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Financial Risk Analysis of Listed Catering Companies—Taking Haidilao as an Example

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Abstract: *Based on the Z-Score model, the modified Z-Score model and the F model, this paper adopts the financial data of Haidilao International Holding Ltd. from 2018 to 2021 to conduct a quantitative risk analysis on the company's scale, asset structure, production capacity and operating results, discusses the impact of the COVID-19 epidemic on the financial situation of enterprises, and puts forward the suggestions for the enterprises to prevent the risks.*

Keywords: *Financial risk; Z-Score model; F model*

1. Introduction

In 2020, the catering industry in China was hit seriously by the COVID-19. According to the statistical data released by the National Bureau of Statistics, the total business volume of the catering industry in China reached 4.67 trillion yuan in 2019, and dropped to 3.95 trillion yuan in 2020, with a decrease of 15.4% compared with 2019. It rose to 469 million yuan in 2021, with an increase of 18.6% compared with 2020. However, the revenue of the catering industry in China from January to May 2022 was 163 million yuan, with a year-on-year decrease of 8.5%. As the uncertainty and unpredictability in the operation and management of catering enterprises increase, accurately identifying the financial risks and take effective measures to control risks in time become more and more important for the catering enterprises. Haidilao International Holding Ltd. (hereinafter referred to as "Haidilao"), which was listed on the Hong Kong Stock Exchange in 2018, is currently the largest chain catering enterprise with the largest number of branches in China. As of June 30, 2022, Haidilao has set up 1,435 direct restaurants around the world, 103 of which are located in 11 foreign countries. By selecting Haidilao as the research object of financial risk analysis, this paper adopts Z-Score and F-Score model to conduct the empirical analysis on the financial data of Haidilao from 2018 to 2021, analyzes the financial risks of the company and puts forward the relevant countermeasures for the new ideas to help more catering enterprises manage the financial risks properly.

2. Theoretical Analysis and Design

In the complex and changeable market and internal environment, the early awareness of the crisis in operation and timely measures to avoid the outbreak of the crisis will cut down the losses of enterprises. With the long-term efforts, many scholars in the academic circles have adopted the following methods to measure the financial risk of enterprises: univariate analysis, multivariate analysis, logical regression analysis and neural network analysis. This paper tries to adopt the multivariate analysis to conduct the quantitative analysis on the financial risk of Haidilao, analyze whether there are significant changes in the financial risks with the impact of the COVID-19 epidemic, and then put forward some suggestions on the early warning of financial risk for the catering industry [1].

2.1 Z-Score model

In 1968, Altman selected the five most representative financial indicators that could predict bankruptcy in previous studies and built the Z-Score model.[2] It was mainly applied to the manufacturing industry, and later has been widely used as an evaluation method for the comprehensive business. The model is constructed as follows:

$$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5 \quad (1)$$

ISSN 2616-5902 Vol. 5, Issue 5: 80-84, DOI: 10.25236/AJBM.2023.050511

Table 1: Meaning and Decision Conditions of Indicators in Z-Sore Model

Index Calculation Formula	Meaning	Decision Conditions
X_1=Working capital ÷ Total assets= (Current assets - Current liabilities) ÷ Total assets	This index shows the liquidity and scale of an enterprise and evaluates its short-term solvency quantitatively	When Z<1.81, there is a high possibility of financial crisis; When 1.81 ≤ Z <2.675, the financial risk of the enterprise is moderate, and it is uncertain whether there is a financial crisis; When Z ≥ 2.675, the financial risk of the enterprise is very small.
X_2=Retained earnings ÷ Total assets =(Shareholders' equity - Capital stock) ÷ Total assets	This indicator measures the profitability of the enterprise in a period of time	
X_3=Earnings before interest and tax ÷ Total assets=(Total profit+Financial expenses) ÷ Total assets	Without taking the impact of tax and financing into consideration, this indicator measures the production capacity of the enterprise assets	
X_4=Market value of owner's equity① ÷ Total liabilities	Conduct the quantitative evaluation on the capital structure of the enterprise	
X_5=Sales revenue ÷ Total assets	This indicator measures the ability of the enterprise's assets to obtain sales revenue	

Table 1 shows the meaning and decision conditions of the indicators in Z-Core model.

