Information Processing and Management 58 (2021) 102692

Contents lists available at ScienceDirect

Information Processing and Management

journal homepage: www.elsevier.com/locate/infoproman

Financial Risk Evaluation Z-Score Model for Intelligent IoT-based Enterprises

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ARTICLE INFO

Keywords:
Intelligent Manufacturing
Internet of Things
Z-Score Model
Financial Risk Warning
Debt Solvency

ABSTRACT:

With accelerating global economic integration processes, the financial risk early warning requirements for companies are becoming higher and higher. This study discusses the financial risk evaluation Z-Score Model for intelligent IoT-based enterprises. The financial risk early warning system of an IoT company is made up of four parts: alarm source analysis, Z-Score Model analysis, and main financial ratio analysis. Among them, the police source analysis is the premise and important guarantee for the operation of the system overall. After analyzing the internal and external risk factors from different sources in combination with the annual and industry reports of the IoT company, we found that the main risk sources IoT companies face focus on external legal risk, industry competition risk (mainly affected by the external environment), and external tenant credit risk (dominated by their own characteristics). Based on analysis of police sources, a Z-Score Model analysis for IoT companies can be carried out. Z-Score Model analysis is the core of the new financial risk early warning system of IoT companies; therefore, an IoT company's long-term solvency is weak. Any IoT company should be committed to diversifying investments and to carefully selecting investment projects. This study may prove helpful for IoT companies in reducing the probability of crises and developing in a healthy and orderly way.

1. Introduction

The Internet of Things not only realizes the comprehensive perception, but also reveals the problem that users face regarding massive data amounts. As the demand side of enterprise financial report, to a certain extent, it has less professional knowledge to understand professional financial information. In this case, the development of IoT presents massive data for users, but also poses difficulties for users seeking to understand and use relevant information.

Compared to other nations, China's research on financial early warning is only in the initial stages of exploration. Although China draws lessons from the existing theories and research results of foreign countries, due to the country's unique national conditions and economic environment, it is impossible to completely copy foreign research results—that is, it is impossible to use the early warning model established by foreign scholars to assess China's economic data; thus, Chinese scholars must efficiently explore a proprietary

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https://doi.org/10.1016/j.ipm.2021.102692
Received 3 April 2021; Received in revised form 13 July 2021; Accepted 13 July 2021
Available online 27 July 2021

model suitable for their own situation—a more targeted model that can in turn more accurately solve the financial early warning problems of domestic listed companies.

Wireless sensor networks (WSN) have many applications, such as climate monitoring systems, fire detection, smart homes, and smart cities. Aranzazu-Suescun C believes that WSN is expected to be integrated into the IoT and will participate in various tasks. He proposed several distributed algorithms for detecting and reporting compound events to mobile receivers. Once the receiver has collected the data, the data can be shared using the IoT infrastructure. Aranzazu-Suescum uses the WSNet simulator designed specifically for event-based WSN to analyze the performance of the algorithm. He measures various indicators, such as the average remaining energy [1]. Mayer S introduced the Open Semantic Framework (OSF), which is a one-stop shop for creating and deploying semantic applications and their lifecycle management. As an example of the use of OSF in actual scenarios, he demonstrated its application to the applicable workplace safety model by automatically inserting safety-related actions directly in the workflow to reduce workplace safety hazards, thereby improving worker safety in an industrial environment. He promotes the creation, integration and provision of knowledge. [2]. Listyorini T believes that slow fires may turn into large fires that prove difficult to extinguish; these dangerous situations can be mitigated by first detecting the fire, so he developed a device that can detect fire hot spots by using the IoT and fuzzy logic. This early prototype fire detection tool can analyze the detected flame intensity by using a fire sensor, temperature sensor, servo motor, buzzer and surveillance camera, all controlled by WEMOS ESP8266 microcontroller, and by applying fuzzy logic methods to analyze the detected flame intensity. Identify hot spots in peatlands. Although the prototype can be used as a learning medium for high school students majoring in computer engineering and networking, the research process is too complicated [3]. Scuotto conducted an empirical test on the IBM Smart City project. As a case study, he chose one leading multinational company that delved into smart city projects, then provided an analysis for that firm. His research has no practical significance [4].

