public-Private Partnership (PPP), and Build-Operate-Transfer (BOT). While each of these models offers its own advantages, it is crucial to recognize that they also possess inherent limitations which needs careful consideration.

Government Capital Investment: This approach relies on the infusion of significant government funds, usually supported by subsidies and contributions from sports lotteries. Although it offers the advantage of direct government control over the infrastructure development process, this model has drawbacks. The separation between decision-making and control could unintentionally result in resource wastage and inefficiency. The scale of government involvement might lead to bureaucracy and delays, slowing down project execution and potentially hampering effective resource allocation.

Public-Private Partnership (PPP): The PPP model emphasizes collaboration between government and private capital, fostering a synergy of expertise and resources. Although this method may seem like an ideal balance, it is not without its drawbacks. One significant challenge lies in the presence of agency problems. The inherent misalignment of interests between the principal (government) and the agent (private entity) could create an environment where decision-making diverges from the best interests of the project (Becker, D. M., Solberg, H. A., & Heyerdahl, G. S., 2022). This misalignment might lead to suboptimal outcomes, especially if private interests don't align harmoniously with public objectives.

Build-Operate-Transfer (BOT): Within the BOT framework, private investors shoulder the responsibilities of financing, constructing, and operating the infrastructure, with eventual transfer back to the government after a predetermined period. Despite its potential, the BOT model also confronts its own set of challenges. The persistence of agency problems poses a significant concern. The private entity's primary focus on profitability might overshadow broader societal benefits and the long-term sustainability of the infrastructure. This skewed emphasis could lead to decisions that prioritize short-

term financial gains over the holistic development and management of the sports infrastructure (Li, T., 2017).

As we navigate the limitations of various financing approaches for sports infrastructure, the need for innovative solutions becomes apparent. Modern sports venues require adaptable financial strategies to ensure sustainability, community engagement, and economic viability. ABS emerges as a transformative option, drawing from successes in other sectors. ABS offers a new perspective on funding sports stadiums. This alignment of ABS with government objectives underscores its potential to foster holistic progress in sports industry.

2.2 Advantages of ABS

ABS method is a financing tool that converts future cash flows into tradable securities, which consists of four main steps:

(1) Selection and separation of asset pool;

(2) Credit enhancement and rating;

(3) Issuance and pricing of securities;

(4) Payment and management of securities.

The theoretical basis of ABS method is cash flow theory, information asymmetry theory, and agency theory, which can solve the problems of insufficient funds, high interest rates, and long payback period in traditional financing methods. The empirical evidence of ABS method is the successful cases in domestic and foreign markets, such as Sports Venue Revenue Bonds (SIRB) in the United States, Football Club Revenue Bonds (FRB) in the United Kingdom, and Toll Road Bonds (TOLL) in China (Zhang, Tjia, Wang, & Ersoy, 2021), yet it's a concept that has yet to be fully explored in the realm of sports stadiums. ABS involves converting the future cash flows of an asset into tradable securities, providing innovative financing avenues and market mechanisms for the construction and operation of these venues.

The application of ABS in other domains has yielded several advantages. For instance, in the case of highway infrastructure, ABS has allowed governments to secure upfront funds for construction and maintenance, thereby improving transportation networks and reducing traffic congestion. Similarly, large retail shops have used ABS to raise capital for expansion, leading to enhanced consumer experiences and economic growth.

Interestingly, the potential benefits of ABS can also be extended to sports stadiums. By securitizing revenue streams such as ticket sales, leasing income, and sponsorship revenue, sports venues can harness the advantages of ABS in unique ways. Just as highways have seen improved infrastructure and retail shops have expanded their reach, sports stadiums can use ABS to achieve several advantages. It boosts liquidity, allowing investments in upgrades and technology. Diversified funding reduces financial pressure. ABS encourages innovation and competition, enhancing fan experiences. It optimizes capital structure, lowering costs and risks.