2.2 Modified Z-Score model

In 2000, Professor Altman revised the Z-Score model to broaden its application scope, which is applicable to the listed non-manufacturing enterprises. The model is as follows:

$$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4 \quad (2)$$

Table 2: Meaning and Decision Conditions of Indicators in the Modified Z-Score Model

Index Calculation Formula	Meaning	Decision Conditions
X_1, X_2, X_3 index calculation formula and meaning are the same as Z model		When Z<1.1, there is a high possibility of financial crisis in the enterprise; When 1.1 ≤ Z < 2.6, the financial risk of the enterprise is moderate, and it is uncertain whether there will be a financial crisis; When Z ≥ 2.6, the financial risk of the enterprise is very small.
X_4=Book value of equity ÷ Total liabilities	Conduct the quantitative evaluation on the capital structure of the enterprise	

Table 2 shows the meaning and decision conditions of indicators in the modified Z-Score model.

2.3 F model

From the indicators in the Z-Score model mentioned above, it can be seen that the impact of cash flow on corporate financial risk has been taken into consideration in the Z-Score or the modified Z-Score. Therefore, some scholars have revised Z-Score to settle the defects of Z-Score, which makes its quantitative results more objective and comprehensive. The modified model is named F model, and the expression is as follows[3]:

$$F = -0.1774 + 1.1091X_1 + 0.1074X_2 + 1.9271X_3 + 0.0302X_4 + 0.4961X_5 \quad (3)$$

Table 3: Meaning and Decision Conditions of Indicators in F Model

Index Calculation Formula	Meaning	Decision Conditions
X_1, X_2 and X_4 are the same as the modified Z model		When F < 0.0274, the enterprise has a high possibility of financial crisis; When F≥0.0274, the enterprise can move on.
X_3=(Net profit + Depreciation) ÷ Average total liabilities	Quantitative evaluation on the enterprise's cash flow for debt repayment ability	
X_5=(Net Profit+Interest +Depreciation) ÷ Average total assets	Quantitative evaluation on the enterprise's ability of the total assets to create cash flow	

① In this paper, the market value of the owner's equity is calculated with the closing price of the last day of each year, and the market value of equity is obtained by multiplying the closing price by the total number of shares.

ISSN 2616-5902 Vol. 5, Issue 5: 80-84, DOI: 10.25236/AJBM.2023.050511

Table 3 shows the meaning and decision conditions of indicators in F model.

3. Empirical Research

3.1 Research object and data source

With the financial early warning model to detect the financial data of the enterprise, it can effectively prevent the outbreak of financial crisis. This paper selects Haidilao as the research object. As a catering enterprise, Haidilao has the dual industry attributes of both food processing and catering. The above three multivariate models are adopted to analyze the quantitative financial risk. The original data used is from the 2018-2021 annual report of the company.

3.2 Overall analysis of the Haidilao financial risk based on Z-Score model[4]

According to the above expression of Z-Score model, the X_1, X_2, X_3, X_4, X_5 and Z values of Haidilao from 2018 to 2021 can be calculated, as shown in the following table 4:

Table 4: Short-term Solvency of Haidilao from 2018 to 2021 Unit: RMB 1,000

Year	Current Assets	Current Liabilities	Total Assets	X_1
2018	5 735 986	3 305 988	11 944 643	0.20344
2019	7 200 291	5 664 071	20 613 932	0.07452
2020	6 593 256	9 867 943	27 527 144	-0.11896
2021	11 405 502	9 885 869	28 021 487	0.05423

According to Table 4, the current assets, current liabilities and total assets of Haidilao are on the rise. From the calculation results of X_1, the value of X_1 has been on the decline since Haidilao was listed in Hong Kong in 2018, and even a negative number in 2020. Affected by the epidemic, Haidilao was closed for 46 days on January 26, 2020. Without any revenue, the company had to pay the personnel wages, rent and other costs. Under huge financial pressure,the bank loans of the enterprises was on the rise. Although X_1 rebounded in 2021, the value was very low, which suggests that Haidilao encounters the risk of short-term debt repayment.

