

FINANCIAL PERFORMANCE EVALUATION OF HOTEL LISTED TOURISM COMPANIES BASED ON FUZZY COMPREHENSIVE EVALUATION MODEL

WEILING SU AND LEI HUANG

Tourism College
Dalian University
No. 10, Xuefu St., Jinzhou New District, Dalian 116622, P. R. China
suweiling@dlu.edu.cn

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ABSTRACT. *With the rapid development of tourism industry in China, it is of huge value to evaluate the financial performance of tourism listed companies. In China, listed tourism companies are divided into three types: hotel, scenic sights, and comprehensive. This paper establishes a financial performance index system of hotel listed tourism companies with ten representative indexes based on the weight by AHP, and applies fuzzy comprehensive evaluation model to evaluating the financial performance of hotel listed tourism companies, and then gets the results.*

Keywords: Hotel listed tourism companies, Financial performance evaluation, Fuzzy comprehensive evaluation model

1. **Introduction.** With the rapid development of Chinese economy and people's living standard, tourism industry has become a sunrise industry, and also a cultivated strategic pillar industry of national economy. In 2015, China received more than 4.1 billion tourists, and tourism revenue achieved 4.13 trillion yuan. Domestic tourists achieved 4 billion with year-on-year growth of 10.5% and domestic tourism revenue achieved 3.42 trillion with year-on-year growth of 13.1%, and with inhabitant's travel rate 2.98 times [1]. China received 133 million inbound tourists, and international tourism revenue achieved \$113.65 billion, with year-on-year growth of 4.0% and 7.8% respectively. Chinese outbound tourists achieved 120 million, with tourist expenditure \$104.5 billion, with year-on-year growth of 12.0% and 16.7% respectively. Tourism direct investment achieved 1.0072 trillion yuan throughout the year, with year-on-year growth of 42%. Annual comprehensive contribution to GDP by tourism is 7.34 trillion yuan, accounting for 10.8% of GDP. Tourism directly employed 27.98 million people, with direct and indirect employment of 79.11 million people, accounting for 10.2% of the total population of the country's employment.

As leading travel companies, listed tourism companies undertake the responsibility of China's tourism development. In China, listed tourism companies are divided into three types: hotel, scenic sights, and comprehensive [2]. Tourism industry, as a major sunrise industry in China's economic development, has gradually grown into an indispensable part of the stock market of China [3]. Hotel tourism listed companies account for about 34% of the total listed tourism companies in China, so it is of huge value to evaluate the financial performance of hotel tourism listed companies, which would provide accurate financial information for the government, social public, shareholders and potential investors.

In recent years, scholars at home and abroad carried out in-depth studies on financial performance evaluation of listed tourism companies. Choi et al. focused on the economic cycle's influence on the U.S. hotel industry performance, and defined operating income as hotel industry's overall performance indicators [4]. Barros applied the DEA

(Data Envelopment Analysis) model to Portugal hotel business performance analysis, and obtained the main influencing factors [5]. Onut and Soner evaluated Turkey's five-star hotel performance based on the DEA method [6]. Yu and Lee analyzed the efficiency and effectiveness of 58 international tourist hotels in Taiwan in 2004 based on two stages traditional DEA model and hyperbolic network DEA model [7]. Ji et al. established financial evaluation system of listed tourism companies based on the model of extension [8]. Zhou et al. constructed financial evaluation index system, made factor analysis according to the financial indexes and gave rankings of the listed companies' financial performance [9]. Jiang et al. combined AHP (Analytical Hierarchy Process) method and DEA method, and introduced DEA/AHP model into resource-based tourism enterprise financial performance evaluation field to evaluate the overall efficiency, technical efficiency and scale benefits [10]. Chen and Zhang made a study of financial comprehensive evaluation of hotel listed tourism companies based on grey relational analysis model [11]. Su and Zha applied attribute synthetic assessment system to financial performance evaluation of scenic sights listed tourism companies [12]. Zhang built financial evaluation model of scenic sights listed tourism companies based on improved TOPSIS method [13]. The research process and results above are of important reference value to this research.

