A Study on Financial Risk Early Warning in Pharmaceutical Companies: The Case of Ruikang Pharmaceutical

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Abstract. This paper analyzes the financial data of Ruikang Pharmaceutical from 2021 to 2023 through the Z-score model. This calculation method makes the multivariate linear discriminant analysis method proposed by the American scholar Edward Eltman. This approach evaluates the financial health of a firm by combining multiple financial indicators in a weighted manner to arrive at a composite indicator, Z-score. Systematically analyze the operation status and bankruptcy of the enterprise, so as to evaluate the potential risks that the company may face in financial aspects, and warn the possible problems in advance, so as to help the enterprise take corresponding measures to avoid risks, improve the competitiveness and sustainable development of the enterprise, and ensure the financial health and stable development of the company. It can improve the ability of pharmaceutical companies to provide high-level and high-quality services, provide reasonable fund management programs for enterprises themselves, and meet the market demand. Through the calculation and analysis results, it can be seen that there are certain financial risks in Ruikang Pharmaceutical, and Ruikang Pharmaceutical has been on the edge of bankruptcy for three years. Finally, this paper puts forward the corresponding solutions and countermeasures to improve the vitality of the company and make it develop for the better.

Keywords: Financial Risk; Pharmaceutical Industry; Ruikang Pharmaceutical; Z-Score Model.

1. Introduction

In today's global economic environment, the competition in the pharmaceutical industry is becoming increasingly fierce, and the financial risk management of enterprises is becoming more and more important. In recent years, with the continuous expansion of the pharmaceutical market and the rapid updating of technology, pharmaceutical enterprises are facing unprecedented challenges and opportunities. Especially in the aspect of financial risk management, how to accurately assess and effectively deal with potential risks has become the key to the sustainable development of pharmaceutical enterprises. Ruikang Pharmaceutical, as a well-known enterprise in the pharmaceutical industry, its financial risk management and control strategy is not only related to the stable operation of the enterprise itself, but also has reference significance for other enterprises in the industry.

As a means of rapid expansion, merger and acquisition can bring more market opportunities and resources to Ruikang Pharmaceutical, but it is also accompanied by huge financial challenges. In the process of M&A, enterprises need to invest a lot of capital, and there are many uncertainties in the financing, use and management of funds. In addition, problems such as resource integration, cultural integration and business coordination after merger and acquisition are also important problems that Ruikang Pharmaceutical needs to face. Improper handling of these problems is likely to cause financial risks of enterprises, and even threaten the survival and development of enterprises. The pharmaceutical industry is a high-tech industry, and its core element of technology, patent, is not only a means of technology protection, but also a powerful means of competition, which brings about patent risks. At present, the theory of risk management is popular in various industries around the world, but the pharmaceutical enterprises in our country still lack knowledge of risk management [1].

It is against this background that this paper focuses on the financial risk early warning research of Ruikang Pharmaceutical. We note that although M&A can bring short-term performance gains to firms, frequent M&A activity may have a profound impact on the financial condition of firms in the long run. Especially in terms of capital liquidity, solvency and profitability, M&A may face severe challenges.

Aiming at the financial risk early warning research of Ruikang Pharmaceutical, this paper aims to use the Z-value model to deeply analyze its financial data from 2021 to 2023, so as to evaluate the potential risks that the enterprise may face in terms of finance. Through systematic data analysis, we expect to find and warn possible problems in time, so as to help enterprises take corresponding measures to avoid risks and ensure the financial health and stable development of the company.

It is noted that the pharmaceutical industry is facing unprecedented changes. With the continuous progress of technology and the increasing openness of the market, pharmaceutical enterprises need to constantly improve their competitiveness and innovation ability to cope with the increasingly fierce market competition. As an important guarantee for the stable operation of enterprises, the importance of financial risk management is self-evident. Therefore, the research in this paper not only has theoretical value, but also has practical significance.

Through literature review, we find that scholars at home and abroad have achieved rich research results in financial risk early warning. The financial risk characteristics of pharmaceutical enterprises mainly include investment risk, financing risk and environmental protection risk [2]. Peng found that enterprises can avoid financial risks by improving financing capacity and strengthening financial control [3]. However, research on financial risk early warning for specific enterprises, especially pharmaceutical enterprises, is still insufficient. In view of this, this paper takes Ruikang Pharmaceutical as an example to explore the construction and application of its financial risk early warning mechanism through empirical research.