Table 5: Profitability of Haidilao in 2018-2021 Unit: RMB 1,000

Year	Total Shareholders' Equity	Capital Stock	Total Assets	X_2
2018	8 629 558	175	11 944 643	0.72245
2019	10 626 033	175	20 613 932	0.51547
2020	10 237 258	175	27 527 144	0.37189
2021	7 928 625	183	28 021 487	0.28294

As shown in Table 5 above, after being listed in 2018, the total assets of Haidilao increased sharply, while the retained earnings only increased in 2019 and kept declining in the following two years, which caused the annual decline of X_2. Therefore, the enterprise shall appropriately increase the proportion of retained earnings in the income distribution to lower the enterprise risks.

Table 6: Production Capacity of Haidilao in 2018-2021 Unit: RMB 1,000

Year	Earnings before Interest and Tax	Financial Expenses	Total Assets	X_3
2018	2 261 830	31 231	11 944 643	0.19197
2019	3 247 224	236 791	20 613 932	0.16901
2020	735 142	445 559	27 527 144	0.04289
2021	-3 976 019	644 513	28 021 487	-0.11889

The profit of Haidilao from 2018 to 2021 is shown in Table 6. In 2019, the profit increased by 43.57% compared with the same period last year, and dropped by 77.36% in 2020. What's worse, it lost nearly 4 billion yuan in 2021. During the epidemic, due to the continuous expansion of new stores and the increase of liabilities, the financial expenses increased significantly year by year. Therefore, the value of X_3 and the profit inequality declined, and even became negative in 2021.

ISSN 2616-5902 Vol. 5, Issue 5: 80-84, DOI: 10.25236/AJBM.2023.050511

Table 7: Capital Structure of Haidilao in 2018-2021 Unit: RMB 1,000

Year	Market Value of Owner's Equity	Total Liabilities	X_4
2018	89 638 900	3 315 085	27.03969
2019	164 983 700	9 987 899	16.51836
2020	316 298 700	17 289 886	18.29386
2021	98 102 400	20 092 862	4.88245

As shown in Table 7, the total liabilities of Haidilao show an overall upward trend, while the market value of owner's equity mainly depends on the closing price of the last day of the year. The closing price of the last day of 2018 was 16.713 yuan,31.129 yuan in 2019,59.679 yuan in 2020, and 17.6 yuan in 2021, while the capital stock increased by 270 million shares in 2021. According to the calculation results, the market value of equity increased year by year from 2018 to 2020. However, in 2021, the owner's equity declined significantly, while the value of X_4 was high, which could protect the creditor's rights and interests.

Table 8: Profitability of Haidilao in 2018-2021 Unit: RMB 1,000

Year	Sales Revenue	Total Assets	X_5
2018	16 969 100	11 944 643	1.42064
2019	26 555 792	20 613 932	1.28824
2020	28 614 255	27 527 144	1.03949
2021	41 111 624	28 021 487	1.46715

As shown in Table 8, from 2018 to 2021, the sales revenue and total assets of Haidilao shows an increase year by year. Since the growth of revenue in 2019 and 2020 was not as high as the growth of assets, the value of X_5 decreased in 2019 and 2020. However, the revenue increased by 43.68% in 2021, and the assets increased by 1.8% year on year, which suggests that the ability of enterprise assets to generate revenue is on the rise.

According to the values of X_1, X_2, X_3, X_4 and X_5 from 2018 to 2021, the Z-Score model can be adopted to tentatively calculate the Z value as shown in Table 9:

Table 9: Analysis of Z-Score Value of Haidilao in 2018-2021

Reporting Year	2018	2019	2020	2021
Z	1.60	1.40	1.16	1.50

According to the calculation, the Z value of Haidilao was not good from 2018 to 2020, all of which were lower than the warning value of 1.81. It suggests that the financial situation of Haidilao was poor, with high financial risk and high probability of bankruptcy. Especially since the outbreak of the COVID-19 in 2020, the main business income of Haidilao has decreased significantly, causing operating losses. In 2021, the net profit loss of the company was 4,161.206 million yuan. According to the 2022 interim report, the net profit loss was 267.265 million yuan, suggesting no improvement in profitability.

