ISSN 2616-5902 Vol. 4, Issue 2: 97-101, DOI: 10.25236/AJBM.2022.040217

Research on Financial Performance Measure of Tourism Industry Based on Combined Weight and Cluster Analysis

Yihao Wang[1], Jiaxin Wang[2,*]

[1]*School of Economics and Management, Inner Mongolia University of Science and Technology, Baotou, China*
[2]*School of Accounting, Shandong University of Finance and Economics, Jinan, China*
**Corresponding author*

Abstract: *As the society enters the post epidemic era, the financial performance level of the tourism industry, which occupies a pillar position in the national economy, needs to be measured effectively, and then targeted and applicable macro and micro policies can be formulated. Based on this, this paper selects the four quarter financial data of some listed tourism companies from 2020 to 2021, and constructs a performance measure index system composed of five financial capabilities. Then, based on the principle of information quantity and independence, this paper uses the combination weight method to measure all aspects of the ability of tourism enterprises. Then, using the coefficient of variation method and cluster analysis, this paper constructs a new financial performance measurement system of tourism industry. The empirical results show that it can effectively reflect the comprehensive financial performance level of each company. In addition, the influence of the five capabilities on the financial performance of enterprises from large to small is profitability, operating capacity, solvency, cash flow and growth capacity. Finally, in order to promote the development, transformation and upgrading of the tourism industry, this paper puts forward relevant suggestions on how to improve their own development level according to the performance evaluation results.*

Keywords: *Tourism; Financial Performance; Portfolio Weight; Cluster Analysis*

1. Introduction

As an intuitive reflection of business results, business performance has always been a hot issue in the research of tourism listed companies. As the society enters the post epidemic era, the overall situation of the national economy continues to develop well. As the backbone of the development of the tertiary industry, the development of the domestic tourism industry has gradually returned to the normal level. However, due to the influence of dynamic factors, a large number of traditional performance evaluation models can not reflect the real comprehensive performance level of tourism. Based on this, it is of great practical significance for the healthy development of all kinds of tourism enterprises to strengthen the research on the business performance evaluation of listed tourism companies and related fields.

The existing literature has adopted different methods in enterprise financial performance evaluation. CEN Chengde (2000) conducted structural evaluation and "gold content" evaluation on the operating performance of listed tourism companies in China, and proposed that the cost of equity capital should be considered in performance evaluation. Liu Tingli (2005) used factor analysis to analyze the performance of listed tourism companies. Hu Yanjing (2006) used DEA model to evaluate the operating performance of listed tourism companies. Jing Qi (2017) screened the indicators through analytic hierarchy process and constructed the financial performance evaluation system, and constructed the enterprise financial performance evaluation system by using DEA model. Fan Shuhai and Ling Ning (2018) proposed to use AHP method to determine the weight of each performance evaluation index, and then use TOPSIS method to calculate the similarity of each scheme relative to the ideal solution to establish the enterprise financial performance evaluation model. Liu Xiaofeng and Ju Hengxin (2021) evaluated the financial performance of enterprises based on factor entropy weighted RSR method. Most tourism financial performance evaluation processes rely on financial data and use statistical methods. On the one hand, most of these studies do not consider the impact of dynamic factors on enterprise performance, which is difficult to accurately reflect the performance level of tourism listed companies. On the other hand, the index weighting methods used do not comprehensively consider the volatility and correlation of financial

ISSN 2616-5902 Vol. 4, Issue 2: 97-101, DOI: 10.25236/AJBM.2022.040217

indicators.

