Enterprise Financial Risks: Take Amyris Inc. as an Example

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Abstract. In today's economic environment, companies will face all kinds of risks, including environmental, political, financial pressure and other risks. If the internal management of the company cannot accurately predict the risk and take appropriate measures to deal with the risks, the company will have financial risks and face the consequences of bankruptcy. In order to help companies with early warning, analysis and dealing with financial risks, it is essential to take a specific company as a case study to deeply understand financial risk. This paper collects indicators in the financial statements of Amyris Inc. from the year 2018 to 2022, uses the Z-score model to evaluate the bankruptcy probability of the company from the year 2018 to 2022, analyzes the internal operation situation of Amyris company, the causes of the internal financial risks of the company, and provides corresponding suggestions for the subsequent restructuring of the company on this basis.

Keywords: Financial risks, bankruptcy, risk prediction.

1. Introduction

Amyris Inc. is a synthetic biotechnology company, the world's first synthetic biology public company and the world's largest supplier of squalane. The company uses synthetic biology technology to produce artemisinin, the biofuel farnesene, the skin care ingredient squalane, and more. It applies its lab-to-market technology platform to design, manufacture, and market high-performance, natural, and sustainable products using computational tools, strain construction tools, screening and analysis tools, and advanced laboratory automation and data integration. It uses its industrial biosynthetic science and technology platform to engineer microorganisms to convert plant-derived sugars into various hydrocarbon molecules. Through the combination of its biotechnology platform and industrial fermentation technology, it has developed, produced, and commercialized many different molecules. Its brand has "Biofene", "Hemisqualane", "Biossance" and "Purecane" etcetera. Amyris Inc. was founded on July 17, 2003. In 2007, Amyris was the first to produce farnesene from sugarcane using synthetic biology. This is a promising, energy-dense biofuel, and Amyris makes it its main business, using synthetic biology methods to produce energy sources such as bioethanol and biodiesel. In 2012, Amyris produced 40 to 50 million liters of farnesene, and the company chose to install two 200,000 liters of upgraded fermenters in Brazil, where the raw material is produced, before investing heavily in a second large-scale plant. However, due to poor management during mass production, serious problems occurred in the fermentation storage tank, and a large number of yeasts died. In 2013, the output was only 4 million liters, which could not meet the market demand, which directly led to the bottleneck of the company's large-scale production. Moreover, in 2010, affected by the shale oil revolution in the United States, the global oil price fell, and the market competitiveness was greatly improved. However, the cost of producing farnesene was too high to have a market advantage, resulting in the final bankruptcy of the project. The second factor that affected Amyris' operating income was artemisinin. However, due to the complex synthesis process and high cost, the company could not obtain stable income for mass production, and the company faced serious financial risks. In 2016, Amyris pulled out of biofuels, lubricants, polymers and plastics, and cleaners to focus on cosmetics, healthcare and food, making vitamin E, squalane and more. Through the analysis of financial data, Amyris' transformation into the cosmetics market has brought the company a turnaround, and the rapid growth of product revenue has enabled the company to temporarily get rid of the financial risks. On August 10, 2023, Amyris Inc. faced severe financial risks again due to operational errors, and Amyris Inc. had to file for bankruptcy protection.

2. Analysis of Amyris Inc.'s Financial Risks

2.1. Company Indicator Analysis

Table 1. Amyris Inc.'s financial metrics for 2018-2022

Year	Net operating cash flow per share (MMyuan)	Net assets per share (MMyuan)	Earnings per share (MMyuan)	Net profit (MMyuan)	Net profit growth rate (MMyuan)	Total liabilities (MMyuan)	Debt ratio
2018	-1.4	-2.8	-3.7	-230.2	-218.3%	345.7	265.6%
2019	-1.3	-2.1	-2.7	-242.8	-5.4%	416.7	255.4%
2020	-0.7	-0.7	-1.9	-331.0	-36.3%	399.6	175.0%
2021	-0.6	0.8	-0.9	-271.0	18.2%	707.9	70.8%
2022	-1.4	-1.3	-1.7	-528.5	-95.4%	1313.6	156.7%

The Table 1 shows that Amyris Inc.'s net profit and earnings per share were negative from 2018 to 2022, and it suffered a huge loss of 528.5 million yuan in 2022. The company's cash flow per share from operating activities was negative from 2018 to 2022, and its net assets per share were negative except for 2021, indicating that the company's ability to resist risks was poor. Amyris Inc's asset-liability ratio decreased from 2018 to 2021, but both exceeded 60% and increased by 85.9% in 2022 compared with 2021, showing serious insolvency.