The implementation process of sports asset securitization involves six steps:

(1) Select suitable sports assets as the underlying assets for securitization;

(2) Set up a special purpose vehicle (SPV) to issue asset-backed securities (ABS) (Figure 1);

(3) Enhance the credit rating of ABS through measures like credit enhancement;

(4) Design the layering structure, repayment plan, and cash flow distribution order for ABS;

(5) Complete the issuance and trading of ABS through intermediary agencies like underwriters and rating agencies;

(6) Use the SPV to collect and distribute the cash flow income of the underlying assets to ABS holders according to priority.

This process ultimately leads to the realization of asset recovery.

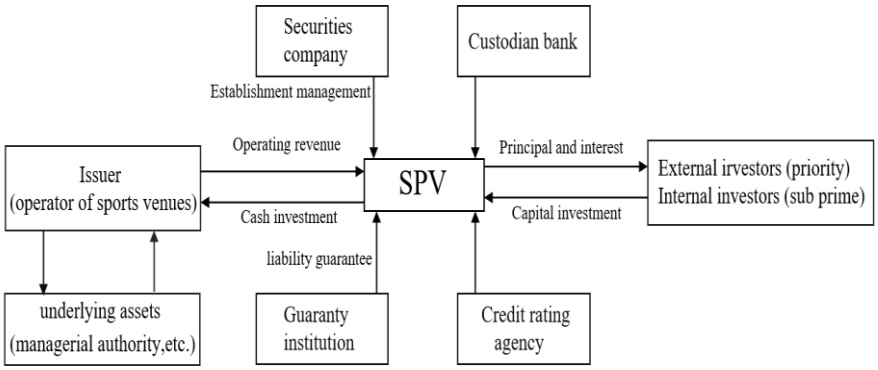

Figure 1. The Implementation Structure of Sports Stadium ABS

2.3 Risk Factors of a Sport Stadium Financing

Managing a sports stadium involves a multitude of intricacies that extend beyond the realms of the game itself. From hosting events to ensuring a seamless fan experience, stadium operators are confronted with a diverse array of challenges. Among these challenges, risk factors play a pivotal role in shaping the operational landscape of sports venues. Risk factors in this context can be broadly categorized into policy risk, operational risk, and financing risk (Gao & Zhang, 2020).

Policy Risk: In the realm of sports stadium management, policy risk encompasses a spectrum of potential disruptions arising from changes in tax policies, governmental support mechanisms, and industry-specific regulations. For instance, alterations in tax policies could impact the financial feasibility of stadium operations, while shifts in industrial or regulatory policies might necessitate costly modifications to comply with updated standards. Government support, a double-edged sword, can either provide stability or vulnerability depending on its consistency and scope.

Operational Risk: Operational risk pertains to challenges associated with the day-to-day functioning of a sports stadium. Factors such as unpredictable market demand, fluctuations in cash flow and income, varying operating costs, and even unexpected events like public health crises can significantly impact stadium operations. For instance, a sudden drop in market demand could lead to reduced ticket sales and revenue, while fluctuations in cash flow might affect maintenance schedules and necessary upgrades.

Financing Risk: Financing risk revolves around uncertainties related to financial management and resource allocation. This category includes risks associated with credit ratings, interest rates on loans exchange rate fluctuations (for international venues), and prepayment obligations. For sports stadiums, maintaining a favorable credit rating is vital for securing financing at reasonable terms, and exchange rate fluctuations can impact the cost of international events.

The occurrence and severity of these risk factors in sports stadiums can be exemplified through various scenarios. For instance, a sudden alteration in tax policies could render existing revenue models obsolete, forcing stadiums to reevaluate pricing structures and financial projections. Similarly, unexpected market shifts, such as changing fan preferences or economic downturns, could lead to cash flow instability and hinder planned investments in stadium upgrades. Financing risks might manifest when an increase in interest rates coincides with a stadium's need to secure funding for expansions or renovations, potentially straining its financial resources.