Based on this, this paper aims to build a new financial performance measurement system of tourism industry, which requires objectivity and applicability. Specifically, firstly, this paper takes some listed tourism companies as the research object. The reason is that tourism listed companies, as an enterprise type with large scale and standardized management, can be the representative of tourism industry. Then, by selecting the financial data of four quarters from 2020 to 2021, this paper constructs a performance measurement index system composed of five financial capabilities: profitability, operating capacity, solvency, cash flow and growth capacity. Its purpose is to comprehensively consider the dynamic factors and all aspects of the enterprise's financial capability into the measurement model. Then, the combined weight is constructed based on the principle of information and independence, and a new financial performance measurement model of tourism industry is constructed by combining the coefficient of variation method and cluster analysis. Finally, this paper puts forward targeted suggestions for enterprise development and relevant management departments to formulate macro policies.

2. Methodology

2.1. Source of Financial Indicators and Data Preprocessing

Referring to the operating rules for enterprise performance evaluation (Revised) and DuPont analysis framework, combined with the financial performance measurement index system constructed by the existing literature and considering the scientificity, comprehensiveness and operability of the index, this paper reconstructs the financial index of financial performance evaluation of Listed Companies in the tourism industry (Ai Xin, Zhao Xuzhou, Hu Huanyu, Wang Zhidong, Peng Dong (2019), Fu Honglei, Su simong (2021), Li Gaozheng (2021), Wang Wenjun, Cao Jian (2022)). Taking into account the characteristics of industry operation, the financial performance measurement index system of tourism industry is constructed from five aspects: profitability, growth ability, operation ability, solvency and cash flow. See Table 1. Using this performance evaluation index system, the financial data of 20 listed companies in the tourism industry from 2020 to 2021 are selected on Sina Finance and economics and other websites. Due to the differences in the dimensions of different financial indicators, the original data are normalized.

Table 1: Tourism financial performance measurement index system

Primary index	Secondary index	P and N
Profitability	Profit rate of total assets (%)	P
	Profit margin of main business (%)	P
	Net profit rate of total assets (%)	P
	Cost profit margin (%)	P
	Operating profit margin (%)	P
	Net profit margin on sales (%)	P
	Return on equity (%)	P
	Cost rate of main business (%)	N
Growth ability	Growth rate of main business income (%)	P
	Growth rate of net assets (%)	P
	Growth rate of total assets (%)	P
Operating capacity	Turnover rate of accounts receivable	P
	Accounts receivable turnover days	N
Solvency	Current ratio	P
	Quick ratio	
	Quick ratio	P
	Cash ratio (%)	P
	Interest coverage ratio	P
Cash flow	Return on operating cash flow (%)	P
	Cash flow ratio (%)	P

2.2. Research Model

Information weight, also known as the coefficient of variation method, is an objective weighting method, which uses the coefficient of variation of the data to assign the weight, and the coefficient of variation is equal to the standard deviation divided by the average value: the independence weight uses

ISSN 2616-5902 Vol. 4, Issue 2: 97-101, DOI: 10.25236/AJBM.2022.040217

the linear strength between indicators to determine the weight. If the correlation between indicators and other indicators is strong, it indicates that there is a large overlap of information, and the weight of the indicator will be relatively low. Combining the two weights, the combined weight will reflect the volatility and correlation of the data, making the measurement process more objective and comprehensive.

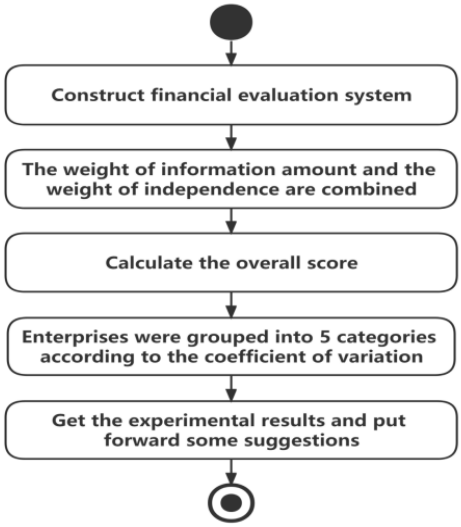

Figure 1: Financial performance measurement process of tourism industry

Clustering analysis is based on the information describing objects and their relationships found in the data. Euclidean distance is generally used to measure and group the data objects. The greater the correlation within the group and the greater the gap between the groups, the better the clustering effect. Cluster analysis of listed tourism enterprises can analyze the companies with different levels of financial status. The specific measurement process of this paper is shown in Figure 1.