The financial risk early warning system of IoT companies is mainly composed of four parts: alarm source analysis, Z-Score Model analysis, main financial ratio analysis, and risk prevention countermeasures. The alarm source analysis is a prerequisite and an important guarantee for the operation of the entire system. Combining the annual and industry reports of the IoT company along with other materials to analyze the internal and external risk factors of different sources, this study found that IoT companies are currently facing risk sources concentrated mainly around external legal risks, industry competition risks (mainly affected by the external environment), and external lessee credit risks (mainly driven by its own characteristics). Based on analysis of alarm sources, Z-Score Model analysis for IoT companies can be launched.

2. Financial Risks of IoT Companies

2.1. Financial Risks

The promulgation of certain government policies may have a restrictive effect on the product development of enterprises; changes in market exchange rates will inevitably affect the foreign trade activities of enterprises, and the occurrence of natural disasters will also have a certain impact on enterprises [5, 6]. In the financial market, the interest rate is too high, the cost of capital increases, and the corporate debt burden increases, thus increasing the possibility of enterprises facing financial difficulties. Therefore, the financial status of enterprises is affected by the financial market environment [7].

Current corporate financial reports are based on the requirements of the China Securities Regulatory Commission and on a regular basis provide general financial reports to the public [8, 9]. Theoretical circles continue to criticize the current financial report, believing to a certain extent that it cannot meet the requirements of information users, is not very usable, and poses certain loopholes [10]. On the one hand, the IoT requires corporate financial reporting goals to be useful in decision-making and to meet the needs of different information users; on the other hand, corporate financial reports are required to meet comparability, not only for the same company across different periods, but also for different companies in the same period. Accounting data is comparable [11,12]. Therefore, by weighing the requirements of these two aspects, in the context of the IoT, it is predicted that the financial report of the enterprise of the IoT will present a two-tier reporting mode: the enterprise regularly provides general financial reports to the outside world. The national macroeconomic environment directly affects the investment and output of enterprises [13]. In a favorable macro environment, when product sales increase, companies will increase investment. At this time, the financial risk companies face is related to capital turnover problems; when the macro economy is in a period of recession, market sales decrease and companies in turn reduce their investment. Since companies are at this time facing a problem related to product sales, investment in products and raw materials is affected [14, 15]; in other words, the national economic environment will affect the financial status of enterprises [16].

2.2. Z-Score Model

In the process of building an enterprise early warning model, and in order to fundamentally eliminate potential risks, it is necessary to establish a sound financial management mechanism and a reasonable financial model, as well as to conform to the actual development of the enterprise; this ensures good financial management for the development of the enterprise and provides targeted suggestion [17, 18]. Under the premise of the rapid development of economic globalization, the corresponding economic theories are continuously improved, and the financial early warning system and early warning models will also be rapidly updated and developed. It is necessary to establish a new data model based on current economic theory and to collect real and effective financial data, as well as to introduce scientific and reasonable statistical methods for data analysis [19]. In the analysis process of this study, we used the Z-value model index system, established a financial early warning model on this basis, and continuously worked toward innovative research methods. In the actual analysis process using the Z-value model index system, according to the actual analysis. In order to

more accurately predict the financial situation of enterprises, it is necessary to focus on analyzing financial indicators, selecting variables at different levels, and then making dynamic observations. Since in the process of enterprise development each variable reflects financial information from different angles, once multiple variables appear, the complexity of the financial situation increases and even leads to information overlap between variables [20, 21] .

At the same time, research on a company's financial risk early warning model, from the initial univariate research to the neural network model in the latest modern multivariate research [22]. Among these models, the Z-Score Model is relatively simple to operate and requires less sample size. At the same time, the accuracy of predicting risks is also high. It can be concisely, conveniently, and comprehensively evaluated in terms of corporate liquidity, profitability, and solvency. The status of the enterprise, as well as judging and predicting whether the enterprise is facing financial risks then giving early warning to the company's managers are useful for the enterprise's own prediction and early warning of financial risks [23, 24].

