Research on the Analysis Method of Small and Medium-sized Enterprises' Solvency Based on Financial Data Analysis

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Abstract— With the rapid development of modern credit economy, debt management has become an important financing method and development strategy for modern enterprises. Reasonable application of debt management and full use of financial leverage will bring more benefits to enterprises. However, debt management also has potential risks, especially for small and medium-sized enterprises. Insufficient debt solvency can easily lead to serious consequences such as broken capital chain. This paper combines the big data analysis method to mine financial data, analyzes the relevant indicators of solvency, sorts out the problems existing in the solvency analysis of SMEs, and puts forward specific strategies to improve the solvency of SMEs, in order to help SMEs develop healthily, continuously and healthily under the background of big data.

Keywords: Solvency; SMEs; Analysis

1 INTRODUCTION

The solvency of an enterprise refers to the ability of an enterprise to use its assets to repay long-term and short-term debts[1]. The solvency of an enterprise is an important indicator that reflects the financial status and operating ability of an enterprise. Whether an enterprise has the ability to pay cash and repay debt is the key to the healthy survival and development of an enterprise[2]. Debt solvency includes the ability to repay short-term debts and long-term debts. For short-term solvency, it means that the company repays liabilities that are due within one year, such as short-term interest, accounts payable, etc. Long-term solvency generally refers to the company's repayment of more than one year's liabilities such as long-term liabilities, bonds payable, and long-term payables[3].

The solvency of an enterprise can judge the financial status of the enterprise. The analysis of the solvency of the enterprise can also reflect the risk of the enterprise's finances, predict the direction of the enterprise's future financing, and provide an important reference for the enterprise to carry out various financial activities[4].

The strength of solvency is related to the survival and development of an enterprise. However, in our country, the analysis of solvency of SMEs is obviously not scientific enough, which greatly affects the financial health of SMEs[5].

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2 RELEVANT THEORIES OF THE ANALYSIS OF CORPORATE SOLVENCY

The essence of solvency analysis is to understand the impact of debt on the company. Operation in debt will bring financial risks to the company. It is mainly divided into two levels[6]. The first level of financial risk is the basic common sense. After the enterprise borrows, it needs to repay the principal and interest as stipulated in the contract. If the debt cannot be repaid when it is due, the enterprise may fall into financial distress or even go bankrupt[7]. Therefore, the first level of financial risk is mainly to analyse whether the company has the ability to repay debts that are due, that is, the problem of repaying current liabilities. The second level of financial risk refers to the fact that borrowing will bring uncertainty to the company's future operating results and increase the volatility of the company's shareholders' income. This is the effect of financial leverage. The second level of financial risk focuses on the analysis of the proportion of liabilities[8].

Capital structure can be divided into broad sense and narrow sense. The narrow sense refers to the composition and proportional relationship of long-term capital (debt, preferred stock and common stock)[9]. The generalized capital structure includes not only the long-term debt of the company, but also the short-term debt, that is, taking the right half of the balance sheet into account, and the generalized capital structure is also called the financing structure. The financing structure involved in this paper refers to the generalized capital structure, and its specific content and its relationship with the capital structure are shown in Figure 1:

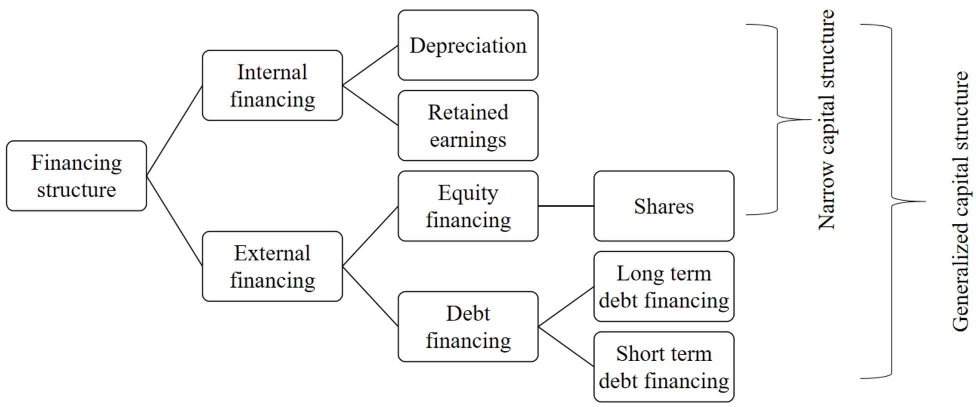

Figure 1 Framework diagram of financing structure

At present, the relevant theoretical system of corporate solvency analysis is very rich, and its content includes: cash flow, current assets, quick ratio, asset-liability ratio, equity ratio and so on.[10] The following is a systematic analysis based on short-term solvency and short-term solvency:

2.1 Short-term solvency analysis

Short-term solvency refers to the company’s ability to repay current liabilities with current assets[11]. It reflects the company’s ability to repay its daily due debts. It is one of the important indicators of a company’s financial status, including working capital, current ratio, and quick ratio.which is as follows in figure 2.