In the following sections, we will first introduce the basic situation of Ruikang Pharmaceutical and evaluate its financial risk based on the Z-value model. Then, we will elaborate on the calculation method of Z-score model and conduct early warning analysis on the financial risk of Ruikang Pharmaceutical. On this basis, we will put forward targeted measures and suggestions to help Ruikang Pharmaceutical effectively deal with financial risks. Finally, we will conclude the paper and look to future research directions.

Financial risk may come from many aspects, including fund management, expense control, income loss, investment risk, etc. A comprehensive identification and assessment of financial risks is a critical step that helps to determine appropriate coping strategies [4]. Through the research of this paper, we expect to provide useful reference and reference for the financial risk management of Ruikang Pharmaceutical and even the whole pharmaceutical industry. At the same time, we also look forward to further improving the financial risk early warning mechanism through continuous exploration and practice, so as to escort the sustainable development of enterprises.

2. Ruikang Pharmaceutical and its Financial Evaluation based on the Z-Score Model

Ruikang Pharmaceutical Group is a comprehensive medical service provider that sells pharmaceuticals, medical devices, and medical consumables directly to medical institutions across the country. It also operates eight major business segments, including the circulation of pharmaceuticals and medical devices, academic services, medical diagnosis, financial technology, traditional Chinese medicine, digital healthcare, professional logistics, and comprehensive medical equipment. Established on September 21, 2004, with a registered capital of 1.5 billion yuan, Ruikang Pharmaceutical Group has over 100 subsidiaries and more than 9,000 employees. The company was listed on the Shenzhen A-share market in June 2011, with stock code 002589. Its sales network covers 31 provinces and cities across the country, directly serving nearly 60,000 medical institutions. Its business covers almost all leading enterprises in the circulation of pharmaceuticals and medical devices from domestic and foreign manufacturers above a certain size.

The Z-score model assigns different weights to five indicators and calculates a numerical value through weighted computation. By comparing this value with a critical threshold, it assesses the severity of corporate financial risk, bond default risk, and bankruptcy risk. The model conveys early warning signals to enterprises, aiming to prevent bond defaults and bankruptcies. The expression of the Z-score model is:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.999X_5 \quad (1)$$

Where X_1= Net Working Capital / Total Assets = (Current Assets - Current Liabilities) / Total Assets; X_2 = Retained Earnings / Total Assets = (Undistributed Profits + Surplus Reserve) / Total Assets; X_3 = Earnings Before Interest and Taxes (EBIT) / Total Assets = (Total Profits + Financial Expenses) / Total Assets; X_4 = Owner's Equity / Total Liabilities; and X_5 = Operating Income / Total Assets.

Generally, a higher Z-score indicates better business performance of an enterprise, with lower possibilities of default and bankruptcy. If the Z-score is below 1.81, the enterprise faces significant financial risks, and the likelihood of bond default and bankruptcy is relatively high; if the Z-score is between 1.81 and 2.675, the financial situation of the enterprise deserves attention, as there are certain risks of default and bankruptcy; if the Z-score exceeds 2.675, the business performance of the enterprise is excellent, the financial status is good, and the probabilities of bond default and bankruptcy are relatively low.

3. Calculation of Z-Score Model

Firstly, Ruikang Pharmaceutical's Z-score in 2021 was 1.583 shown in Table 1, which, though close to the bankruptcy risk threshold of 1.81, did not meet the criteria for financial stability. This indicates that while the company's financial position was relatively sound in 2021, it still carried certain financial risks that required management's attention. By 2022, Ruikang Pharmaceutical's Z-score had significantly decreased to 0.761, far below the threshold of 1.81. This figure reveals that the company faced severe financial risks in this year, with a higher likelihood of default and bankruptcy. Entering 2023, although Ruikang Pharmaceutical's Z-score rebounded slightly, it remained low at 0.913, still below the threshold of 1.81. This suggests that while the company's financial situation had improved, it was still in an unstable state, necessitating continued strengthening of financial management and risk control. Therefore, based on the analysis of the Z-score model, Ruikang Pharmaceutical experienced significant fluctuations in its financial position from 2021 to 2023, with an overall serious financial situation.