3. Research Results

Table 2: Comprehensive score and ranking of financial performance

Stock code	2020.4	2021.1	2021.2	2021.3	Score	Volatility	S	label	Rank
300859	1.5433	1.7799	1.8622	1.8984	1.7285	0.1383	0.0800	0	3
601888	1.7048	1.7213	1.6615	1.7140	1.6959	0.0232	0.0137	0	1
002033	1.8378	1.5767	1.6067	1.5673	1.6738	0.1111	0.0663	0	2
300144	1.5710	1.5761	1.6469	1.5960	1.5980	0.0300	0.0188	3	4
603199	1.6749	1.5041	1.5413	1.5307	1.5734	0.0662	0.0421	3	6
300005	1.4385	1.6007	1.5892	1.4644	1.5428	0.0724	0.0470	3	7
000888	1.4875	1.5613	1.5655	1.5177	1.5381	0.0322	0.0210	3	5
300133	1.4771	1.4577	1.4603	1.4489	1.4650	0.0102	0.0070	2	8
000069	1.6024	1.3598	1.3994	1.4224	1.4539	0.0930	0.0640	2	12
600640	1.4374	1.4466	1.4342	1.3425	1.4394	0.0422	0.0293	2	9
002244	1.5049	1.3804	1.4167	1.4181	1.4340	0.0458	0.0319	2	10
600088	1.4952	1.3370	1.3942	1.3111	1.4088	0.0707	0.0502	2	11
600258	1.3943	1.3456	1.3987	1.4085	1.3795	0.0243	0.0176	4	15
000524	1.3153	1.3561	1.3773	1.3326	1.3495	0.0235	0.0174	4	14
600138	1.3462	1.3032	1.3229	1.3224	1.3241	0.0152	0.0115	4	13
603099	1.3014	1.2412	1.2190	1.3303	1.2539	0.0448	0.0357	1	19
300178	1.0947	1.3183	1.3082	1.5084	1.2404	0.1464	0.1180	1	20
000978	1.2039	1.2449	1.2509	1.1707	1.2332	0.0326	0.0264	1	17
000796	1.2262	1.2177	1.1931	1.1457	1.2123	0.0313	0.0258	1	16
002707	1.1618	1.1899	1.1702	1.0969	1.1740	0.0349	0.0297	1	18

By programming with Python, we can get the comprehensive score and ranking of financial performance of 20 listed companies from the fourth quarter of 2020 to the third quarter of 2021. As shown in Table 2, where s represents the coefficient of variation and label represents the clustering results.

ISSN 2616-5902 Vol. 4, Issue 2: 97-101, DOI: 10.25236/AJBM.2022.040217

In addition, the analysis shows that the listed companies with financial risks rank last, which can show that the model constructed in this paper has a certain reference value. From the grading results, the enterprises in the first echelon have high average scores of financial performance, low volatility and coefficient of variation, and their profitability is also significantly stronger than other enterprises in other echelons. However, the profitability of enterprises located in the second tier is at the middle and upper reaches level, and their solvency, cash flow and growth ability and profitability need to be improved, but they have certain development potential and low operating capacity. We should focus on a series of improvement measures such as strengthening operation management, innovating management mode and optimizing capital structure. Finally, on the whole, the influence of the five aspects of financial ability on the financial performance of enterprises from large to small is profitability, operating ability, solvency, cash flow and growth ability.

4. Conclusion

The financial situation of listed tourism companies is an important factor related to the long-term development of enterprises. In the process of development, the financial situation of enterprises is often affected by various factors. Therefore, in the process of operation, we should establish a scientific and reasonable financial performance measurement model to timely and accurately evaluate the financial situation of the enterprise, and effectively plan the future development of the enterprise according to the evaluation results, so as to improve the operation efficiency and avoid financial risks to a certain extent. This paper constructs a tourism financial performance measurement based on combination weighting, coefficient of variation method and cluster analysis. The empirical results show that it can effectively reflect the comprehensive financial performance level of each company.