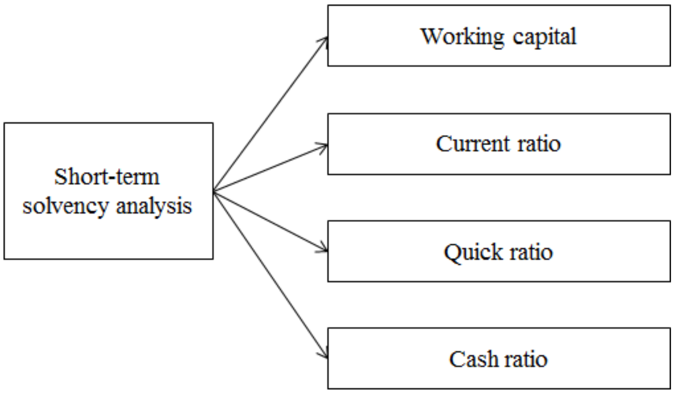

Figure 2 Short-term solvency analysis

2.1.1 Working capital

In a narrow sense, working capital = current assets-current liabilities. Working capital is the net amount of working capital available for use and turnover of an enterprise in its operations[12]. Generally speaking, the more working capital a company has, the smaller the financial risk it faces. However, the more working capital is not the better. Too much idle capital is just a waste of the company. Therefore, business managers should reasonably set the scale of working capital to improve the short-term solvency of the company and increase the utilization rate of capital[13].

2.1.2 Current ratio

Current ratio = current assets/current liabilities.The current ratio and the working capital allocation ratio reflect the same solvency[14]. This indicator is used to measure the ability of a company's current assets to be converted into cash for debt repayment before the short-term debt expires. Generally speaking, the higher the ratio, the stronger the liquidity of the company’s assets and the stronger the short-term debt repayment ability; otherwise, the weaker it is[15].

It is generally believed that a current ratio greater than 2 is reasonable, which means that half of the current assets can be realized in a short period of time to guarantee the repayment of current liabilities; but now with changes in business operations and financial environments, the ratio has a downward trend.

From the perspective of business operations, an excessively large current ratio usually means that the company occupies more current assets, which may be a backlog of inventory or a large proportion of accounts receivable, which will affect the efficiency of the company's capital use and profitability. Therefore, companies should try their best to keep the current ratio at a reasonable level that can guarantee timely debt repayment without causing idle monetary funds.

2.1.3 Quick ratio

Quick ratio = quick assets/current liabilities. Quick assets are the balance of a company's current assets minus inventory and prepaid expenses, which mainly include cash, short-term investments, notes receivable, accounts receivable and other items. Compared with the current ratio, the quick ratio can more accurately measure the company's ability to repay short-term liabilities. It is generally considered that a quick ratio of 1 is more appropriate. When the quick ratio is less than 1, it indicates that there may be problems with short-term debt solvency; when the quick ratio is greater than 1, it indicates that the company may lose some profit opportunities due to holding too many quick assets.

2.1.4 Cash ratio

The cash ratio is an indicator used when investigating the company's liquidity ability when a company has formed a large amount of accounts receivable due to a large number of credit sales. Cash ratio = (monetary funds + marketable securities)/current liabilities. The cash ratio refers to the amount of cash assets that can be used as a guarantee for the repayment of every dollar of current liabilities. This indicator reflects the direct solvency of the company, but under normal circumstances, the company does not need to have sufficient monetary funds and securities to repay all current liabilities, otherwise it means that the funds raised through current liabilities are not fully utilized, resulting in capital waste.

