Research on Dynamic Comprehensive Evaluation of Operating Performance of Textile Manufacturing Listed Companies in China

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Abstract. Aiming at the comprehensive evaluation of the operating performance of listed companies in Chinese textile manufacturing industry, this paper selects the operating data of 20 listed companies in Chinese textile manufacturing industry or with related concepts in the past 5 years from 2017 to 2021, and realizes the dynamic comprehensive evaluation of the operating performance of listed companies by establishing an incentive control model considering the time dimension. The main ideas are as follows: Firstly, the evaluation index system with 13 indicators including basic earnings per share of listed companies is constructed; Secondly, the entropy method is used to obtain the static comprehensive evaluation value of each listed company in different years, and then on this basis, the advantages and disadvantages of incentives are introduced to obtain the comprehensive evaluation information of each listed company in different years; Finally, the weight of each year's time point is obtained by using the minimum variance time weight method with the strategy of 'paying more attention to the present than to the past', and then the final total dynamic evaluation results of the operating performance of each listed company in the past five years are obtained by combining the time weight of each year with the operating performance evaluation value of each year of the listed company, so as to achieve a more realistic and objective evaluation of the operating performance of the listed companies in the textile manufacturing industry.

Keywords: textile manufacturing · operating performance · two-way incentive · dynamic comprehensive evaluation

1 Introduction

Textile industry is a traditional industry in China, China is also a big country in textile production and export, Not only provides a large number of jobs, It has also made great contributions to promoting the growth of the national economy, Is an important pillar of China's national economy. After years of development, The competitive advantage is obvious, With the most complete industrial chain in the world, The highest processing level, The self-regulation ability to deal with market risks has been continuously enhanced, It provides a solid guarantee for the development of textile industry. But on

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the premise of high-quality development, Facing the complicated global international situation and the impact of the epidemic, The healthy development of textile industry has also been greatly impacted. In order to understand the operating conditions of listed companies in textile industry and the development level of listed companies in the industry, this paper selects some representative domestic textile manufacturing and related concepts of listed companies to evaluate and analyze their operating performance. It is of great theoretical significance and practical value to make an objective and accurate evaluation of their operating conditions as much as possible.

At present, aiming at the hot issue of operating performance evaluation of listed companies, Scholars have done a lot of research on the performance evaluation of different types of listed companies from different angles and using various methods, and obtained valuable research results. For example, Geng et al. used factor analysis to evaluate and rank the performance of 20 tourism companies listed in Shanghai and Shenzhen [1]; Chen et al. used DEA-Tobit to empirically measure the operating performance of 37 listed pharmaceutical manufacturing companies in mainland China and analyze the corresponding influencing factors [2]; Cheng used factor analysis to analyze the operating performance of coal listed companies, and then clustered the research results, and pointed out the direction for the future development of traditional energy companies such as coal from the perspective of operating performance [3]; Based on the management entropy theory, Wang et al. made an empirical study on the operating performance of forestry listed companies, and put forward corresponding suggestions for improvement [4]; Dong et al. established a performance evaluation model by using grey comprehensive clustering method, and evaluated the operating performance of listed banking companies, and got the conclusion that the overall performance level of listed banking companies in China showed a downward trend in recent years [5]; Of course, there are many scholars who have studied the operating performance of listed companies with different concepts from the above [6–9], They also give meaningful research conclusions, This provides a meaningful reference for enriching the research contents and methods of performance evaluation of listed companies to a certain extent. At present, the research on the evaluation of performance of listed companies in textile industry, which is concerned by this paper, is typical as follows: Xiang comprehensively evaluated the financial performance of enterprises by using factor cluster analysis method combined with the financial data of 32 listed companies in garment manufacturing industry in 2019, and put forward corresponding suggestions [10]; Shu uses super-efficiency DEA method to evaluate and analyze the operating performance of some listed textile enterprises in China. This method emphatically solves the problem of distinguishing the operating performance of six listed textile enterprises which are evaluated as simultaneous effective by traditional DEA [11]; Leng selects evaluation indexes from multiple perspectives, evaluates the operating performance of 27 textile and garment industries in Shanghai stock market from 2013 to 2015 by using factor analysis method, and gives relevant suggestions according to the evaluation results [12].