The Z multivariate model based on financial ratios can be used to predict corporate finance and bankruptcy risks [25]. The model screened out the five most predictive financial indicators and established a multiple regression discriminant function Z score model. The expression is:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5 \tag{1}$$

where X_1 is net working capital, X_2 is retained earnings, X_3 is profit before interest and taxes, X_4 is the face value of total liabilities, and X_5 is total assets [26]. However, because the model is based on analysis of data of manufacturing listed companies, it may not be fully applicable to listed non-manufacturing companies. Therefore, in order to meet the needs of listed non-manufacturing companies for financial risk early warning, the model was modified to obtain the improved Z-Score Model, namely:

$$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4 \tag{2}$$

The meaning of each variable in the model is consistent with the meaning of each variable in the Z-Score Model. According to the corresponding indicator system, set the original data matrix:

$$X = \begin{bmatrix} x_{11} & \cdots & x_{1p} \\ x_{21} & \cdots & x_{2p} \\ x_{n1} & \cdots & x_{np} \end{bmatrix} = (x_1, x_2, \ldots, x_p) \tag{3}$$

where n is the number of selected listed companies [27]. Standardize the original data, but due to the different indicator dimensions within the indicator system, the indicator measurement standards are different [28,29]:

$$y_{ij} = \frac{x_{ij} - x_j}{\sigma_j}, (i = 1, 2, \ldots, n : j = 1, 2, \ldots, p) \tag{4}$$

Among them, x_{ij} is the original data.

$$x_j = \frac{1}{n}\sum_{i=1}^{n} x_{ij}, (j = 1, 2, \ldots, p) \tag{5}$$

The standard deviation of the j index is [30]:

$$\sigma_j = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_{ij} - x_j)^2}, (j = 1, 2, \ldots, p) \tag{6}$$

The standardized matrix is [31]:

$$Y = (Y_{ij})n \times p \tag{7}$$

Calculate the pairwise correlation matrix R [31, 32].

$$R = (r_{ij})_{p\times p} = \frac{Y^T \times Y}{n-1}, (i,j = 1, 2, \ldots, p) \tag{8}$$

Among them [34, 35]:

$$r_{ij} = \frac{1}{n-1}\sum_{i=1}^{n}(y_{ti} - y_{tj}), (i,j = 1, 2, \ldots, p) \tag{9}$$

Analysis of variance contribution ratea_i.

$$a_i = \frac{\lambda}{\sum_{i=1}^{p}\lambda_i}, (i = 1, 2, \ldots, p) \tag{10}$$

The score function of the factor of a listed company is [36]:

$$F_{tk} = h_{ki}y_{t1} + h_{k1}y_{t2} + \ldots, h_{kp}y_{tp} \tag{11}$$

There is in turn a declining trend, and there is no influence between each component to avoid duplication of information. We used the following to get the calculated comprehensive score [37, 38]:

$$F_t = \sum_{i=1}^{k} a_j Fu, (t = 1, 2, \ldots, n) \tag{12}$$

Figure 1 shows the company's financial risk early warning system.

2.3. Internet of Things in the Smart Era

A corporate financial report is a comprehensive economic embodiment of the corporate value movement. It essentially reflects the exercise of information users' right to know the enterprise. Stakeholders are the main body making the demand for corporate financial information, and to a certain extent they determine the financial reports that the enterprise provides. When companies provide external financial reports, they can use the information transmission effect to convey to information users data about the company's better operating conditions. In this way, companies have certain proactive motives for sharing external financial information; on the other hand, enterprises need to spend the corresponding necessary manpower and material costs to provide that financial information to the outside world. Moreover, the reporting of financial information to the outside world may transmit confidential corporate information. From this perspective, companies have a certain passivity in the provision of financial information. As mentioned earlier, the development of the IoT will lead to a stronger sense of individualized needs of financial information demanders. Then, in the face of the personalized needs of corporate financial information demanders, corporate financial information providers will face the need to provide personalized requests. The pressure of demanding information will increase the cost enterprises face to provide financial information. In summary, the development and application of the IoT will exacerbate the contradiction between financial report providers and users.