In conclusion, the management of sports stadiums is not solely about organizing events and ensuring a great fan experience. It also involves navigating through a landscape of risks that can impact financial viability, operational efficiency, and long-term sustainability. By comprehending and proactively addressing policy, operational, and financing risks, stadium operators can enhance their ability to make informed decisions, adapt to changing circumstances, and ultimately create enduring venues that cater to the needs of athletes, fans, and stakeholders alike.

3. Methods

3.1 Selection of Research Methods

Methods of analyzing refer to the quantitative or qualitative evaluation of various risk factors, to determine their impact and importance on ABS financing. There are many methods for analysis of indicator layer, such as Analytic Hierarchy Process (AHP), Fuzzy Comprehensive Evaluation (FCE), Grey Relational Analysis (GRA), etc. These methods have their own advantages and disadvantages, and need to be chosen according to the specific situation and purpose. This paper adopts the AHP method, which decomposes the problem into goal, criterion, and indicator layers, constructs judgment matrices by pairwise comparison, and calculates the weight vectors of each factor, thus obtaining the relative importance of each risk factor on ABS financing. This paper chooses the AHP method, rather than the FCE or GRA method, mainly based on the following reasons:

AHP method is a widely used method for risk assessment and decision analysis, which can decompose complex problems into hierarchical structures, and obtain the relative importance and priority of each factor by pairwise comparison and weight calculation.

AHP method is a simple, easy-to-use, and flexible method, which can adopt different judgment matrices and calculation methods according to different problems and data types, such as reciprocal matrix, fuzzy matrix, interval matrix, etc.

AHP method is a scientific, reasonable, and objective method, which can test and improve the quality and robustness of judgment matrices by consistency check and sensitivity analysis, thus enhancing the reliability and validity of the results.

In contrast, FCE or GRA methods have the following disadvantages:

FCE method is a method based on fuzzy set theory, which can deal with uncertainty and ambiguity problems, but also has some limitations, such as difficulty in determining fuzzy membership function, difficulty in dealing with multi-objective problems, difficulty in considering the interaction among factors, etc. (Hu, Wu, & Pan et al., 2021).

GRA method is a method based on grey system theory, which can analyze incomplete information and irregular changes problems, but also has some limitations, such as difficulty in determining grey correlation degree calculation formula, difficulty in dealing with qualitative data and nonlinear data, difficulty in reflecting the weight difference among factors, etc (Patil, Walke, & Gawkhare, 2019).

In summary, AHP method is a suitable method for analysis of indicator layer in this paper, which can fully consider the impact and relationship of each risk factor, thus providing a comprehensive and systematic risk assessment for ABS financing.

3.2 The Application of AHP

The AHP (Analytic Hierarchy Process), developed by Thomas Saaty in the early 1970s, is a crucial decision-making method for complex problems with objectives, criteria, and alternatives (Saaty, 1977). Its application involves five steps:

Step 1: Break down the problem into goal, criterion, and indicator layers, forming a hierarchy. The goal layer defines the objective, the criterion layer contains main influencing factors, and the indicator layer holds specific measuring indicators.

Step 2: Compare factors pairwise and create a judgment matrix with values from 1 to 9, representing importance. Elements in the matrix indicate comparisons.

$$A=\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \quad (1)$$

Step 3: Use methods like eigenvalue to calculate weight vectors for each matrix. These weights indicate relative importance, with their sum equaling 2.

$$W=[w_1,w_2,\cdots,w_n]^T \quad \sum_{i=1}^{n} w_i=1 \quad (2)$$

Step 4: Calculate consistency ratio (CR) using consistency index (CI) and average random consistency index (RI). CR < 0.1 signifies matrix consistency; otherwise, modifications are needed.

$$CI = \frac{\lambda_{max}-n}{n-1}$$
$$CR=\frac{CI}{RI} \quad (3)$$

Step 5: Combine single rankings and upper-layer weights to calculate overall factor weights (hierarchical total ranking). Perform total ranking sequentially from top to bottom.

$$W^* = W_0 W_1 W_2 \cdots W_m \quad (4)$$

3.3 Indicator System Construction

To construct a comprehensive and reliable indicator system for risk analysis of sports stadium ABS, this study adopts a three-step approach: literature review, expert consultation, and AHP analysis.