After combing the above, it is found that the evaluation research on the operating performance of listed companies in most literatures is a static evaluation research under various methods at a fixed time point, Obviously, the operating conditions of listed companies are a dynamic change process for a period of time, Considering dynamic changes will more effectively reflect the real operating performance of listed companies, Therefore, the static evaluation will be insufficient when evaluating the dynamic changes or development trends of the company's operating conditions, and the aggregated information is mostly linear aggregation, Less consideration of "rewards and punishments" and other management means. In the literature review, it is also found that the research results on the performance evaluation of textile manufacturing listed companies to be studied in this paper are still relatively lacking, And the evaluation research considering its dynamic change process is even rarer. At present, in the dynamic comprehensive evaluation method and application of describing the development and change of research things, Guo and Zhang have done a lot of valuable theoretical research and application exploration [13–18], The research results have greatly promoted the development of comprehensive evaluation research on describing the dynamics of things, And has been popularized and applied in various fields such as economy, management and finance. Through combing and analyzing the research results of scholars on the evaluation of operating performance of listed companies, It provides an important research basis and reference for the dynamic comprehensive evaluation of the operating performance of textile manufacturing listed companies, and provides an important guarantee for the establishment of index system, evaluation model and analysis of the dynamic comprehensive evaluation of the operating performance of textile manufacturing listed companies in this paper.

2 Establishment of Performance Evaluation Index System of Listed Companies

To evaluate the operating performance of listed companies scientifically, objectively and effectively, it is necessary to establish a set of reasonable evaluation index system. The more indexes selected in theory, the more real evaluation results can be reflected. However, some scholars have confirmed that the more indicators, the greater the possibility of information superposition, which will make the evaluation results inaccurate[19].Therefore, this paper comprehensively considers the Operating Rules for Enterprise Performance Evaluation issued by the Ministry of Finance and the characteristics of China's financial data, Referring to the previous research on the performance evaluation index system of listed companies and the index setting principles (comprehensive, scientific, fair and operable, etc.), the evaluation indexes that can reflect the main operating performance are extracted from the financial statements of listed companies, and the evaluation index system is established in Table 1.

Table 1. Performance Evaluation Index System of Chinese Textile Manufacturing Listed Companies

Evaluation objective	First-class index	Secondary index	Indicator identification	Indicator nature
Operating performance	Profitability	Basic earnings per share (yuan)	X_1	Positive
		Return on equity (%)	X_2	Positive
		Net interest rate (%)	X_3	Positive
		Net interest rate on total assets (%)	X_4	Positive
	Development capacity	Growth rate of net profit (%)	X_5	Positive
		Year-on-year growth rate of total operating income (%)	X_6	Positive
		Gross profit margin (%)	X_7	Positive
	Operational capability	Turnover rate of accounts receivable (times)	X_8	Positive
		Inventory turnover rate (times)	X_9	Positive
		Turnover rate of total assets (times)	X_{10}	Positive
	Solvency	Asset-liability ratio (%)	X_{11}	Negative
		Quick-acting ratio	X_{12}	Positive
		Current ratio	X_{13}	Positive

3 Method Description of Dynamic Comprehensive Evaluation Model

3.1 Establish a Dynamic Time Series Stereo Evaluation Data Table

Consider the observed values $x_{ij}(t_k)(i = 1, 2, \cdots n; j = 1, 2, \cdots m; k = 1, 2, \cdots T)$.