In the IoT environment, information related to enterprises has increased. In addition to the general financial reports that the enterprises offer, information users can also obtain ample information beyond these provided statements. This information poses different values for different information users. In addition, due to the increase in the amount of information, and as mentioned earlier, the development of the IoT has brought forth information users' more personalized requests for financial information, making it possible for companies to provide different data that can in turn satisfy different information users' needs. The cost of financial information related to decision-making has increased. Finally, because traditional financial reports are by and large public goods (listed companies are mandated by the China Securities Regulatory Commission to disclose regularly, meaning the disclosures are mandatory and involuntary), it is difficult to meet different information use in terms of decision-making usefulness. In this case, if an independent third-party financial report is provided to information users in the form of a demander's payment, it might, on one hand, meet the needs of different information users and improve the quality of financial information; on the other hand, it can reduce the burden on the enterprise to maximize social benefits[38].

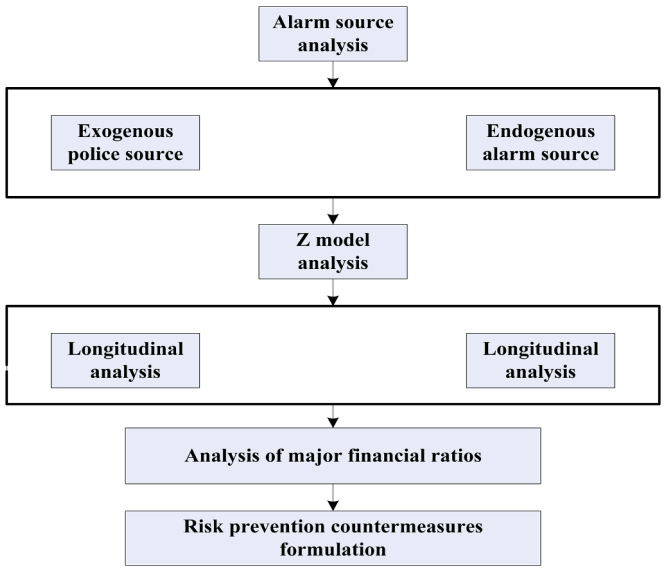

Figure 1. Company's financial risk early warning system

3. Financial Risk Evaluation of IoT Enterprises

3.1. Financial Risk Assessment Z-Score Model System Framework Purpose and Principles

Combining the main characteristics of the IoT company's industry characteristics, development status, financial status, and related theories on financial risks and financial risk early warning can help determine when the financial risk of the IoT company is in crisis—and when it might seriously affect the company's operation and profit acquisition. In order to avoid this, various companies have begun to choose different financial crisis early warning models in order to predict the possibility of a financial crisis in the company and make corresponding changes and adjustments based on the results, taking measures in advance to avoid crises. Minimization of company risk is critical and based on two platforms: 1) scientific, which means that in the process of constructing the indicator system, the indicators are not related, do not affect each other, and have clear meanings and their own characteristics, and 2) practicality, which means that after the risk early warning model is constructed, the model should be applied to the actual business workings of the company, featuring both academic and practical significance.

3.2. Calculation of Financial Indicators

Due to the limitations of accounting data, we should make appropriate adjustments to the accounting data when calculating financial indicators to meet our requirements for the connotation of financial indicators. In general, it is to remove virtual assets from total assets, remove virtual liabilities from total liabilities, and remove non-renewable profits from total profits and net profits. False assets include long-term deferred expenses, and false liabilities include deferred income tax liabilities, estimated liabilities, advance premiums, advance receipts, etc.; when calculating related profit indicators, non-inclusive recurring gains and losses. When it comes to the calculation of financial indicators related to current assets and current liabilities, liquidity virtual assets should be removed from current assets, and liquidity virtual liabilities should be removed from current liabilities.

3.3. Construction of Indicator System

(1) This article focuses on financial strength: assets are an indicator of an enterprise's financial strength—that is, the larger a company's assets base, the stronger its financial picture and the better able it is to resist financial risks. Considering the large amount of assets, logarithmic processing is adopted.

(2) ~~Aiming at the efficiency status,~~ This article also focuses on two aspects of efficiency, namely, financial efficiency and operating efficiency. Financial efficiency is expressed by accounts receivable turnover rate, inventory turnover rate, fixed asset turnover rate, and weighted average return on net assets; operating efficiency is measured by operating profit margin. From an international perspective, accounts receivable turnover rate and inventory turnover rate are used frequently as measurable financial indicators. In assessing operating efficiency, we calculated operating profit/main business income, which can fully reflect the profitability of the enterprise under normal circumstances and proves better than the operating profit rate calculated according to net profit. This reduces the problem of low accuracy in index measurements caused by the difference in the calculation of the index itself.