Literature review: This step involves reviewing existing literature on sports stadium financing and ABS risk analysis, as well as relevant theories and models from other fields. The purpose of this step is to identify the main categories and factors of risk that affect the feasibility and profitability of sports stadium ABS, and to form a preliminary indicator system based on the literature findings.

Expert consultation: This step involves consulting experts from different domains, such as sports management, finance, economics, law, and statistics. The purpose of this step is to validate and refine the preliminary indicator system based on the expert opinions and suggestions, and to assign initial weights to each indicator based on their relative importance.

AHP analysis: This step involves applying the AHP methodology to the refined indicator system, using pairwise comparisons and eigenvalue calculations to derive the final weights for each indicator. The purpose of this step is to quantify and compare the relative importance of each indicator in a rigorous and objective manner, and to test the consistency and validity of the results.

Through this three-step approach, a hierarchical indicator system for risk analysis of sports stadium ABS has been established. This methodical approach, which draws from a variety of articles and insights provided by seasoned professionals, ensures a well-rounded strategy that combines theoretical depth with practical knowledge (Gao & Zhang, 2020; Zhang, H., 2023). The resulting three-tiered framework, depicted in Table 1, represents a fusion of scholarly and real-world expertise. This fusion highlights its ability to comprehensively address the complex risk landscape inherent in sports venue Asset-Backed Securities (ABS) facilities. The framework's reliability and effectiveness are reinforced by the range of sources and experts that have contributed to its development.

Table 1. Hierarchical Analysis of Risk Factors in Sports Venue ABS

Criterion layer	Indicator layer
Policy risk	Tax policy
	Industrial policy
	Regulatory policy
	Government support
Operational risk	Market demand
	Cash flow instability
	Income fluctuation
	Operating cost
Financing risk	Credit rating

	Interest rate
	Exchange rate
	Prepayment

3.4 Empirical AHP Analysis for Sports Stadium ABS

3.4.1 Data Source

The weights and scores of risk factors in stadium ABS financing are from the questionnaire survey and expert consultation designed by this paper. The survey adopts the method of random sampling and stratified sampling. A total of 30 questionnaires were distributed and 28 valid questionnaires were collected. The recovery rate was 93.3%. The questionnaire objects include investors, managers and other stakeholders of stadium projects. The expert consultation adopts the Delphi method. A total of 10 experts with rich experience and knowledge were invited, including professors, consultants and others in the field of sports industry.

3.4.2 Analysis of Criteria Level

By using results of the questionnaire survey and expert consultation to determine the weights and ratings of risk factors in ABS financing for sports stadiums, a comparative analysis of the aforementioned 12 indicators was conducted to ensure that the results of this hierarchical analysis are as objective as possible. The constructed matrix is shown in Table 2.

Table 2. Judgment Matrix for Criteria Level

Criterion layer	Operational risk	Policy risk	Financing risk
Operational risk	1	3	9
Policy risk	1/3	1	7
Financing risk	1/9	1/7	1

Analyzing the matrix according to the above-mentioned method yields the following results as Table 3 and Table 4.

Table 3. Results of AHP Analytic Hierarchy Process

Criterion layer	Eigenvalue	W(%)	λ max	CI
Operational risk	1.946	64.862		
Policy risk	0.884	29.464	3.08	0.04
Financing risk	0.17	5.674		

Table 4. Results of consistency test

λ max	CI	RI	CR	Results of consistency test
3.08	0.04	0.525	0.076	Pass

As summarized above, operational risk has the highest eigenvalue (1.946) and weight (64.862%), which means it is the most important criterion.