Table 2. Dynamic time series stereo data table

	t_1	t_2	…	$t_T t_T$
	$x_1, x_2, ..., x_m$	$x_1, x_2, ..., x_m$	…	$x_1, x_2, ..., x_m$
s_1	$x_{11}(t_1), x_{12}(t_1), ..., x_{1m}(t_1)$	$x_{11}(t_2), x_{12}(t_2), ..., x_{1m}(t_2)$	…	$x_{11}(t_T), x_{12}(t_T), ..., x_{1m}(t_T)$
s_2	$x_{21}(t_1), x_{22}(t_1), ..., x_{2m}(t_1)$	$x_{21}(t_2), x_{22}(t_2), ..., x_{2m}(t_2)$	…	$x_{21}(t_T), x_{22}(t_T), ..., x_{2m}(t_T)$
⋮	⋮	⋮		⋮
s_n	$x_{n1}(t_1), x_{n2}(t_1), ..., x_{nm}(t_1)$	$x_{n1}(t_2), x_{n2}(t_2), ..., x_{nm}(t_2)$	…	$x_{n1}(t_T), x_{n2}(t_T), ..., x_{nm}(t_T)$

of m evaluation indicators $X = \{x_1, x_2, ..., x_m\}$ of n evaluated objects $S = \{s_1, s_2, \cdots s_n\}$ in T time periods. In this way, a dynamic time series stereo data table is constructed [20], The specific form is as shown in Table 2.

3.2 Construct the Static Comprehensive Evaluation Value Matrix of the Evaluation Object at Each Time Point

The original data in the dynamic time series data table is uniform and dimensionless, and considering the difference of information provided by the selected evaluation indexes, the "entropy method" is used [20].After processing the original index data, the static comprehensive evaluation values $x_i(t_k)(i = 1, 2, \cdots, n; k = 1, 2, \cdots, T)$ of each evaluation object at different times are obtained, and the static evaluation value matrix is constructed from the static evaluation values of all evaluated objects at different times and recorded as follows: X

$$X = \begin{bmatrix} x_1(t_1) & x_1(t_2) & \ldots & x_1(t_T) \\ x_2(t_1) & x_2(t_2) & \ldots & x_2(t_T) \\ \ldots & \ldots & \ldots\ldots & \\ x_n(t_1) & x_n(t_2) & \ldots & x_n(t_T) \end{bmatrix} \tag{1}$$

3.3 Calculate the Excitation Values of the Evaluation Object at Different Time Points

By substituting the static comprehensive evaluation value matrix data obtained above into the following Eq. (2), the average maximum gain $\eta^{\max}$, average minimum gain $\eta^{\min}$ and average gain $\overline{\eta}$ of the evaluation object can be calculated first, and the calculation

formula is as follows:

$$\begin{cases} \eta^{\max} = \max\limits_{i}(\dfrac{1}{T-1}\sum\limits_{k=1}^{T-1}(x_i(t_{k+1}) - x_i(t_k))) \\ \eta^{\min} = \min\limits_{i}(\dfrac{1}{T-1}(\sum\limits_{k=1}^{T-1}(x_i(t_{k+1}) - x_i(t_k))) \\ \overline{\eta} = \dfrac{1}{n(T-1)}\sum\limits_{i=1}^{n}\sum\limits_{k=1}^{T-1}(x_i(t_{k+1}) - x_i(t_k)) \end{cases} \tag{2}$$

Then, the advantages and disadvantages gain level of the object to be evaluated is calculated by using the following formula (3), which is recorded as η^+, η^-.

$$\begin{cases} \eta^+ = \overline{\eta} + (\eta^{\max} - \overline{\eta})k^+ \\ \eta^- = \overline{\eta} - (\overline{\eta} - \eta^{\min})k^- \end{cases} \tag{3}$$

Where $k^+, k^- \in (0, 1]$ is the floating coefficient (representing a certain psychological expectation of the evaluator. If there are no special requirements, it is generally taken to be $k^+ = k^- = 0.5$). Substitute the obtained η^+, η^- into the following Eq. (4) to obtain the incentive values $x_i^+(t_k)$ and $x_i^-(t_k)$ for the evaluation object, the solution formula is as follows:

$$\begin{cases} x_i^+(t_k) = \eta^+ + x_i(t_{k-1}) \\ x_i^-(t_k) = x_i(t_{k-1}) + \eta^- \end{cases} (k = 2, 3, \cdots, T) \tag{4}$$