2.2. Early Warning of Financial Risks--Based on the Z-Score Model

The Z-score model was designed by Edward Altman, an American financial expert, in 1968. It can comprehensively evaluate the financial status of a company and give early warning for the financial crisis of an enterprise [1]. When the z-score is equal to 2.675, the probability of bankruptcy and non-bankruptcy is 50%; When the z-score is greater than or equal to 2.99, the company is in the safe zone and is not easy to go bankrupt; When the z-score is less than 1.81, the company is in the danger zone and is easy to go bankrupt [2]. The Z-score model is formulated as follows:

$$Z=1.2X1+1.4X2+3.3X3+0.6X4+0.999X5. \quad (1)$$

Among them, the function values of the discriminant are: X1= working capital/total assets, X2 = retained earnings/total assets, X3= profit before interest and tax/total assets, X4= stock market value/total book value of liabilities, X5= sales revenue/total assets [3]. From this, the Z-score model of Amyris Inc. can be derived.

Table 2. Z-score model index

Year	X1	X2	X3	X4	X5	Z
2018	-0.93	0.0004	-1.80	13.60	0.50	1.59
2019	-0.54	-0.0003	-1.50	1.08	0.95	-4.02
2020	-0.07	0.0021	-1.47	2.01	0.78	-2.95
2021	0.39	0.0020	-0.29	5.78	0.36	3.33
2022	-0.10	0.0001	-0.66	0.86	0.33	-1.46

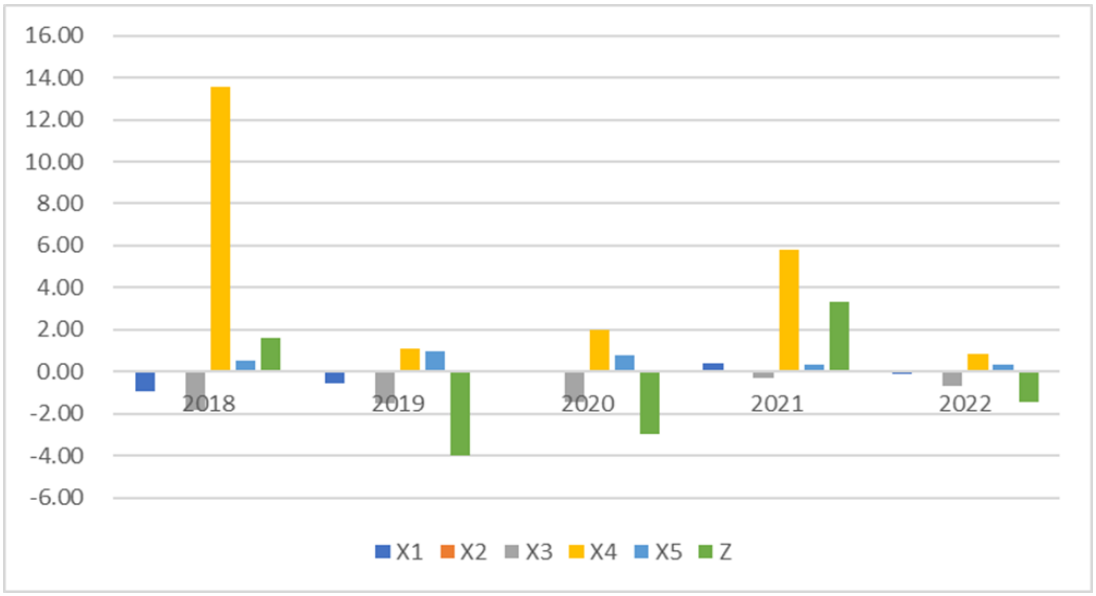


Figure 1. Bar chart of the Z-score model

According to Table 2 and Fig.1, in 2018, the Z-score of the company was 1.59, which is lower than 1,81. Although the stock market price of the company was high this year, the current assets owned by the company were too low, and the utilization effect of the assets was poor, resulting in an increase in the probability of bankruptcy [2]. In 2019-2020, the Z-score of the Company was negative, and the bankruptcy probability was higher than that in 2018, because in 2019-2020, the total liabilities of the company increased, the market price of the stock decreased, the capital provided by shareholders was relatively unbalanced with the capital provided by creditors, the basic financial structure of the enterprise was unstable, the risk increased, and the bankruptcy probability increased [2]. In 2021, the current assets of the company increased, the short-term solvency increased, and the stock market price increased. The Z-score reached 3.33, which was the highest in the past four years, and the probability of bankruptcy was very low [2]. In 2022, the company's stock market price decreased, the total liabilities increased, the current assets owned by the company decreased, and the Z-score decreased to -1.46. Compared with 2021, the company's bankruptcy probability increased.

3. Analysis of Causes of Financial Risks of Amyris Inc

3.1. Insufficient Product Cost Control Ability

Table 3. Amyris Indicators for 2018-2022

Year	Main business income (MM yuan)	Main business cost (MM yuan)
2018	63.6	36.7
2019	152.6	76.2
2020	173.1	86.6
2021	341.8	154.0
2022	269.8	257.4

According to Table 3, the main business income of Amyris Inc. in 2021 was 341.8 million yuan, an increase of 97.43% compared with last year, which was the highest in the past five years. Although good results were achieved in revenue, compared with 2020, the main business income of Amyris Inc. was 341.8 million yuan. In 2021, the operating cost increased by 78% to 15.4 million yuan. The sales cost was too high and the enterprise was under great financial pressure, resulting in losses. In 2022, Amyris' cost of sales increased by 66.73% compared with 2021, but its sales revenue decreased by 21% compared with 2021, which caused the capital market to doubt its continued profitability, and the stock price plummeted.