3.4.3 Analysis of Indicator Layer

In this analysis, we delve into the risk factors associated with the implementation of Asset-Backed Securities (ABS) for sports venues. Our focus lies in three primary categories of risk: Operational risk, Policy risk, and Financing risk. Through the utilization of the Analytic Hierarchy Process (AHP), we have conducted a comprehensive evaluation of key indicators within each of these categories, aiming to ascertain their relative significance in the context of sports venue ABS. The results presented below are based on our questionnaire survey and expert consultation. We have structured this analysis to provide insights into the most critical risk factors and to guide decision-makers in enhancing the robustness and sustainability of sports venue ABS initiatives.

3.4.3.1 Analysis of Operational Risk

Judgment matrix for Operational risk is shown in Table 5.

Table 5. Judgment Matrix for Operational Risk

Operational risk	Market demand	Cash flow instability	Income fluctuation	Operating cost
Market demand	1	1/7	1/5	1/3
Cash flow instability	7	1	5	3
Income fluctuation	5	1/5	1	1
Operating cost	3	1/3	1	1

Analyzing the matrix according to the above-mentioned method yields the results for Operational risk as Table 6 and Table 7.

Table 6. Results of AHP Analytic for Operational Risk

Section	Eigenvalue	W (%)	λ max	CI
Market demand	0.238	5.95	4.141	0.047
Cash flow instability	2.291	57.276		
Income fluctuation	0.758	18.955		
Operating cost	0.713	17.819		

Table 7. Results of Consistency Test for Operational Risk

λ max	CI	RI	CR	Results of consistency test
4.141	0.047	0.882	0.053	Pass

As summarized above, we can observe that cash flow instability is the most significant indicator, accounting for 57.276% of the operational risk, followed by Income fluctuation at 18.955% of the operational risk. Next is operating cost, contributing to 17.819% of the operational risk, and finally, market demand, constituting 5.95% of the operational risk. This implies that the main risk factor for sports stadium ABS lies in the instability of cash flow. Any cracks or gaps in cash flow could impact the repayment capability of the sports venue ABS, thus increasing the risk. Therefore, in conducting the AHP hierarchy analysis for sports venue ABS, special attention should be given to the cash flow instability indicator. Appropriate measures should be taken to enhance both the stability and sufficiency of cash flow.

3.4.3.2 Analysis of Policy Risk

Judgment matrix for Policy risk is shown in Table 8.

Table 8. Judgment Matrix for Policy Risk

Policy risk	Tax policy	Industrial policy	Regulatory policy	Government support
Tax policy	1	5	3	7
Industrial policy	1/5	1	1/3	3
Regulatory policy	1/3	3	1	5
Government support	1/7	1/3	1/5	1

Analyzing the matrix according to the above-mentioned method yields the results for Policy risk as Table 9 and Table 10.

Table 9. Results of AHP Analytic Hierarchy Process for Policy risk

Section	Eigenvalue	W (%)	λ max	CI
Tax policy	2.232	55.789	4.117	0.039
Industrial policy	0.487	12.187		
Regulatory policy	1.053	26.335		
Government support	0.228	5.689		

Table 10. Results of Consistency Test for Policy Risk

λ max	CI	RI	CR	Results of consistency test
4.117	0.039	0.882	0.044	Pass

Based on the weight vector, it can be discerned that tax policies are the most crucial indicator, accounting for 55.789% of policy risk. Following this is regulatory policy, constituting 26.335% of policy risk. Next in line is industry policy, contributing to 12.187% of policy risk, and lastly, government support, accounting for 5.689% of policy risk. This indicates that the primary risk factors for sports venue ABS stem from uncertainties in tax matters. Any changes or adjustments in tax policies could alter the tax burden of the sports venue ABS, thus impacting its cash flow and profits.

Moreover, regulatory policies also wield significant influence. Should regulatory policies shift or intensify, the compliance of the sports venue ABS might be affected, influencing its credibility and market acceptance. Industry policies and government support also exert a certain level of impact on the risk profile of the sports venue ABS. If industry policies change unfavorably, the sector in which the sports venue ABS operates could be affected, impacting its earnings and competitiveness. Similarly, alterations or reductions in government support could affect the creditworthiness of the sports venue ABS, thus influencing its financing costs and efficiency.