3.4 Calculate the Total Dynamic Comprehensive Evaluation Value of the Object to Be Evaluated With Excitation at Multiple Time Points

After calculating the excitation value of the object to be evaluated, the gain of the object to be evaluated at different time points can be calculated by using the following formulas (5) and (6) in combination with the static evaluation value of the object to be evaluated at different time points: $v_i^+(t_k)$ *and* $v_i^-(t_k)$

$$v_i^+(t_k) = \begin{cases} x^+(t_i) - x_i(t_k), & x_i^+(t_k) > x_i(t_k) \\ 0, & \text{other} \end{cases} \tag{5}$$

$$v_i^-(t_k) = \begin{cases} x(t_i) - x_i^-(t_k), & x_i(t_k) > x_i^-(t_k) \\ 0, & \text{other} \end{cases} \tag{6}$$

Generally, at the initial time point t_1, it is specified that no excitation will be obtained, that is $v_i^+(t_1) = v_i^-(t_1) = 0$. Then, the pros and cons incentive factor $h^+, h^-(h^+, h^- > 0)$ is calculated using the following Eq. (7), and the formula is as follows:

$$\begin{cases} r = \dfrac{h^+ \sum\limits_{i=1}^{n} \sum\limits_{k=1}^{T} v_i^+(t_k)}{h^- \sum\limits_{i=1}^{n} \sum\limits_{k=1}^{T} v_i^-(t_k)} \\ h^+ + h^- = 1 \end{cases} \tag{7}$$

r ($r \in R^+$) is the proportion of the total number of good and bad incentives (a reflection of the evaluator's decision-making intention), and the following Eq. (8) can be used to obtain the total dynamic comprehensive evaluation value of the ith evaluation object s_i with incentives at T different time points. The formula is as follows:

$$\begin{cases} z_i(t_k) = h^+ v_i^+(t_k) + x_i(t_k) - h^- v_i^-(t_k) \\ z_i = \sum\limits_{k=1}^{T} \tau_k z_i(t_k) \end{cases} \quad (i = 1, 2, \cdots n) \tag{8}$$

Where $z_i(t_k)$ is the comprehensive evaluation value of s_i subjected to superior and inferior incentives at time t_k, while z_i is the total dynamic comprehensive evaluation value of the evaluation object s_i with incentives at all T times, and τ_k is the time factor. If time preference is not intentionally emphasized, it is generally preferred to be 1; The decision maker can also use the minimum square difference method to determine the time weight vectors at different time points, taking into account time preference ("enrich the past and thin the present" or "enrich the present and thin the past").This method is formally manifested as solving a non-linear programming problem [20]. The non-linear programming solution for the time weight coefficients at T time points is as follows:

$$\begin{cases} \min(D(w) = \frac{1}{T} \sum\limits_{i-1}^{T} w_i^2 - \frac{1}{T^2}) \\ s.t.\ \lambda = \frac{1}{T-1} \sum\limits_{i-1}^{T} (T - i) w_i \\ \sum\limits_{i-1}^{T} w_i = 1,\ \ w_i \in [0, 1], i = 1, 2 \ldots . T \end{cases} \tag{9}$$

In the above equation, $D(w)$ is the variance of weight coefficient, and λ is the time degree. The time weight vector $(w_1, w_2, \cdots w_T)$ at different time points can be obtained after the value of λ is given according to the requirement of time preference.

4 Dynamic Comprehensive Evaluation and Analysis of Operating Performance of Textile Manufacturing Listed Companies

According to the division and definition of the concept plate of listed companies by Haitong e Haicaitong Software of Haitong Securities and considering the availability and quantification requirements of each index data in the established evaluation index system, Considering the establishment years of listed companies and other factors, 20 representative textile manufacturing and related conceptual listed companies such as

Jiaxin Silk, Xinye Textile, Huafang, Hangmin and BOC Cashmere were selected as the evaluated objects. And from the financial analysis database of the corresponding listed companies in Oriental Fortune website, the original data of the corresponding indicators with a time span of five years from 2017 to 2021 is extracted for analysis. Due to the large amount of data limited by space, the original data is omitted in this paper.