Table 1. Z-scores and X-values from 2021 to 2023

	Year 2021	Year 2022	Year 2023
X_1	0.158	0.019	0.047
X_2	0.086	0.024	0.027
X_3	0.037	-0.073	0.010
X_4	0.580	0.457	0.509
X_5	0.798	0.672	0.481
Z	1.583	0.761	0.913

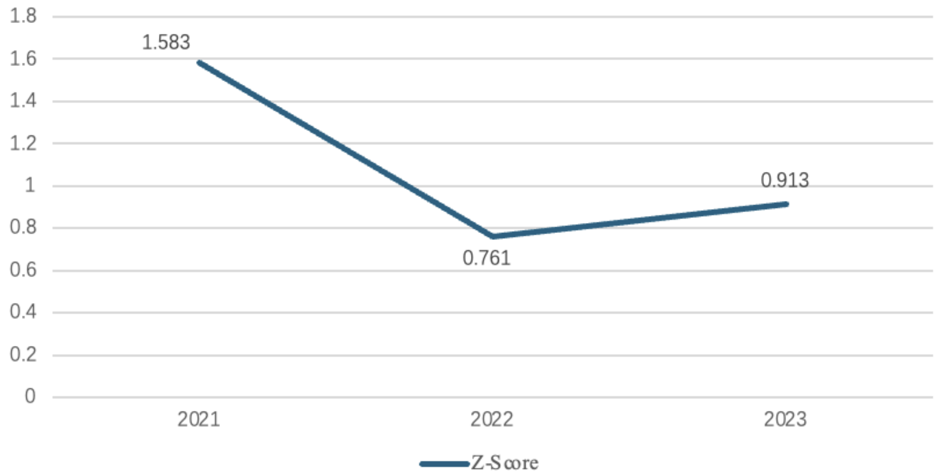

Fig. 1 Z-score of Ruikang Pharmaceutical (Photo/Picture credit: Original)

Throughout these three years, Ruikang Pharmaceutical's Z-score consistently remained below 1.81 shown in Figure 1, the minimum threshold according to the Z-score model, indicating the persistent presence of potential financial risks in the company during the selected period. The analysis results may also reflect the deterioration of the overall market environment, leading to issues such as declining revenue and increasing bad debts for Ruikang Pharmaceutical. These three years have demonstrated the company's excessive debt levels, resulting in increased pressure on debt repayment and subsequently affecting its financial position. Operational issues reflect the company's inefficient operations, high employee compensation expenses, or severe employee turnover, leading to a lack of innovation in products or services, which may also negatively impact the company's financial situation. Companies with poor financial health may be unable to provide competitive salaries and benefits, resulting in rising employee turnover rates. The loss of talent may cause companies to lose key personnel and technology, further weakening their competitiveness. Companies may also face cash flow constraints, unable to meet the needs of daily operations and development, such as paying employee wages and purchasing raw materials. An excessively low Z-score may lead to a decline in the company's credit rating, affecting its reputation and position in the market, and reducing the trust of customers, suppliers, and partners. A lower credit rating may result in higher financing costs for the company, such as increased lending rates or reduced financing limits. On the other hand, there are also supply chain risks. A low Z-score may cause suppliers to doubt the company's payment ability, leading to suppliers demanding stricter contract terms or earlier payment. This may increase the company's procurement costs and affect the stability of the supply chain.

4. Analysis of Financial Risk Early Warning

4.1. Low Z-Score

Research by Lu et al. has found that the overall magnitude of the Z-score is most closely related to the X_3 value, which also reflects the company's profitability and the quality of its profits and total assets [5]. This finding provides important theoretical support for understanding the fluctuations in Ruikang Pharmaceutical's Z-score.

Upon further examination of the data in Table 1, it is evident that the significant decrease in Ruikang Pharmaceutical's Z-score in 2022 was primarily due to the X3 value dropping to a negative number. This change not only reveals the company's concerning profit and total asset situation in that year but also indicates a significant decline in its profitability. In 2023, although the Z-score increased, the magnitude of the increase was relatively small, mainly due to the limited increase in the X3 value. This again demonstrates that Ruikang Pharmaceutical still faces significant issues in terms of the quality of its profits and total assets, as well as its profitability.