Among the five selected aspects of financial ability, profitability and operating ability have a great impact on the financial performance of listed tourism enterprises. Based on this, listed tourism enterprises should improve their profitability from the following aspects: first, the strategic choice of enterprises, second, the reform of enterprise business model, third, the optimization of enterprise organization and management structure, and fourth, the improvement of enterprise innovation ability. In addition, in view of the operation capacity, tourism enterprises should adjust the existing mode, improve the overall office efficiency of enterprises, build an efficient and United decision-making team, and improve the overall quality of employees. Finally, enterprises must continue to reform and innovate, walk in the forefront of the national generous needle and conform to the times, so as to continuously improve the comprehensive financial performance of enterprises.

References

[1] Ai Xin, Zhao Xuzhou, Hu Huanyu, Wang Zhidong, Peng Dong, Zhao Lang Application of G1 – entropy weight – independence weight method in power grid development situation awareness [J] Power grid technology, 2020,44 (09): 3481-3490 DOI:10.13335/j.1000-3673. pst. 2019.2429.
[2] CEN Chengde Comprehensive evaluation of the operating performance of China's listed tourism companies [J] Journal of Sun Yat sen University (SOCIAL SCIENCES EDITION), 2000 (06): 97-102
[3] Fu Honglei, Su simong financial performance evaluation of Haida group based on factor analysis [J] Mall modernization, 2021 (23): 186-188 DOI: 10.14013/j.cnki. scxdh. 2021.23.067.
[4] Fan Shuhai, Ling Ning Enterprise financial performance evaluation based on ahp-topsis model [J] Friends of accounting, 2018 (06): 78-80.
[5] Fu Honglei, Su simong financial performance evaluation of Haida group based on factor analysis [J] Mall modernization, 2021 (23): 186-188 DOI: 10.14013/j.cnki. scxdh. 2021.23.067.
[6] Li Gaozheng Research on financial performance evaluation of ZS company [D] Xi'an University of petroleum, 2021 DOI: 10.27400/d.cnki. gxasc. 2021.000988.
[7] Liu Tingli Analysis and evaluation of operating performance of listed tourism companies [J] Journal of tourism, 2005 (04): 92-96.
[8] Liu Xiaofeng, Ju Hengxin Research on enterprise financial performance evaluation based on factor entropy weighted RSR method [J] Mall modernization, 2021 (22): 153-155 DOI: 10.14013/j.cnki.scxdh. 2021.22.055.
[9] Hu Yanjing, Feng Qi Business performance evaluation of listed tourism enterprises in China based on DEA [J] East China economic management, 2006 (09): 62-65 DOI: 10.19629/j.cnki.34-1014/f. 2006.09.018.
[10] Jing Qi Research on financial performance evaluation of Listed Companies in media industry based

ISSN 2616-5902 Vol. 4, Issue 2: 97-101, DOI: 10.25236/AJBM.2022.040217

on ahp-dea [J] Statistics and information forum, 2017,32 (03): 92-100
[11] Wang Wenjun, Cao Jian Financial performance evaluation of construction enterprises [J] Cooperative economy and technology, 2022 (04): 134-137 DOI: 10.13665/j.cnki. hzjjykj. 2022.04.055.
[12] Zhu Yue Research on financial performance evaluation of China's Internet industry based on TOPSIS method [J] Fortune today, 2021 (15): 203-204.
[13] Zhou Yanchao, Xue Kun, Ge Haiyan, Chen Huoying, Liu Yang Comprehensive evaluation of Cherry Tomato Quality Based on principal component and cluster analysis [J] Zhejiang Agricultural Journal, 2021, 33 (12): 2320-2329