The paper mainly conducts researches on two aspects. Firstly, financial index system of financial performance evaluation for hotel listed tourism companies is established based on the current literature and financial features of Chinese hotel listed tourism companies. Secondly, based on financial statements of 3 hotel listed tourism companies, fuzzy comprehensive evaluation model is exerted to make assessment for those companies, thus obtaining their results of financial performance for the hotel listed tourism companies, which is also the innovation point in the paper. As a result, accurate information can be provided for the users, which would help investors make correct decisions, and help hotel listed tourism companies to be in healthy development.

2. Financial Performance Evaluation Index System of Hotel Listed Tourism Companies. Listed tourism companies refer to those companies which are publicly traded in Shanghai and Shenzhen Stock Exchange and rely on securities market to finance. Their main business includes tourist spot services, tourism transportation, tourist catering, tourism information, hotel services, purchase and sale of tourism products and so on; and their main business income should account for more than 50% of total income [14]. Hotel listed tourism companies rely on hotel related business (such as hotel services, catering, house renting and property management) as source of main revenue. At present, hotel listed tourism companies account for a large proportion in the tourism sector, and their performance change exerts large influence on the tourism sector. Hotel listed tourism companies are more competitive, with volatile business performance.

Based on tourism law related content, on the basis of features of hotel listed tourism companies, the law of the enterprise financial evaluation and relevant literature of scholars at home and abroad, according to the scientific, feasibility, whole optimization and dynamic principle, this paper establishes the financial performance index system of hotel listed tourism companies as shown in Figure 1.

3. Calculation of Evaluation Index Weights. AHP is a kind of systematic analysis method put forward in the 1970s by T. L. Saaty [15], an American famous operational research expert and professor of University of Pittsburgh. The implementation process of AHP method is as follows: firstly, break up complex questions into organized levels; secondly, provide ration for relative importance of factors among different levels according to the judgment on objective facts, which is to structure comparison judgment matrix; then determine the weights for the sequence of relative importance of factors in each level by means of judgment matrix to get the greatest eigenvalue and eigenvector; finally bring