3.2. Unbridled Expansion and Mergers

Squalane is widely used in some moisturizing cosmetics [4]. Amyris is the world's largest supplier, accounting for about 41% of the market share. However, Amyris Inc. has not yet made a strong and solid presence in the raw material category of squalane, developed a unique extraction technology, or improved the quality of raw materials, so it has turned its business direction to enter the consumer market, increased the acquisition and expansion of cosmetics brand business, and invested $493 million to own nearly 14 consumer brands. However, the high investment did not get a considerable return, and most enterprises did not provide a stable source of funds, and only 3-4 enterprises could stably make profits and provide a source of funds. This, combined with rising raw material prices and the impact of the pandemic, has left the company with huge losses.

3.3. Poor Management

Amyris Inc.'s managers did not lower market expectations or deliver better results than market expectations, and the company's managers liked to communicate business expectations to investors, but this led to the actual development of the business behind the time and made the manager's credibility and stock price suffer.

4. Countermeasures and Suggestions for the Financial Risks of Amyris Inc.

4.1. Appropriate Mergers and Acquisitions

In order to quickly complete the merger and acquisition without destroying the equity structure, Amyris Inc. adopted cash payment. However, Amyris Inc. is not a large and stable enterprise, so it should not adopt excessive cash payment at one time, which will bring great cash pressure to the company's later operation and affect the working capital turnover [5]. Amyris Inc. evaluates the value of the acquired enterprise before the merger and acquisition, estimates the cost to complete the merger and acquisition, and sets a reasonable price based on the financial statements, operating conditions, market value, and other indicators of the acquired enterprise and itself to reduce the probability of financial risks [5].

4.2. Reasonable Management

The healthy development of the company is based on the correct operation and management, and the correct management can help the company achieve better economic benefits [6]. Amyris Inc. should be market-oriented, actively conduct market research, understand market demand, and make reasonable decisions. First of all, the managers of Amyris Inc. did not realize that high-quality raw materials and developed technology can also form a unique and competitive brand. In the current situation, the management of Amyris Inc. should not enter the consumer market, but improve the quality of squalane products, mature the raw material technology, and accumulate certain working capital before entering the consumer market. This will greatly reduce the financial pressure on enterprises. Secondly, Amyris Inc. should improve the financial professional ability of internal managers [7], obtain correct corporate financial data, give correct expectations to the market and consumers, and improve the company's reputation.

4.3. Reasonable Operation

If Amyris Inc. wants to get out of bankruptcy and large-scale business reduction in the future, it needs to pay attention to the use of working capital first. Instead of spending too much money to buy brands, it needs to sell existing brands to increase the working capital of the company. Working capital is used to pay off liabilities and bear costs [8]. Secondly, Amyris Inc. needs to apply for chapter 11 bankruptcy protection order to the court, because during the bankruptcy protection period, Amyris Inc. will not be forced to repay debts [9], and the company can still operate, which can reduce the financial pressure of the company and obtain more time for debt repayment. Third, the company can

seek help from the government [10]. The government will buy the company's products and start projects to build infrastructure so that the company can obtain working capital. However, the government will not intervene in the operation of the company itself, which can ensure that the company will not be chaotic due to the change of management mode.

5. Conclusion

According to the research data in this paper, the reasons for the serious financial risks of Amyris come from two aspects: the first one is the overconfidence in the company's products and finance and the reckless expansion of mergers and acquisitions; the second one is the lack of experience of the management, which does not know how to properly run the company and make correct business decisions. It can be concluded that in the process of operation, the company needs to always pay attention to the internal financial situation of the company, obtain accurate financial data, select the investment project that can bear it for investment, and should not excessively pursue speed in the process of development of the company. Secondly, company managers must have strong business experience and strong financial professionalism to make correct business decisions. Finally, when the company faces bankruptcy in financial risks, it must obtain working capital in time, repay debts, promote capital turnover, and make the company get out of the danger of bankruptcy as soon as possible. However, different countries have different risk treatment methods and bankruptcy treatment policies, so when providing financial advice to enterprises in the future, it should consider whether the country where the enterprise is located has policy protection or advantages. The risk prediction model in this paper adopts a simple Z-score model, and the risk prediction accuracy of the model is very high. However, the study found that the Z-score model also has shortcomings, mainly as follows: first, the effect of horizontal comparison is poor; Second, the discrimination accuracy is high within two years before the bankruptcy of the enterprise, and the accuracy decreases beyond two years. Third, the selected sample space as well as the financial indicator variables are required to follow a normal distribution. At the same time, it must adopt the statement information prepared on the accrual basis, without considering the cash flow index, which cannot accurately reflect the actual financial situation of the enterprise. Therefore, in future research, for the enterprise with complex internal business and not using the accrual basis to prepare the statement, it can choose a more objective and rigorous model to increase the accuracy of the prediction.

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