(3) This article also targets two aspects of quality, namely, financial quality and operating quality. The former is mainly for assets, and the latter is mainly for profits. Financial quality is measured by the asset impairment rate; operating quality is expressed by the earnings-to-cash ratio and the interest guarantee multiple. Among them, the asset impairment rate A = the ending book balance of the impairment provision/net asset value, and the asset impairment rate B = the change in the impairment provision/net asset value. The quality status aspect of this study satisfies the priority of paying comprehensive attention to financial quantity and quality. As for financial strength, we surveyed quantity of assets, and this aspect focuses on the issue of quality. Under the same other conditions, the higher the provision for impairment of assets, the truer and more reliable the assets status is as presented by the company on the balance sheet. As for the asset impairment rate, this study adopts two calculation methods, both of which are comparative indicators; thus, this article reports on the overall financial structure and structure.

(4) Finally, this article focuses on two aspects of growth, namely, financial growth and business growth. The asset growth rate corresponds to the aforementioned index of asset log. The asset growth rate is a dynamic indicator, while the asset log is a static indicator, which satisfies the aforementioned principle of fully reflecting both the static and dynamic of financial affairs. Business growth satisfies the principle of focusing on the overall financial structure and structure. Since other business profits are relatively stable, this section does not separately examine the profit growth rate of the main business, but instead examines the growth rates of the remaining three profit indicators and reviews the growth of operating income.

3.4. Main Content of the Financial Risk Assessment Z-Score Model System Framework

The financial risk early warning system of IoT companies is mainly composed of four parts: alarm source analysis, z-model analysis, main financial ratio analysis, and risk prevention countermeasures. Among them, the alarm source analysis is the prerequisite and important guarantee for the operation of the entire system. Combining the annual report of the IoT company, the industry report, and other materials to analyze the internal and external risk factors of different sources, we found that IoT companies are currently facing the main risk sources, concentrated on exogenous legal risks, industry competition risks (mainly affected by the external environment), and endogenous lessee credit risks (mainly driven by its own characteristics). Based on the analysis of alarm sources, Z-Score Model analysis for IoT companies can be launched. Z-model analysis is the core of the new financial risk early warning system for IoT

companies. Different from the traditional Z-Score Model, because IoT companies belong to the category of non-manufacturing companies, it is more accurate to analyze them with the improved Z-Score Model (i.e., the Z" model). The Z-Score Model analysis is divided into two aspects; on one hand, the vertical and horizontal dimensions make for a more comprehensive comparison of the different stages of IoT companies, IoT companies, and other homogeneous companies. On the other hand, and according to the definition and functions of the Z-Score Model, the relationship among liquidity, profitability, financial leverage, and solvency, the financial risks of IoT companies are screened. The Z-Score Model analysis results will demonstrate which dimension and which aspects of IoT companies pose greater risks. Based on this, further analysis of major financial ratios can be carried out, and the selection is important. The indicators are explained in detail. Using the final analysis results as a reference, relevant personnel in the IoT company can formulate risk countermeasures. The Z value judgment standard is shown in Table 1[39].

4. Financial Risk Analysis of IoT Enterprises

4.1. Bank Interest Rate Risk Analysis

The bank interest rate risk is shown in Table 2. According to the 2020 annual report of A IoT Company, as of the end of 2020, the total debt of A IoT Company is 4,342,171.3 million yuan, of which 4,12,964,600 yuan is borrowed, and the amount of bank borrowing is 279788 million yuan, which accounts for more than half of the total debt. In the financial leasing industry, the core source of business funds is bank loans. Since most of the financial leasing businesses are long-term enterprises, if the proportion of current liabilities is large, it means that the efficiency of the company's capital utilization is relatively low, which will have a significant impact on the company's profitability, production, and operation; it is not, however, good for long-term development. The amount of bank borrowing, which accounts for a large proportion of the debt of the IoT company, is a typical short-term loan. Although the IoT company is a banking financial leasing company, and shareholders have strong capital strength, this form of "borrowing the short and using the long" requirements for the refinancing ability of the IoT companies are very high, which increases the company's operating risks. The number of IoT companies is growing rapidly, the scale of enterprises continues to grow, and business volume is also expanding. At the same time, with the entry of many IoT companies, obvious business homogeneity has appeared in the industry. These facts all point to fierce competition in the IoT industry, and show that IoT companies are in turn facing greater competitive pressures and risks. The results of bank interest rate risk analysis are shown in Figure 2. An analysis from the perspective of corporate cash flow reveals the following: the average cash flow ratio of company A is too high, the average cash sales ratio is negative, and the average cash recovery rate of assets is low, indicating that the company's operating conditions are poor and profitability is poor. Therefore, managers must take steps to improve the operation of the enterprise and to increase its profitability.