3.3 Overall analysis of financial risk of Haidilao based on the modified Z-Score model

Substituting the relevant data in the financial statements of Haidiao from 2018 to 2021 into the modified Z-Score model, the X_1, X_2, X_3, X_4 and Z "values of Haidiao from 2018 to 2021 can be calculated in sequence, as shown in Table 10:

Table 10: Values of the Variables in the Modified Z-Score Model of Haidilao in 2018-2021

	X_1	X_2	X_3	X_4	Z"
2018	0.20344	0.72245	0.19197	2.60311	7.71
2019	0.07452	0.51547	0.16901	1.06389	4.42
2020	-0.11896	0.37189	0.04289	0.59209	1.34
2021	0.05423	0.28294	-0.11889	0.39460	0.89

The maximum value of Z" in Haizilao is 7.71, and then it was on the decline. After 2020, the value of Z" was lower than 2.6, which suggests there is a financial risk. In 2021, the value of Z" was lower than the warning value of 1.1, which suggests that the possibility of financial crisis in the enterprises is increased.

3.4 Overall analysis of financial risk of Haizilao based on F model

The critical value of F model is 0.0274. The higher the value, the higher the viability and development

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ability of the enterprise, and the smaller the financial risk it faces; On the contrary, it suggests that the enterprise is likely to be on the edge of bankruptcy and encounter greater financial risks.

Table 11: Values of Variables of F Model from 2018 to 2021

	X_1	X_2	X_3	X_4	X_5	F
2018	0.20344	0.72245	0.70531	2.60311	0.19836	1.66
2019	0.07452	0.51547	0.42434	1.06389	0.21709	0.92
2020	-0.11896	0.37189	0.19336	0.59209	0.13764	0.19
2021	0.05423	0.28294	0.01925	0.39460	0.03681	-0.02

As shown in Table 11, from 2018 to 2020, the F value of Haidilao was higher than the critical value, but the F value in 2021 was negative. According to the values of X_3 and X_5 in F model, there was a decline in 2021. It suggests that Haidilao shall improve the management of cash flow, control the operating costs, and find the new profit growth points to reduce the pressure on the cash flow and financial risks of the enterprise.

To sum up, for the determination of the financial risk of Haidilao, the results are consistent by calculating the Z value, the Z "value and the F value, and there is a possibility of financial crisis in Haidilao. According to the calculation of the three models above, it shows the reasons why some enterprises are in financial distress from the indicators. On the one hand, affected by the COVID-19 in 2020, the demand for food and beverage across the country declined with great loss; On the other hand, it is also related to the enterprise itself. According to the financial report of Haidilao, the number of new stores in Haidilao reached 544 in 2020. In 2021, 421 restaurants were opened, while 276 restaurants were closed. When the national catering industry is in deficit and shrinking, blindly opening the new stores will result in the poor anti-risk ability of Haidilao. If the enterprise fails to take immediate measures to deal with the crisis, it may suffer great losses.

As a catering enterprise greatly affected by the market, only by setting up a complete and early warning system of financial risk, can Haidilao avoid the financial crisis.

4. Measures to Financial Risk Management of Haidilao

Enhance R&D capability of the product and improve the market position. For catering enterprises, only by constantly carrying out R&D of the product and updating their products can they occupy a favorable position in the catering market. Ensure reasonable asset structure and improve the solvency of enterprises. The asset-liability ratio index should not be too high. Too much debt will increase the debt repayment pressure of enterprises. Innovate and develop the business models to cut down the costs. During this epidemic, the biggest dilemma of the catering industry is the reduction of revenues, but there are also labor costs and rent costs. Therefore, the catering industry can adopt the artificial intelligence to control the human cost. For example, using the self-service machines and artificial intelligence equipment to provide services will greatly help to cut down the costs and expenses, increase the profits of enterprises and improve the profitability of enterprises[5].

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