2.2 Long-term solvency analysis

Long-term solvency refers to the ability of an enterprise to repay long-term debts, including repayment of debt interest and principal on schedule. To measure the long-term debt repayment ability of an enterprise mainly depends on whether the financial structure of the enterprise is reasonable and stable, and the size of the long-term profitability of the enterprise. Its main indicators include asset-liability ratio, equity ratio, tangible net worth debt ratio and interest guarantee multiples， which is as follows in figure 3.

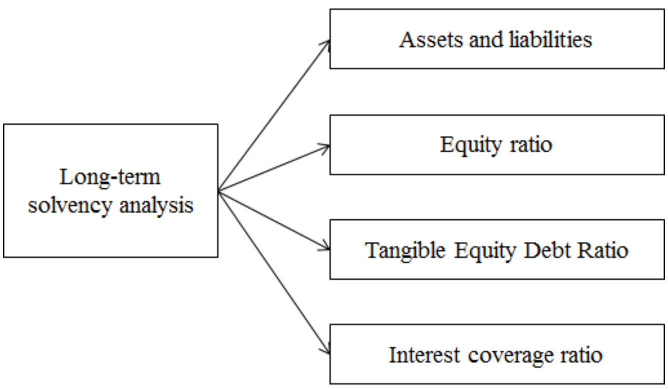

Figure 3 Long-term solvency analysis

2.2.1 Assets and liabilities

The debt-to-asset ratio, also known as the debt operation ratio, is used to measure the company’s ability to use creditors to provide funds for operating activities, as well as an indicator that reflects the degree of safety of creditors’ loans. It is obtained by comparing the company’s total liabilities with its total assets. It belongs to the debt ratio among all the assets of the enterprise.

Asset-liability ratio = total liabilities/total assets. The lower the asset-liability ratio, the more secure the company’s ability to repay debts. When the company’s asset-liability ratio is greater than 0.5, the interests of creditors may lose protection. Given the large differences in the liquidity of different assets, the types of assets owned by enterprises are different. The suitable asset-liability ratio is also different, so generalizations cannot be made.

2.2.2 Equity ratio

Equity ratio = total debt/owner's equity. Generally speaking, the equity ratio can evaluate whether the shareholders hold too much equity, whether they are sufficient, etc., and can also reflect the level of corporate borrowing operations from the side. The equity ratio is one of the indicators to measure the long-term debt repayment ability of a company, and it is also an important indicator of the soundness of the company's financial structure. Under normal circumstances, the higher this indicator, the weaker the solvency, but it is not absolute, it depends on the specific situation.

2.2.3 Tangible Equity Debt Ratio

Tangible net worth debt ratio = total liabilities ÷ (owner's equity-net intangible assets).Tangible net value is the equity of shareholders minus the net value of intangible assets, that is, the net value of tangible assets that shareholders have ownership of. The tangible net worth debt ratio index is essentially an extension of the equity ratio index, and it is a more demanding and cautious reflection of the degree to which the capital invested by creditors is protected by shareholders’ rights during the liquidation of the enterprise. In terms of long-term solvency, the lower the ratio, the better.

2.2.4 Interest coverage ratio

The interest protection multiple, also known as the earned interest multiple, is the ratio of the profit before interest and tax obtained by the production and operation of the enterprise to the interest expense. Interest protection multiple = (total profit + interest expense)/interest expense.

This indicator is an indicator to evaluate the ability of an enterprise to repay debt interest. The Interest coverage ratio reflects the current corporate income as a multiple of the debt interest paid, and reflects the risk of the debt policy. If the company can pay the interest on time, the long-term debt can continue and it will be easier to borrow new debt. Generally, the interest protection multiple is greater than 5 as the standard. The larger the index, the more secure the interest payment.

3 The Problems Existing in the Analysis of the Solvency of SMEs

Small and medium-sized enterprises generally have the characteristics of relatively small production or operation scale, short cycle, relatively sensitive to market changes, and flexible mechanisms, but they have high cost input and are not easy to increase economic benefits. Small and medium-sized enterprises have poor ability to withstand operating risks and financing, and the capital chain cycle is relatively weak. Improving the solvency of enterprises is vital to the survival and development of enterprises.

3.1 The analysis mechanism is not perfect, and the analysis method is relatively single

In the development process of an enterprise, the evaluation and analysis of the company's capital status and the correct calculation of the company's solvency can enable the company to avoid risks, improve the company's core competitiveness, and provide auxiliary support for the company's development decision-making. However, at this stage, the analysis mechanism of corporate solvency is imperfect, and the analysis method is too single. The ratio analysis method usually used emphasizes quantitative research, but ignores qualitative research, and fails to accurately pay attention to the development and changes of the enterprise itself and the market environment. Changes have caused research to stay only on the surface.