Based on the information data of the above listed companies' operating performance in recent five years, the detailed processing process of dynamic evaluation of the operating performance of the selected 20 textile manufacturing listed companies is as follows:

1) Since the selected index has a negative indicator (asset-liability ratio), $X'_{ij} = \max_i(X_{ij}) - X_{ij}$ is used for consistent processing of the negative indicator data in a certain year, and then "extreme value processing method" [15] is adopted for standardized processing of the indicator data after consistent processing, and "entropy method" is adopted to calculate the static evaluation value $x_i(t_k)$ of each listed company in different years as shown in Table 3.

Table 3. Static comprehensive evaluation values and rankings of textile manufacturing listed companies in different years from 2017 to 2021

Company name	2017	Rank	2018	Rank	2019	Rank	2020	Rank	2021	Rank
Yanjiang shares	0.0810	3	0.0504	11	0.0444	11	0.0559	5	0.0339	12
Jianshenggroup	0.0519	10	0.0476	13	0.0427	13	0.0302	15	0.0328	15
Xingyetechnology	0.0540	8	0.0544	8	0.0673	5	0.0472	10	0.0760	5
Lianfa shares	0.0604	6	0.0637	6	0.0811	2	0.0647	4	0.0774	4
Ruyi Group	0.0293	17	0.0348	18	0.0175	19	0.0210	20	0.0145	19
Xinye textile	0.0377	15	0.0376	17	0.0225	18	0.0236	19	0.0262	17
Huafu fashion	0.0434	12	0.0420	15	0.0273	15	0.0242	18	0.0376	11
Vosges shares	0.0387	14	0.0385	16	0.0261	16	0.0298	16	0.0329	14
Weixing shares	0.0791	4	0.0638	4	0.0486	9	0.0529	7	0.0449	9
Hua Mao shares	0.0191	19	0.0336	19	0.0442	12	0.0480	9	0.0523	7
ShanghaiSan Mao	0.0312	16	0.0504	11	0.0535	8	0.0361	14	0.0530	6
Xinlong Holdings	0.0408	13	0.0516	10	0.0564	7	0.0988	2	0.0775	3
Kairun shares	0.0745	5	0.0704	2	0.0454	10	0.0383	13	0.0390	10
Huafang shares	0.0212	18	0.0438	14	0.0261	16	0.0298	16	0.0262	17
Jiaxin silk	0.0448	11	0.0638	4	0.0599	6	0.0487	8	0.0451	8
BOC Cashmere	0.0071	20	0.0016	20	0.1317	1	0.1443	1	0.1641	1
Nuobang shares	0.0520	9	0.0559	7	0.0414	14	0.0532	6	0.0330	13
Hangmin shares	0.0886	2	0.0701	3	0.0729	4	0.0657	3	0.0991	2
Jinhong group	0.0903	1	0.0537	9	0.0154	20	0.0423	12	0.0272	16
ST Bailong	0.0549	7	0.0723	1	0.0755	3	0.0451	11	0.0073	20

2) Using Eq. (2), the average maximum gain, average minimum gain and average gain of 20 textile manufacturing listed companies evaluated are obtained, which are as follows: $\eta^{\max} = 0.0393$, $\eta^{\min} = -0.0158$, $\overline{\eta} = 0$.
3) According to the formula (3), the superior and inferior gain levels when the floating coefficient is $k^+ = k^- = 0.5$ as follows: $\eta^+ = 0.0197$, $\eta^- = -0.0079$.
4) According to Formula (4), the superior and inferior incentive values of listed companies in each year can be calculated respectively. The calculation results are shown in Tables 4 and 5.