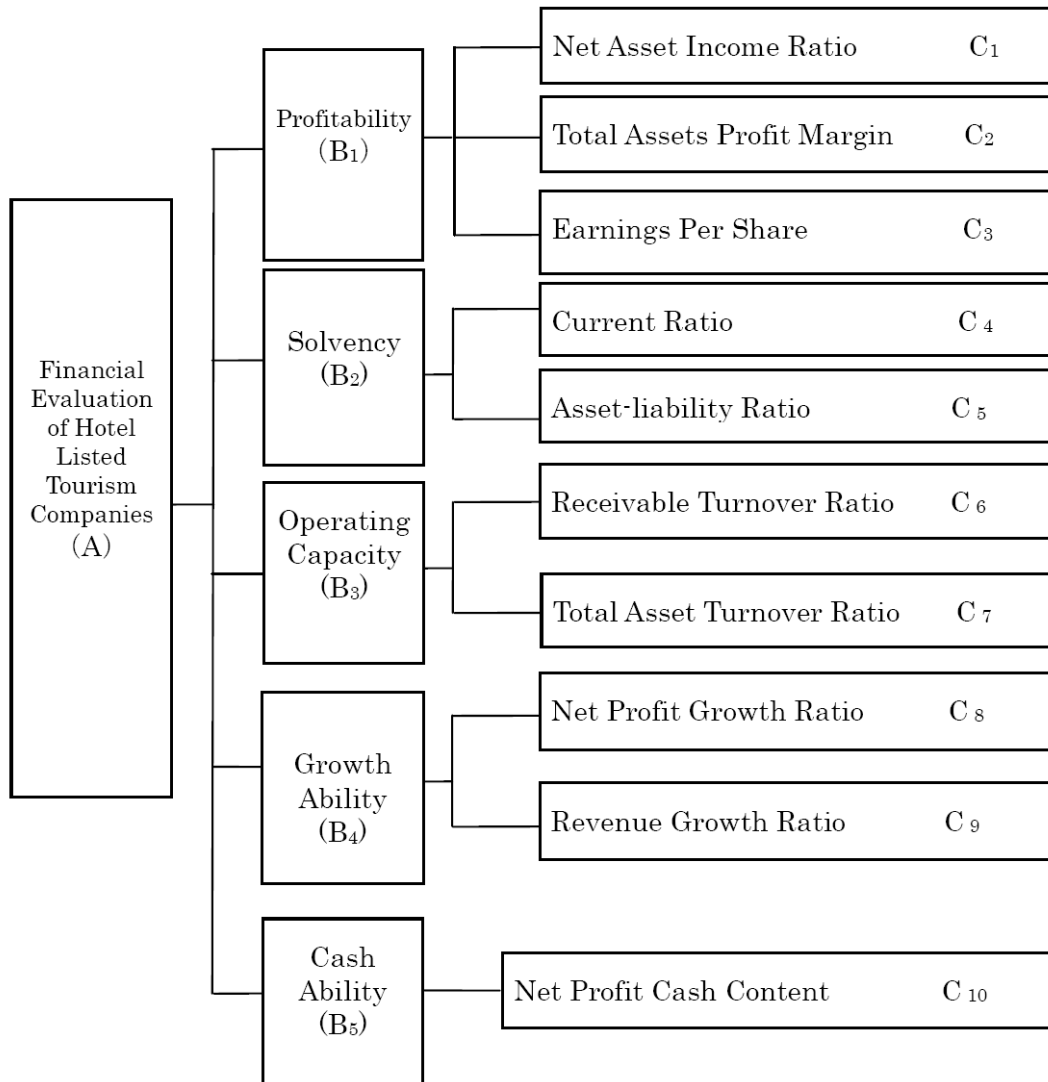


FIGURE 1. Financial performance evaluation index system of hotel listed tourism companies

the analysis to the whole problem through the hierarchies analysis, which is the weight of total order sorting.

This paper calculates the evaluation index weights by using AHP. Firstly, construct the judgment matrix and use calculating software to do consistency check and comprehensive. Secondly, use AHP software to get the hierarchical single arrangement and total sequencing. At last, get the following index weights. (w_j indicates the weight of the j th index, $j = 1, 2, \dots, 10$):

$$w_1 = 0.0926, w_2 = 0.1294, w_3 = 0.1616, w_4 = 0.0436, w_5 = 0.0582, \\ w_6 = 0.0843, w_7 = 0.1332, w_8 = 0.0779, w_9 = 0.1079, w_{10} = 0.1113.$$

4. The Empirical Research on Financial Performance Evaluation of Hotel Listed Tourism Companies with Fuzzy Comprehensive Evaluation Model.

4.1. **Fuzzy comprehensive evaluation model.** Factors influencing the financial performance of hotel listed tourism companies are of strong complexity and uncertainty. Therefore, the paper resorts to fuzzy comprehensive evaluation model to study the financial performance of hotel listed tourism companies, making research results more scientific and reasonable.

Fuzzy comprehensive evaluation method has been widely applied in the researches. During the course of making the evaluation, some kind of question is often encountered, which is that each influencing factor should be assessed because of an evaluation determined by various factors. On the basis of the individual evaluation on each factor, how to evaluate them with all factors is a problem of comprehensive evaluation.

Fuzzy comprehensive evaluation model is a kind of model which takes account of various factors to make the synthetic decision for some particular purpose under fuzzy circumstances. Firstly, comprehend and analyze the phenomenon to build a scientific and reasonable index system for the evaluation on the phenomenon and to determine the corresponding judgment set. Then, launch first-level comprehensive judgment; avail the weight vector of each factor and proper operator to determine the fuzzy transformation, on the basis of which second-level and multilevel synthetic judgments are conducted. Next, according to the maximum membership principle, we get the final results after carrying out normalization processing for judgment results of the last layer.

4.2. Establishment of fuzzy evaluation matrix. Considering the established financial performance evaluation index system of hotel listed tourism companies, we suppose U as factor set, V as judgment set.

U = {net asset income ratio C_1 , total assets profit margin C_2 , earnings per share C_3 , current ratio C_4 , asset-liability ratio C_5 , receivable turnover ratio C_6 , total asset turnover ratio C_7 , net profit growth ratio C_8 , revenue growth ratio C_9 , net profit cash content C_{10} }

V = {excellent, good, average, weak}

The paper selects three samples of hotel listed tourism companies: “Lingnan Holdings (000524)”, “Jinling Hotel (601007)”, and “Jinjiang Hotels (600754)”. Financial performance research of 2015 (up to December 31, 2015) is carried out. Within the report period, the financial performance indexes of three samples are as follows (data source: the stock market of NetEase Finance) [16-18]:

Lingnan Holdings (000524):