Many business managers have not realized the importance of solvency analysis, and executive staff do not have the comprehensive quality of solvency analysis, and they have not formed an effective solvency analysis guarantee and evaluation mechanism. When the company specifically constructs the relevant analysis system, the company’s solvency analysis is not included in the company’s daily management and internal control work. Therefore, there are a lot of financial fraud and data distortion, which seriously affects the company’s debt repayment. The quality of capability analysis restricts the healthy and healthy development of the enterprise.

3.2 Data sources are not extensive enough, there are data deviations

At present, SMEs in our country are generally accustomed to calculating the corresponding ratio based on the data at the end of the financial statement when analyzing the debt solvency, and then make judgments based on the calculated current ratio, quick ratio, cash ratio and other indicators.

Although the financial statement data can reflect the accounting information of the enterprise, the data are all established quantitative indicators in the past. For some non-quantitative and qualitative information such as the selection of accounting policies and changes in accounting policies, it is difficult to measure economic facts in currency. It cannot be fully reflected. The actual value of some asset items is usually different from the actual fair value. The data in the table is directly used to analyze the solvency of the company, and the accuracy and authenticity of the results are open to question.

3.3 Difficulty in financing, single source of debt repayment funds

The incomplete financial mechanism of SMEs directly leads to incomplete and inaccurate information disclosure in the final financial report. It is difficult for financial institutions to obtain accurate and complete information, objective and detailed evaluation, and it is difficult to establish trust mechanisms. When financial institutions have low credit ratings for SMEs, it is more difficult for SMEs to obtain financing.

In this context, the solvency analysis of SMEs focuses on the realization of assets, and it is easy to use the realization of assets as the main source of funds. Ignoring multiple debt repayment channels such as corporate financing and operating cash flow obviously cannot correctly measure the corporate debt repayment ability, which limits the corporate decision-making perspective, resulting in difficult financing and a single source of funding.

3.4 Pay attention to short-term benefits, the market continues to be weak

For a long time, my country's corporate solvency analysis is based on the hypothetical model of bankruptcy liquidation, which is to realize all assets and use this part of funds to repay the debts owed by the company. This model violates the accounting going concern assumption and does not conform to the actual operating conditions of the company.

In addition, most small and medium-sized enterprises will pay too much attention to short-term benefits due to the pressure of survival, and pay relatively little attention to business innovation and R&D investment that can bring long-term value. Driven by short-term interests, SMEs are at a disadvantage in terms of business model, cash flow, operational management, market promotion, and diversified product innovation. SMEs are tired of price wars, the market environment is getting worse and worse, and market competition continues to increase.

4 CONSTRUCTION OF FINANCIAL EARLY WARNING MODEL FOR SMEs

4.1 Screening of samples

In the study of financial early warning, we can choose one-to-one matching selection or non-matching selection. One-to-one selection means that the selected two types of enterprises have the same number and opposite financial status, and at least one condition that the asset scale is the same as or similar to the industry is met. This paper studies the financial early warning of small and medium-sized enterprises. In order to make the model accurate and effective, one-to-one matching method is adopted. Select ST on the main board and enterprises with one-year loss as samples of enterprises in financial crisis, and select small and medium-sized enterprises matched with them on the small and medium-sized board as samples of normal companies. These samples are divided into two groups, the estimated sample group and the test sample group, which are used to build and test the financial early warning model respectively.

4.2 Selection of model variables

The financial indicators of an enterprise can reflect its financial status. Therefore, according to the above analysis, this paper selects 10 indicators from three aspects of enterprise management, and the variables are shown in Table 1.

TABLE 1 FINANCIAL TARGET

Financial target	Variable	Name	Describe
Debt paying ability	X_1	Liquidity ratio	Current assets/liabilities
	X_2	currency ratio	Ending balance/current liabilities of cash and

			cash equivalents
	X_3	asset-liability ratio	Total liabilities/assets
	X_4	Long-term debt ratio	Total long-term liabilities/total liabilities
Profitability	X_5	Operating profit rate	Operating profit/revenue
	X_6	Operating margin	(operating income-operating cost)/operating income
	X_7	Return on assets	(total profit+financial expenses)/total assets
	X_8	Ratio of profits to cost and expense	Total profit/(operating cost+sales expenses+management expenses+finance)
Risk indicators	X_9	Financial leverage coefficient	Earnings before interest and tax/total profit
	X_{10}	Operating leverage	Operating profit/earnings before interest and tax

4.3 Construction of early warning model

In this paper, the factor analysis method is selected, and the main factor is extracted as the variable into the model. The analysis principle of factor analysis is to simplify data, that is, to put forward several main factors that can reflect the basic structure of data and the main information of the original variables by examining the correlation degree among the calculated variables. The mathematical idea is to simplify and reduce the dimensions of variables.