4.2. financing Risk Indicators

After using the Z-Score Model to conduct financial risk early warning analysis, the results show that compared with the financial data of previous years, in 2017 the company faces the problem of reduced liquidity and solvency; this called for analysis of short-term solvency of the A IoT company, as well as (liquidity) and long-term solvency. After screening, a total of basic variables were selected as shown in Table 3. the values calculated according to the annual report of A IoT company are shown in Table 4. In terms of short-term solvency, from the perspective of the realization of assets of A IoT company, from 2018 to 2020, the current ratio was low and decreased year by year, indicating that the liquidity of current assets is low. The cash ratio also shows a year-by-year decreasing trend, which indicates that the ability of A IoT company's currency funds to be used immediately to repay the company's debt is weak. It is generally believed that the cash flow ratio is above 0.2, and the cash ratio in 2018 and 2020 are both above 0.2 level, but it fluctuated greatly in 2019 and is negative. The possible reason is that in 2019, the net cash flow of A IoT company's operating activities was -1.38 billion, which indicates that the company may have been in the start-up stage. At this stage, a large amount of capital needs to be invested to develop the market. Therefore, the financing of enterprises in this period faces higher risks. The financing risk analysis is shown in Figure 3.

In terms of long-term solvency, after screening, a total of basic variables were selected as shown in Table 5. We used the annual report data of A IoT company to calculate the values shown in Table 6. The above financial ratio indicators show that from 2018 to 2020, the debt-to-asset ratio of online companies is above 0.85. In general, the lower this ratio (below 50%), the stronger the solvency of the company. The long-term gearing ratio from 2018 to 2020 is 0.5780, 0.5930, and 0.5364, respectively, indicating that the proportion of long-term capital non-current liabilities of the company is as high as 50% or more; the ratio of cash to debt of A IoT company is small, indicating that the company's financial flexibility is poor, and the ability of the enterprises to bear debts is weak. The interest coverage ratio has been declining year by year, indicating that the ability of A IoT company to pay interest on liabilities has weakened. The long-term solvency analysis of the company is shown in Figure 4.

Table 1
Z value judgment standard

Z range	Critical result
$Z>2.6$	Financial condition is good, basically there is no possibility of bankruptcy
$1.1\leq Z\leq 2.6$	There is a minor financial crisis, and effective measures can be taken to prevent risks
$Z<1.1$	There is a severe financial crisis and the probability of bankruptcy is high

Table 2
Bank interest rate risk

Project	End of the current period	End of last period	Change range (%)
Total liabilities	4342171.30	3639552.16	19.31
Loan	4 12296.46	219525.00	87.81
Borrowed funds	2797880.00	226 2708.33	23.65
Financial assets sold under repurchase agreements	300000.00	300000.00	-
Bonds payable	2891 13.23	354065.24	-18.34
Long-term payables	364,647.14	374,388.65	2.60

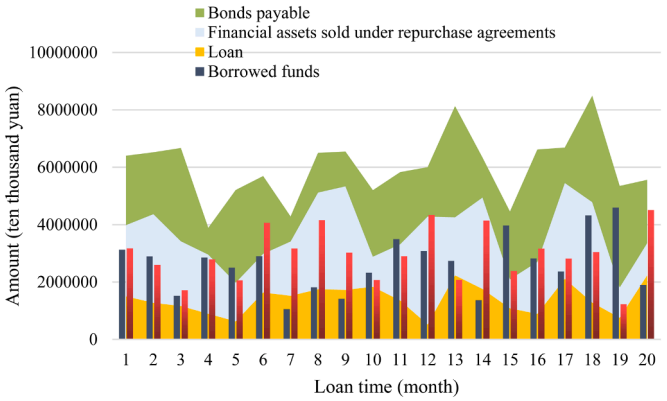

Figure 2. Results of bank interest rate risk analysis

Table 3
Total selection of basic variables

Financial capability	Financial indicator	Calculation
Short-term solvency	Current ratio	Current assets/current liabilities
	Cash ratio	Monetary funds/current liabilities
	Current: Gold Flow Ratio	Cash flow from operating activities/current liabilities