3.4.3.3 Analysis of Financing Risk

Judgment matrix for Financing risk is shown in Table 11.

Table 11. Judgment Matrix for Financing Risk

Financing risk	Credit rating	Interest rate	Exchange rate	Prepayment
Credit rating	1	7	5	3
Interest rate	1/7	1	1/3	1/5
Exchange rate	1/5	3	1	1/3
Prepayment	1/3	5	3	1

Analyzing the matrix according to the above-mentioned method yields the results for Financing risk as Table 12 and Table 13.

Table 12. Results of AHP Analytic Hierarchy Process for Financing Risk

Section	Eigenvalue	W (%)	λ max	CI
Credit rating	2.232	55.789	4.117	0.039
Interest rate	0.228	5.689		
Exchange rate	0.487	12.187		
Prepayment	1.053	26.335		

Table 13. Results of Consistency Test for Financing Risk

λ max	CI	RI	CR	Results of consistency test
4.117	0.039	0.882	0.044	Pass

It can be observed that credit rating is the most critical indicator, accounting for 55.789% of financing risk. Following this is Prepayment, constituting 26.335% of financing risk. Next in line is exchange rate fluctuations, contributing to 12.187% of financing risk, and lastly, interest rate changes, accounting for 5.689% of financing risk. This indicates that the primary risk factors for sports stadium ABS originate from uncertainties in credit aspects. If the credit rating deteriorates or defaults occur, the financing costs of the sports venue ABS could increase, thus escalating the risk.

Furthermore, prepayment is also a significant influencing factor. If early redemption occurs, the cash flow of the sports venue ABS might be affected, thus impacting its earnings and returns. Exchange rate fluctuations and interest rate changes also have a certain level of impact on the risk profile of the sports venue ABS. If exchange rate fluctuations or interest rate changes are substantial, the sports venue ABS could experience increased foreign exchange losses or interest expenses, thus influencing its profits and cash flow.

3.4.3.4 Conclusion

The outcomes of the AHP analysis have emphasized the significance of maintaining stable cash flow, navigating tax policy complexities, and managing credit rating fluctuations. These risk factors were found to be the most influential within their respective dimensions, underscoring their critical impact on the overall risk profile of ABS financing for sports venues.

4. Discussion

Armed with a thorough understanding of the principal risk factors highlighted through the AHP analysis, the subsequent course of action entails devising focused strategies to adeptly mitigate these pivotal concerns.

4.1 Solution for Operational Risk

In the landscape of operational risks, the cash flow uncertainty emerges as a pivotal factor, particularly pronounced within sports stadium Asset-Backed Securities (ABS). Recent analysis underscores the significance of addressing this specific challenge, as it stands out as the most impactful element contributing to operational risk in this domain. As such, finding effective strategies to manage this cash flow unpredictability is imperative for maintaining the financial stability of sports stadium projects. One approach that holds considerable promise in this regard is the application of a Dual-SPV (Special Purpose Vehicle) model—a solution that not only addresses the uncertainties but also aligns seamlessly with the unique dynamics of sports stadium enterprises (Wang, 2019).

Sports stadiums operate within an environment marked by distinct revenue volatility stemming from factors like team performance, weather conditions, and event scheduling. These variables can lead to erratic attendance and revenue patterns, exerting potential strain on the stability of cash flows. The Dual-SPV model is notably well-suited for this context due to its inherent adaptability.

At its core, the Dual-SPV model entails the establishment of two separate SPVs, each assigned specific roles that synergize with the securitization process (Zhu, Chen, & Jiang, 2022). The primary SPV assumes the mantle of overseeing the day-to-day stadium operations, encompassing tasks such as ticket sales, concessions, and facility upkeep. This dedicated operational focus positions the primary SPV to promptly respond to shifts in attendance and revenue, thereby enabling the implementation of strategies aimed at mitigating disruptions in cash flow.