4.2. Decline in Solvency

Ruikang Pharmaceutical has chosen to raise funds through debt, and furthermore, all consideration payments were made in cash. This situation has led to strained cash flow for the company, affecting its solvency. This paper will analyze Ruikang Pharmaceutical's solvency starting from its debt position.

Table 2. Debt Status of Ruikang Pharmaceutical

	Current Liabilities (¥Billion)	Non-current Liabilities (¥Billion)	Total Liabilities (¥Billion)	Proportion of Current Liabilities
2021	16.510	0.196	16.706	98.83%
2022	12.470	0.112	12.582	99.11%
2023	10.760	0.311	11.071	97.19%

As can be seen from Table 2, Ruikang Pharmaceutical primarily relies on short-term debt financing for its debt financing. From 2021 to 2023, the average current liabilities reached 13.247 billion yuan, while the average non-current liabilities were only 0.206 billion yuan. Despite the increasing number of acquisitions, most of Ruikang Pharmaceutical's debt consists of short-term debt. The majority of Ruikang Pharmaceutical's debt pressure comes from current liabilities, with non-current liabilities accounting for a very small proportion of the overall debt. From the perspective of short-term solvency indicators, it can be seen that Ruikang Pharmaceutical's solvency is relatively weak. Due to the very limited cash retained from operations, the company has long relied on short-term debt to supplement its working capital, which has led to significant pressure on the company to repay current liabilities. At the same time, it is also difficult for the company to make long-term investments, increase research and development, and explore new areas of business.

On the other hand, the company's frequent mergers and acquisitions over the years have not achieved synergistic effects to bring operating cash flow to the company in the short term after the acquisitions. Therefore, the company needs to continue borrowing to meet its financing needs, ultimately resulting in poor short-term solvency [6].

In summary, Ruikang Pharmaceutical has a large outflow of cash, and its operating net cash flow has not brought positive cash flow to the company. The large amount of debt has exposed the company to the risk of paying high interest expenses, and Ruikang Pharmaceutical's debt financing is mainly short-term. In this situation, the company faces significant risks.

4.3. Decline in Profitability

Firstly, from the perspective of operating income, Ruikang Pharmaceutical's revenue has been declining year by year. In 2021, the company's total revenue was 21.061 billion yuan, a year-on-year decrease of 22.67%. By 2022, total revenue further declined to 12.311 billion yuan, a year-on-year decrease of 41.54%. In 2023, the company's total revenue continued to drop to 8.034 billion yuan, a year-on-year decrease of 34.74%. This trend indicates the market pressures and challenges faced by Ruikang Pharmaceutical in recent years [7].

Table 3. Debt Status of Ruikang Pharmaceutical

	Operating Revenue (¥Billion)	Operating Costs (¥Billion)	Operating Cost/Operating Revenue (%)
2021	21.06	17.22	81.77%
2022	12.311	10.64	86.43%
2023	8.034	7.207	89.71%

Secondly, from the perspective of net profit, Ruikang Pharmaceutical's net profit has also experienced significant volatility. In 2021, the company's net profit was 0.3820 billion yuan, a year-on-year decrease of 38.91%. However, by 2022, the company's net profit incurred a significant loss, reaching -1.739 billion yuan, a staggering year-on-year decrease of 555.15%, partly due to the impact of the COVID-19 pandemic. In 2023, the company's net profit turned losses into profits, reaching 31.97 million yuan, a year-on-year increase of 101.84%. This change indicates that Ruikang Pharmaceutical is striving to improve its profitability, but it still faces considerable pressure overall.

Poor cost management is the main reason restricting Ruikang Pharmaceutical's profitability. With cost-to-revenue ratios exceeding 80%, it indicates that the company is facing significant cost pressures. High-cost expenditures limit its investments in innovation, research and development, and marketing, which has a negative impact on the company's development [8]. According to Table 3, the indicator of operating cost ratio shows an increasing trend year by year, indicating that Ruikang Pharmaceutical's cost-effectiveness is decreasing, which means the company's cost-effectiveness is declining annually. The reduction in cost-effectiveness may affect the company's profitability and market competitiveness, thereby increasing the company's financial risks. The rise in operating cost ratio also reflects a decline in the company's operational efficiency. If the company's cost control is ineffective or operational efficiency decreases, then the company's profitability will be affected, thereby increasing financial risks. With the continuous rise in operating cost ratio, Ruikang Pharmaceutical's financial risks are also accumulating. This accumulated financial risk may have a negative impact on the company's stable operation and may even lead to operational crises.