Before factor analysis, to judge whether a variable is suitable for factor analysis, we should test the sphericity of KMO and Bartlett. KMO test is a statistic used to check the partial correlation between variables, and its value is between 0 and 1. Barthlett spherical test is to test whether variables are independent. The test criteria are KMO test greater than 0.6, Bartlett's sphericity test significance probability less than 0.05. In addition, the effect of factor analysis can be measured by examining the degree of commonality. The closer the degree of commonality is to 1, the better the effect is. The results of SPSS test are shown in Table 2.

TABLE 2 FACTOR MOLECULAR CONDITION TEST

Test of KMO and Bartlett		
Kaiser-Meyer-Olkin measure of sampling adequacy		.620
Bartlett's ball	Approximate chi-square	365.07
Form test	Df	78
	Sig.	.000

As shown in Table 2, KMO value of 0.62 is slightly better than 0.6, which is not very suitable for factor analysis, while Bartlett's sphericity test is significant at 0, significantly less than 1%.

5 Effective measures for small and medium-sized enterprises to improve their solvency

5.1 Strengthen inventory and accounts receivable management

For small and medium-sized enterprises, especially physical production or sales enterprises, first of all, it is necessary to strengthen inventory management and rationally arrange the production and sales of inventory so as to reduce the amount of enterprise inventory. Small and medium-sized enterprises should increase their investment in product selection, R&D and innovation to ensure that their products are competitive in the market. Best-selling products can shorten the inventory turnover period. Only when people are willing to purchase the manufactured products can solve the capital turnover problem.

Secondly, strengthen the management of accounts receivable and reduce bad debts. Accounts receivable management can increase sales, reduce inventory, and at the same time bring opportunity costs, management costs, and bad debt costs. Therefore, it is necessary to formulate reasonable credit policies for corporate accounts receivable. Establish a customer credit evaluation system, adopt different sales strategies according to different customers, compare whether credit sales can bring additional profits to the enterprise and whether the collection cost of credit sales is too high, etc., promptly supervise the collection of accounts receivable, and prevent enterprises from responding too many accounts received. In addition, when receiving payments, use paper-based payment tools as little as possible, because it will incur a relatively large floating period cost. The floating period cost refers to the opportunity cost. For example, there is a mailing floating period, a processing floating period, and a settlement floating period. Try to use electronic payment methods as much as possible, which reduces or eliminates the floating period of collection, reduces the cost of collection, and the process of collection is easier to control.

Finally, we must also pay attention to increasing the proportion of intangible assets and controlling the scale of fixed assets, so as to effectively improve the solvency of enterprises. For example, appropriately increase scientific research investment, increase the proportion of intangible assets, and enhance the core competitiveness of enterprises. Intangible assets such as trademark rights and patent rights are profitable assets, which can improve the profitability and visibility of small and medium-sized enterprises, and enable enterprises to stand out in the fierce market competition. In terms of controlling the scale of fixed assets, too many fixed assets will increase the company’s operating leverage and magnify the impact of changes in market and production factors on profit fluctuations. Therefore, small and medium-sized enterprises must appropriately control the scale of fixed assets and increase the efficiency of existing fixed assets.

5.2 Improve capital utilization

Companies need to use cash, especially cash flows from operating activities, to repay debts. Therefore, companies need to hold sufficient cash flow from operating activities, which requires that the sales revenue of the company can be converted into cash as quickly as possible, and the cash flow generated by operating activities is maintained at a reasonable level, which is an important basis for measuring the solvency of the company. On the one hand, SMEs should determine the proportion of current assets suitable for their enterprises in accordance with the principle of balancing liquidity and profitability. When a company’s current assets are relatively large, it indicates that the company's solvency is relatively strong; on the other hand, if too much capital is invested in current assets, it will reduce the future profitability of corporate funds. Therefore, it is necessary to choose the ratio of current assets to long-term asset that maximizes the value of the enterprise. Therefore, it is particularly important to improve the utilization rate of funds.