Moreover, the second SPV addresses legal and regulatory concerns. It ensures compliance with cross-jurisdictional regulations and obtains the necessary approvals for the securitization process. This legal compliance layer adds an extra dimension of security and certainty to the structure, further safeguarding the interests of both investors and stakeholders.

However, it's important to note that beyond the Dual-SPV model, alternative approaches also hold potential for addressing cash flow uncertainty. These might include introducing diversified revenue streams through partnerships, renegotiating agreements with sports teams to align incentives, and exploring innovative ticketing models to enhance revenue predictability. While the Dual-SPV model provides a comprehensive solution, these additional strategies demonstrate the versatility required to tackle the multifaceted nature of cash flow uncertainty.

4.2 Solution for Policy Risk

In the landscape of policy risks, tax policy emerges as a pivotal factor in the sports venue sector, with several pressing concerns at hand. These encompass the inequitable nature of tax policies, the absence of differentiation between public and commercial dimensions, and the insufficiency of monitoring mechanisms (Chen, Yang, & Wang, 2016). These challenges result in uneven market standing among stakeholders, obstructing equitable competition and hindering the advancement of service quality and efficiency within the sports venue industry.

Primarily, the prevailing tax policies lean towards benefiting public entities and specific social organizations, often disadvantaging enterprises responsible for venue ownership and management. This imbalance culminates in disparate market positions, fostering an unfavorable competitive environment that curbs business growth and dampens the industry's overall health (Gao, X., 2018).

Additionally, the current tax policies inadequately account for the dichotomy between the public service and commercial facets inherent to sports venues. These policies lack distinction between the services offered to the public and those catering to private interests. Consequently, such policies fail to provide clear incentives for sports venues, hindering their impetus to enhance service quality and operational efficiency. As a result, citizens' access to high-quality sports services is compromised.

Furthermore, a notable shortcoming lies in the lack of supplementary oversight and evaluation mechanisms for sports venue tax policies. This deficiency impedes the effective prevention of issues such as tax evasion, fraud, and exploitation of tax loopholes. The absence of robust regulatory measures enables certain individuals to elude their tax responsibilities, thereby compromising the integrity and impartiality of the national tax system.

To tackle these pressing challenges, a series of solutions must be implemented to refine and optimize tax policies in the sports venue sector. This involves creating a more equitable and logical tax system, as well as fostering the healthy and sustainable growth of the sports venue industry. These solutions encompass:

Tailored Tax Incentive Policies: Crafting nuanced tax incentives according to the distinct characteristics of sports venues—their nature, scale, functions, and target beneficiaries. This could entail granting more extensive tax reductions or exemptions to venues emphasizing strong social and public benefits, while providing proportionate tax breaks or reduced taxation for those operating commercially and facing significant market competition.

Rational Taxation Standards: Establishing rational tax collection standards that align with the type of services offered by sports venues. This involves applying lower or exempted tax rates to segments that deliver public sports services and regular or higher rates to those catering to private sports services. Such an approach stimulates venues to augment their offerings of public sports services.

Robust Oversight and Evaluation Mechanisms: Instituting comprehensive mechanisms for overseeing and evaluating tax policies within the sports venue sector. Enhancing scrutiny and inspections at various stages—from tax registration and declaration to accounting, collection, and management—is critical. This ensures prompt identification and rectification of any illicit activities. In tandem, periodic assessments and feedback loops must be established to gauge the effectiveness of tax policies and facilitate necessary adjustments to align with evolving societal and market demands.

By adopting these solutions, the sports venue industry can attain a more equitable and efficient tax policy framework. This not only addresses current challenges but also propels the industry's growth while upholding fairness and adherence to taxation norms.

4.3 Solution for Financial Risk

Managing the impact of credit rating fluctuations, which are the most important factor in financing risk, requires a comprehensive approach that encompasses legal frameworks and standardized information disclosure practices:

Legal Framework: Establishing a clear legal basis and regulatory framework for information disclosure is pivotal. Creating unified standards and guidelines can streamline information disclosure practices, ensuring consistency and clarity for both regulators and market participants (Li & Liu, 2023).