In summary, the increasing operating cost ratio of Ruikang Pharmaceutical may reflect issues such as reduced cost-effectiveness, decreased operational efficiency, and accumulated financial risks.

5. Suggestions

Ruikang Pharmaceutical should pay close attention to the medical policies issued by the national and local governments, especially those related to the pharmaceutical business industry, and use these policy dividends to adjust the company's strategy and optimize the allocation of resources. With the continuous progress of science and technology, informatization has become an important trend in the development of pharmaceutical business industry. Ruikang Pharmaceutical should keep up with the pace of The Times, increase information investment, and improve the company's information level. This can not only improve the company's operating efficiency, but also reduce operating costs, thus enhancing the company's market competitiveness [9].

Ruikang Pharmaceutical should establish a sound internal control system, including financial approval system, internal audit system, etc., to reduce the occurrence and impact of financial risks. By strengthening internal control, the company can ensure the accuracy and integrity of financial data and provide a strong guarantee for cost control.

The pharmaceutical manufacturing industry requires a large amount of capital investment, and the pharmaceutical industry has a long production cycle, leading to the turnover of working capital is more difficult, and enterprises need to make detailed plans in terms of corporate strategy to avoid a variety of risks in the future. Therefore, China's pharmaceutical industry should try a variety of financing methods, abandon a single financing method, according to the development of enterprises, through bond financing, equity financing and other channels, to create a diversified and suitable financing model, so as to better reduce the financing risk [10]. Ruikang Pharmaceutical should optimize its debt structure and reduce financial risks according to its own business conditions and market environment. The company can reduce the financing cost and improve the utilization efficiency of funds by reasonably controlling the proportion of long-term and short-term liabilities and choosing appropriate financing methods.

For the pharmaceutical industry as a whole, it is important to first ensure that all R&D activities comply with local and international laws and regulations, avoid intellectual property rights infringement and other related legal issues, and second, pay close attention to relevant policy changes and adjust the company's R&D strategy in a timely manner to meet new regulatory requirements.

The pharmaceutical industry should also conduct a comprehensive risk assessment in the early stage of research and development, including technical, legal, market and financial risks. Establish a sound risk management system to ensure that potential risks are identified and addressed in a timely manner throughout the R&D process. During the research and development process, we can establish partnerships with other enterprises, research institutions or academia to share experience and resources and jointly promote the progress of research and development projects. In the process of research and development, we should also pay close attention to market changes and competitive situation, timely adjust research and development priorities and strategies, including long-term market trend analysis, forecast the future development direction, and adjust research and development investment and direction according to the results, and reduce technical and market risks through these measures.

6. Conclusion

In general, due to the high frequency acquisition of Ruikang Pharmaceutical in the early stage, and the acquired enterprises cannot provide cash flow, resulting in the financial situation of Ruikang Pharmaceutical from 2021 to 2023 facing greater challenges and pressure. Among them, the operating income declined, and the net profit fluctuated greatly. The company needs to adjust the original business and strive to improve its profitability in order to cope with the changes in the market and the pressure of competition. The pharmaceutical industry can make adjustments to the status quo mainly focused on the continuous attention to policy and increased research and development investment in these two aspects.

This article also has some limitations. In order to study how pharmaceutical companies avoid financial risks, we choose Ruikang Pharmaceutical as the research object, but it is difficult to select only Ruikang Pharmaceutical to represent the entire pharmaceutical industry. For the problems that appear in Ruikang Pharmaceutical, whether other pharmaceutical companies face the same problem also lacks effective support. Secondly, the measures proposed in this paper are based on data and theory, and have not been tested in practice, so the practicability of the measures has yet to be proved.

In short, if the pharmaceutical industry wants to avoid financial risks, it should flexibly adjust research and development investment according to the policy. In this process, enterprises should establish a sound risk management system, and the financial risk prevention measures formulated by them should start from the long-term and take the sustainable development route. In the process of making financial decisions and daily management, enterprises should not only be good at grasping opportunities, but also be able to calmly cope with possible financial risks. This minimizes the threat of financial risk.

Authors Contribution

All the authors contributed equally, and their names were listed in alphabetical order.

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