$C_{11} = 6.37\%$, $C_{12} = 4.83\%$, $C_{13} = 0.15$, $C_{14} = 3.18$, $C_{15} = 26.95\%$, $C_{16} = 21.03$, $C_{17} = 0.38$, $C_{18} = 7.88\%$, $C_{19} = 1.33\%$, $C_{110} = 1.39\%$

Jinling Hotel (601007):

$C_{21} = 3.56\%$, $C_{22} = 1.14\%$, $C_{23} = 0.17$, $C_{24} = 2.10$, $C_{25} = 37.44\%$, $C_{26} = 14.04$, $C_{27} = 0.23$, $C_{28} = 15.31\%$, $C_{29} = 20.07\%$, $C_{210} = 3.40\%$

Jinjiang Hotels (600754):

$C_{31} = 7.70\%$, $C_{32} = 0.34\%$, $C_{33} = 0.79$, $C_{34} = 0.77$, $C_{35} = 68.64\%$, $C_{36} = 21.16$, $C_{37} = 0.29$, $C_{38} = 30.87\%$, $C_{39} = 90.95\%$, $C_{310} = 1.75\%$

According to the judgment set and financial indexes, the paper respectively constructs expert judgment tables for the three hotel listed tourism companies. Then the tables are given to experts to make judgments. Fuzzy evaluation matrixes are built as follows based on statistics of expert judgment tables:

$$R_1 = \begin{bmatrix} 0.09 & 0.64 & 0.27 & 0 \\ 0.82 & 0.18 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0.18 & 0.73 & 0.09 & 0 \\ 0.09 & 0.73 & 0.18 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0.82 & 0.18 & 0 \\ 0 & 0.18 & 0.82 & 0 \\ 0 & 0 & 0.73 & 0.27 \\ 0 & 0 & 1 & 0 \end{bmatrix} \quad R_2 = \begin{bmatrix} 0 & 0 & 0.73 & 0.27 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 \\ 0.18 & 0.73 & 0.09 & 0 \\ 0.09 & 0.73 & 0.18 & 0 \\ 0 & 0 & 0.73 & 0.27 \\ 0 & 0.27 & 0.64 & 0.09 \\ 0 & 1 & 0 & 0 \\ 0.27 & 0.73 & 0 & 0 \\ 0.18 & 0.73 & 0.09 & 0 \end{bmatrix}$$

$$R_3 = \begin{bmatrix} 0.27 & 0.73 & 0 & 0 \\ 0 & 0.18 & 0.27 & 0.55 \\ 0.82 & 0.18 & 0 & 0 \\ 0 & 0.27 & 0.73 & 0 \\ 0 & 0.18 & 0.82 & 0 \\ 0.18 & 0.82 & 0 & 0 \\ 0 & 0.27 & 0.73 & 0 \\ 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0.36 & 0.64 & 0 \end{bmatrix}$$

Taking Lingnan Holdings (000524) as an example as shown in the fuzzy judgment matrix R_1 as for the index C_1 of the listed tourism company, we can see that 9% of the experts argue that the index reflects an “excellent” financial performance of the company, 64% of the experts argue that the index reflects a “good” financial performance of the company, 27% of the experts “average” while 0% of the experts “weak”. The rest can be done in the same manner to get the evaluation vector of $C_2, C_3, C_4, \dots, C_{10}$.

4.3. Calculation of fuzzy comprehensive evaluation model for hotel listed tourism companies financial performance. Use total ordering results by Analytic Hierarchy Process as the weight value of each factor.

$$A = [0.0926, 0.1294, 0.1616, 0.0436, 0.0582, 0.0843, 0.1332, 0.0779, 0.1079, 0.1113]$$

Fuzzy comprehensive evaluation model can be determined by matrix R and matrix A . Through calculations, the comprehensive evaluation model is

$$\begin{aligned} S_1 &= A \times R_1 = (0.1275 \quad 0.3644 \quad 0.4789 \quad 0.0292) \\ S_2 &= A \times R_2 = (0.0623 \quad 0.3482 \quad 0.5298 \quad 0.0597) \\ S_3 &= A \times R_3 = (0.3585 \quad 0.2874 \quad 0.2830 \quad 0.0711) \end{aligned}$$

According to membership principle, financial performance evaluations of three hotel listed tourism companies are as follows.

Financial performance of Lingnan Holdings (000524) is “average” during 2015 (up to December 31, 2015) (maximum = 0.4789).