Table 4
Values calculated according to the annual report data of A IoT company

Financial indicator	2018	2019	2020
Current ratio	0.3151	0.2413	0.1517
Cash ratio	0.2107	0.1227	0.0752
Cash flow ratio	0.2532	-0.4758	0.2182

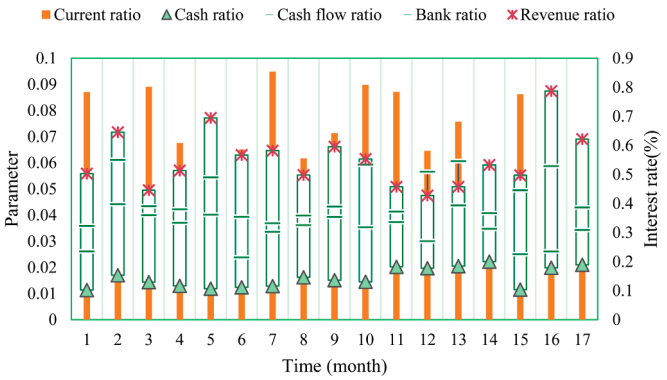

Figure 3. Funding risk analysis

Table 5
Basic variables selected after screening in terms of long-term solvency

Financial capability	Financial indicator	Calculation
Long-term solvency	Assets and liabilities	Total liabilities/total assets
	Long-term gearing ratio	Non-current liabilities/non-current liabilities + shareholders' equity
	Cash flow to debt ratio	Net cash flow from operating activities/total liabilities

Table 6
Calculated based on the annual report data of A IoT company

Financial indicator	2018	2019	2020
Assets and liabilities	0.8578	0.8710	0.8742
Long-term gearing ratio	0.5780	0.5930	0.5364
Cash flow to debt ratio	0.0225	-0.0379	0.0261
Interest coverage ratio	7.4437	6.4243	5.8148