Standardized Content and Format: Developing a comprehensive and standardized content and format for information disclosure is essential. This involves defining pre-sale and post-sale information templates that cover all relevant aspects (Neilson, Ryan, Wang, & Xie, 2021). Standardization simplifies comparisons and analysis for investors, enhancing the transparency and integrity of the process.

Loan-Level Disclosure: For credit ABS, enhancing transparency can involve exploring loan-level disclosure. This approach entails providing granular information about underlying assets, including borrower characteristics, loan performance, and delinquency status. Such detailed disclosure enhances accuracy in risk assessment and strengthens investor confidence.

5. Conclusions

In conclusion, this study makes significant contributions to the field of sports stadium financing in China. Firstly, it offers a novel approach that replaces traditional financing methods, addressing the deficiencies of the existing methods and effectively eliminating the issues of agency problems and inefficiency that have plagued previous approaches. This contribution positively impacts the sustainable development of sports stadium projects in China, providing them with more viable and flexible financing options.

Secondly, the outcomes of the AHP analysis underscore the importance of maintaining stable cash flow, navigating complex tax policies, and managing credit rating fluctuations. This insight provides valuable guidance for decision-makers, helping them better address the various risks associated with the implementation of Asset-Backed Securities (ABS), ultimately enhancing the long-term stability and success of projects. Therefore, this study not only provides a foundation for the adoption of innovative financing methods but also offers effective strategies to overcome the challenges associated with these methods, thus making significant contributions to the further development of sports stadium financing in China.

As we navigate beyond theory, this article's conclusions encompass several key dimensions that underline its significance:

Practical Application: The article underscores the tangible impact and implications of its research, extending beyond academia into practical problem-solving. It outlines how ABS holds the potential to alleviate governmental fiscal burdens, bolster operational capabilities of sports venues, and cultivate sustainable development in the sports sector. It also accentuates AHP's role in fostering transparent and accountable decision-making and policy formulation.

Method Summation: The methods employed throughout the research are succinctly summarized, underscoring their effectiveness in addressing the central problem and research inquiry. ABS is characterized as a transformative force that converts future cash flows into tradable securities, paving the way for pioneering financing avenues and innovative market mechanisms. Meanwhile, AHP's hierarchical structure empowers comprehensive evaluation and comparison through the deconstruction of complex problems into manageable layers and indicators.

Discussion of Limitations: Acknowledging the inherent limitations in the research, the article underscores their significance in interpreting and applying the results. It acknowledges the challenges that still surround ABS implementation—encompassing issues like cash flow volatility, tax policy uncertainties, and credit rating fluctuations. Moreover, the article recognizes that AHP analysis is subjective, potentially introducing bias and inconsistencies.

Guidance for Future Research: The article identifies avenues for future research, steering discussions toward areas ripe for exploration. It suggests extending ABS application to other sporting infrastructure facets such as training facilities, stadiums, and arenas. Moreover, it proposes a fusion of AHP with complementary methodologies like fuzzy logic or neural networks to bolster precision and resilience.

Policy and Societal Impact: The article underscores the research's ramifications for policy formulation, societal transformation, and public welfare. It contends that ABS has the power to forge synergies between stakeholders, governments, private investors, and communities, crafting sports venues that transcend symbols of pride to become engines of sustainable economic growth, community involvement, and vibrant sports culture.

In closing, the article hails the fusion of inventive funding mechanisms -chiefly ABS- and the structured AHP decision-making process as its cornerstone achievement. Tailored meticulously to China's financial landscape, this research aspires to kindle sustainable economic expansion, fuel community engagement, and establish an enduringly robust sports infrastructure sector within the nation. With an unwavering commitment to collaboration and innovative thinking, the article aspires to inaugurate a new era of sports stadium financing, one that redounds to the advantage of all stakeholders and bequeaths an indelible legacy for generations to cherish.

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