Secondly, speed up capital turnover. The cash turnover period refers to the time period between when the company pays cash and receives cash. It is equal to the operating cycle minus the accounts payable turnover period. The business cycle refers to the process from the storage of goods to the receipt of funds, which is equal to the turnover cycle of inventory plus the turnover cycle of accounts receivable. The turnover rate of funds is equal to three hundred and sixty days divided by the number of turnover days of funds. Therefore, to speed up the turnover rate of funds is to extend the account payable turnover period and reduce the operating cycle. In the actual operation of the enterprise, the commercial credit of the enterprise can be used to pay the seller's payment as late as possible, which makes the enterprise occupy a certain amount of opportunity cost. For SMEs' receivables, cash discounts can be used to quickly recover the receivables.

Thirdly, in order to improve the level of cash management and capital utilization, overall planning must be carried out within the enterprise. The finance department should take the lead in formulating financial capital management methods and capital budgets, and mobilize various business and functional departments to coordinate the cash situation of the entire company. At the same time, in order to control the funds to reach the most efficient use, the company must control the flow of funds according to the fund budget by department. In order to have a detailed understanding of each income and expenditure, it must have a detailed record to facilitate the fund. It can be consulted during turnover. For customers, the amount that should be recovered should be recovered in time and recorded in the account in time. When an enterprise predicts that there will be large transaction expenditures and cash inflows in production and business activities, it should allocate cash in an appropriate way to prevent sudden financing problems.

5.3 Ensuring its own reputation and enhancing the ability to finance loans

Integrity management is the foundation for the survival and development of an enterprise, and guaranteeing its own credibility is the lifeblood of guaranteeing its own survival and development. If a company does not have credibility, financing becomes difficult and there is no capital for development. Therefore, it is necessary to ensure credibility during development. Enterprises should establish a credit-quality image for financial institutions, and always pay attention to relevant announcements and policies issued by the government, keep up with the time development, pay attention to the direction of government support and encouragement, so as to lower their own financing thresholds.

On the basis of having a good reputation system, SMEs should broaden their financing channels and achieve diversification of borrowing. Currently, enterprises have a variety of financing methods, Such as stock issuance, external debt, internal financing, asset sales financing, etc., each of which has its own advantages and disadvantages. Enterprises should conduct reasonable financing based on the actual situation and combine the characteristics of each financing method to reduce financing costs and risks.

5.4 Enhance competitiveness and increase profitability

Compared with leading companies in the industry, small and medium-sized enterprises often have a series of problems such as single product, small scale, high cost, and low market recognition. Under the background of severe homogeneity of industry products, small and medium-sized enterprises should increase their product quality and market recognition. , Continuously improve the comprehensive competitiveness of the enterprise. Specifically, it should focus on highlighting the individual differences of the company's products, paying attention to the established target consumer groups, first occupying part of the market segment, and then gradually extending the characteristics of the product. Strengthen word of mouth, build and improve the pre-sales, in-sales and after-sales service system of products, pay attention to the word-of-mouth communication power brought by services so that every customer becomes the brand spokesperson of the company, pay attention to key customers, and make full use of current We Chat Network marketing channels such as program, community, word-of-mouth fission, etc., broaden all-round promotion.

In addition, there is a positive proportional relationship between corporate profitability and debt solvency. The two complement each other. With strong corporate profitability and debt solvency, it can also win the favor of more investors, making it easier to finance and borrow money. Small and medium-sized enterprises should conduct profitability analysis in a timely manner, find out the reasons for the decline in their profitability, and take corresponding measures to improve their profitability. On the basis of research and analysis of previous sales revenue and sales models, we will formulate long-term sales strategies, pinpoint market positioning, actively develop new products and new markets, and strive to improve the profitability of the company.

6 CONCLUSION

In the process of corporate financial management, the solvency reflects the financial health of the enterprise, and improving the solvency of the enterprise is of great significance to the financial health of the enterprise, especially for small and medium-sized enterprises. Insufficient debt solvency can easily lead to the break of the capital chain and other serious consequences. Therefore, this article analyzes the relevant indicators of solvency, sorts out the problems in the analysis of solvency of SMEs, and proposes specific strategies for improving solvency of SMEs, so as to help SMEs be healthy in the context of severe market competition.

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