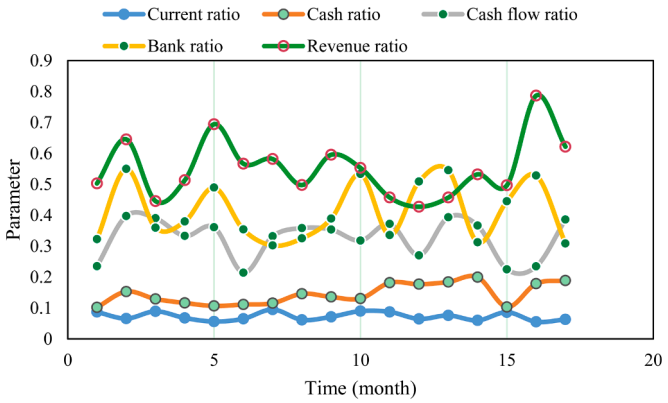

Figure 4. Analysis of the company's long-term solvency

4.3. Operational Risk Indicators

The operational risk indicators are exhibited in Table 7 and show that the return on total assets of Company A declined from 2018 to 2020 and that the company's overall profitability remained unstable. The gross profit margin of sales plummeted by six percentage points in 2018. Although there was a rebound in 2019, the instability of the company's overall profitability also brought certain risks to the business. Combining the analysis results of A IoT company, it is clear that the current risk prevention measures that A IoT company urgently needs to develop are concentrated on liquidity and solvency. In addition, there are certain potential risks in investment and operation. The comparison result of the horizontal Z" value shows that the external causes of financial risks involve various levels at the macro and meso levels, and it is difficult for companies to play an active leading role. Therefore, the prevention of financial risks of A IoT company should start mostly from the inside. First, A IoT companies should attach great importance to liquidity management. Companies need to regularly check liquidity conditions and gradually form a complete liquidity check, report, and early warning mechanism. It is generally believed that stress testing is the most effective way to manage liquidity risk. The A IoT company should assign professionals to conduct regular stress tests and provide timely feedback on the results, so that corresponding measures can be deployed in a timely manner. Secondly, the A IoT company should seek appropriate capital structure, financing methods, and time. The A IoT company can also be based on industry average assets debt status used to adjust the company's capital structure to avoid the accumulation of financial risks that excessive debt causes; at the same time, A IoT company should exercise caution for its own security rights, before providing guarantees, and conduct a comprehensive and detailed investigation of the financial status of the guaranteed company to ensure that the company has debt solvency. The company can also seek to improve the accounts receivable management model by controlling the amount of accounts receivable of the IoT company A, setting the limit, and reviewing and adjusting at any time. A IoT companies can also analyze the aging of the accounts receivable and conduct detailed management of the granting object through the aging analysis. In addition, A IoT companies should devote themselves to diversified investment and carefully chosen investment projects. In order to reduce investment risks, A IoT company should, on one hand, diversify investments and reduce the total amount of risks faced by the enterprise; on the other hand, A IoT company should adopt the NPV rule, etc. Strict review and meticulous evaluation of investment projects. The results of the analysis of operational risk indicators are shown in Figure 5.

Table 7
Operational risk indicators

Financial indicator(%)	2018	2019	2020
Return On Total Assets	0.0224	0.0197	0.0210
Gross profit margin	0.6695	0.6063	0.6941

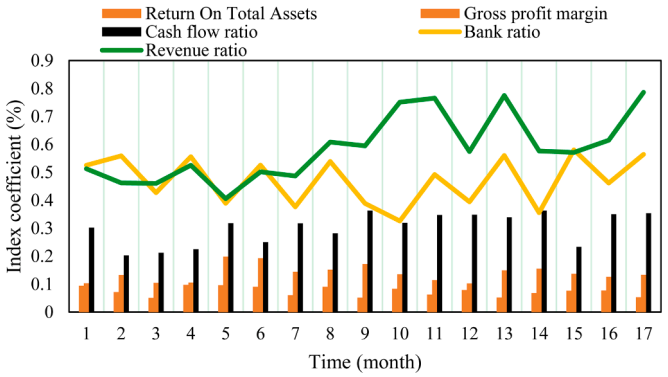

Figure 5. Analysis results of operational risk indicators

5. Conclusion

This article focuses on financial strength: assets are an indicator of an enterprise's financial strength—that is, the larger a company's assets base, the stronger its financial picture and the better able it is to resist financial risks. Considering the large amount of assets, logarithmic processing is adopted.

This article also focuses on two aspects of efficiency, namely, financial efficiency and operating efficiency. Financial efficiency is expressed by accounts receivable turnover rate, inventory turnover rate, fixed asset turnover rate, and weighted average return on net assets; operating efficiency is measured by operating profit margin. From an international perspective, accounts receivable turnover rate and inventory turnover rate are used frequently as measurable financial indicators. In assessing operating efficiency, we calculated operating profit/main business income, which can fully reflect the profitability of the enterprise under normal circumstances and proves better than the operating profit rate calculated according to net profit.

This article also targets two aspects of quality, namely, financial quality and operating quality. The former is mainly for assets, and the latter is mainly for profits. Financial quality is measured by the asset impairment rate; the operating quality is expressed by the earnings-to-cash ratio and the interest guarantee multiple. Among them, the asset impairment rate A = the ending book balance of the impairment provision/net asset value, and the asset impairment rate B = the change in the impairment provision/net asset value. The quality status component mainly satisfies the principle of comprehensive attention to financial quantity and quality. We also paid attention to the issue of quantity of assets, and this aspect focuses on the issue of quality. The higher the provision for impairment of assets, the more true and reliable the status of the assets are as presented by the company on the balance sheet. This research helps IoT companies reduce the probability of crises and develop in a healthy and orderly way.

Author statement

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Acknowledgements

This work is supported by the soft science project of Zhejiang Province, China (2020C35025); Zhejiang Province social science planning project, China (21NDJC023Z); Wenzhou basic scientific research project, China (R2021017), China postdoctoral science foundation, China (2019M653884XB); Shanxi social science foundation, China (2020D018).

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