Financial performance of Jinling Hotel (601007) is “average” during 2015 (up to December 31, 2015) (maximum = 0.5298).

Financial performance of Jinjiang Hotels (600754) is “excellent” during 2015 (up to December 31, 2015) (maximum = 0.3585).

5. Conclusion. Based on financial index system of financial performance evaluation for hotel listed tourism companies, the paper uses Analytic Hierarchy Process to determine the index weights and adopts fuzzy comprehensive evaluation model to conduct researches on hotel listed tourism company financial performance. The analysis process is simple and feasible, and the results are realistic, which would provide effective decision-making information for investors, and play an active role in healthy development of the enterprises.

With the soaring development of tourism, financial performance researches on hotel listed tourism companies are surely to be gradually perfected and evaluation methods will be more systematic and diverse. With regard to evaluation index system of hotel listed tourism company financial performance, increasing the range and quantity of indexes can be considered. On the aspect of evaluation method and data selection, it is significant to draw lessons from the new progress in intelligent computing, management evaluation model and big data, to perfect evaluation system of hotel listed tourism company financial performance.

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REFERENCES

- [1] http://www.cnta.gov.cn/zwgk/lys/j/201610/t20161018_786774.shtml.
- [2] Y. T. Li, *Research on the Development of Urban Tourism Industry: Index System, Development Mode and Economic Effect*, Ph.D. Thesis, East China Normal University, 2013.
- [3] W. L. Su and S. S. Zha, Financial evaluation research of listed tourism companies based on attribute synthetic assessment system, *ICIC Express Letters*, vol.8, no.2, pp.637-642, 2014.
- [4] J. G. Choietal, M. D. Olsen and F. A. Kwansa, Forecasting industry turning points: The US hotel industry cycle model, *International Journal of Hospitality Management*, vol.18, no.2, pp.159-170, 2009.
- [5] C. P. Barros, Measure efficiency in the hotel sector, *Annals of Tourism Research*, vol.32, no.2, pp.456-477, 2005.
- [6] S. Onut and S. Soner, Energy efficiency assessment for the Antalya Region hotels in Turkey, *Energy and Buildings*, vol.38, no.8, pp.964-971, 2006.
- [7] M. M. Yu and B. C. Y. Lee, Efficiency and effectiveness of service business: Evidence from international tourist hotels in Taiwan, *Tourism Management*, vol.30, no.4, pp.571-580, 2009.
- [8] T. Ji, H. X. Nie and Z. W. Xu, Financial evaluation system of listed tourism companies based on the model of extension, *Value Engineering*, vol.29, no.20, pp.21-22, 2010.
- [9] Y. L. Zhou, Z. J. Li and Y. Q. Li, Comprehensive evaluation research of listed companies' financial situation in Chinese tourism, *Journal of South-Central University for Nationalities (Natural Science Edition)*, vol.30, no.2, pp.124-128, 2011.
- [10] T. C. Jiang, Y. Lu and J. J. Wu, Financial performance evaluation of resource-based tourism enterprise based on DEA/AHP model, *Market Forum*, no.11, pp.33-35, 2011.
- [11] D. Y. Chen and Y. Y. Zhang, Financial comprehensive evaluation of listed tourism companies based on grey correlation evaluation model, *Economic Vision*, no.4, pp.80-81, 2013.
- [12] W. L. Su and S. S. Zha, Financial performance evaluation of scenic sights listed tourism companies, *Manager Journal*, no.15, p.56, 2015.
- [13] J. W. Zhang, Financial performance evaluation of scenic sights listed tourism companies: Based on improved TOPSIS method, *Modern Business Trade Industry*, no.17, pp.116-118, 2016.
- [14] S. Zhu, *Diversification Strategy Research of China's Listed Tourism Companies*, Master Thesis, Anhui University, 2004.
- [15] T. L. Saaty, Modeling unstructured decision problems: Theory of analytic hierarchies, *Mathematics and Computers in Simulation*, vol.20, no.3, pp.147-157, 1977.
- [16] http://quotes.money.163.com/f10/zycwzb_000524,year.html, 2015.
- [17] http://quotes.money.163.com/f10/zycwzb_601007,year.html, 2015.
- [18] http://quotes.money.163.com/f10/zycwzb_600754,year.html, 2015.