5) Using the data in Table 4 and Table 5, the superior and inferior incentives $v_i^+(t_k)$, $v_i^-(t_k)$ of each listed company in each year can be calculated according to formula (5) and (6), Taking the ratio of the total number of good and bad incentives $r = 1$, we can obtain the binary linear equation set for solving the good and bad

Table 4. Excellent Incentive Value of Textile Manufacturing Listed Companies from 2018 to 2021

Listed company	2018	2019	2020	2021
Yanjiang shares	0.1007	0.0701	0.0641	0.0756
Jiansheng group	0.0716	0.0673	0.0624	0.0499
Xingyetechnology	0.0737	0.0741	0.0870	0.0669
Lianfa shares	0.0801	0.0834	0.1008	0.0844
Ruyi Group	0.0490	0.0545	0.0372	0.0407
Xinye textile	0.0574	0.0573	0.0422	0.0433
Huafu fashion	0.0631	0.0617	0.0470	0.0439
Vosges shares	0.0584	0.0582	0.0458	0.0495
Weixing shares	0.0988	0.0835	0.0683	0.0726
Hua Mao shares	0.0388	0.0533	0.0639	0.0677
Shanghai SanMao	0.0509	0.0701	0.0732	0.0558
Xinlong Holdings	0.0605	0.0713	0.0761	0.1185
Kairun shares	0.0942	0.0901	0.0651	0.0580
Huafang shares	0.0409	0.0635	0.0458	0.0495
Jiaxin silk	0.0645	0.0835	0.0796	0.0684
BOC Cashmere	0.0268	0.0213	0.1514	0.1640
Nuobang shares	0.0717	0.0756	0.0611	0.0729
Hangmin shares	0.1083	0.0898	0.0926	0.0854
Jinhong group	0.1100	0.0734	0.0351	0.0620
ST Bailong	0.0746	0.0920	0.0952	0.0648

Table 5. Bad Incentive Value of Textile Manufacturing Listed Companies from 2018 to 2021

Listed company	2018	In 2019	2020	2021
Yanjiang shares	0.0731	0.0425	0.0365	0.0480
Jiansheng group	0.0440	0.0397	0.0348	0.0223
Xingyetechnology	0.0461	0.0465	0.0594	0.0393
Lianfa shares	0.0525	0.0558	0.0732	0.0568
Ruyi Group	0.0214	0.0269	0.0096	0.0131
Xinye textile	0.0298	0.0297	0.0146	0.0157
Huafu fashion	0.0355	0.0341	0.0194	0.0163
Vosges shares	0.0308	0.0306	0.0182	0.0219
Weixing shares	0.0712	0.0559	0.0407	0.0450
Hua Mao shares	0.0112	0.0257	0.0363	0.0401
ShanghaiSanMao	0.0233	0.0425	0.0456	0.0282
XinlongHoldings	0.0329	0.0437	0.0485	0.0909
Kairun shares	0.0666	0.0625	0.0375	0.0304
Huafang shares	0.0133	0.0359	0.0182	0.0219
Jiaxin silk	0.0369	0.0559	0.0520	0.0408
BOC Cashmere	-0.0008	-0.0063	0.1238	0.1364
Nuobang shares	0.0441	0.0480	0.0335	0.0453
Hangmin shares	0.0807	0.0622	0.0650	0.0578
Jinhong group	0.0824	0.0458	0.0075	0.0344
ST Bailong	0.0470	0.0644	0.0676	0.0372

incentive factors h^+, h^- according to Formula (7) as follows:

$$\begin{cases} 17421h^+ = 9381h^- \\ h^+ + h^- = 1 \end{cases}$$

Thus, the superior and inferior incentive factors are further solved as follows $h^+ = 0.35, h^- = 0.65$: Therefore, the evaluation value $Z_i(t_k)$ of each listed company at each time when using the superior and inferior incentive values for "reward and punishment" can be obtained according to the first formula in (8), as shown in Table 6.

6) Due to the importance of data that are closer to the year in the development process of listed companies, the principle of "enrich the present and thin the past" is adopted to take the time degree $\lambda = 0.3$, and then substitute it into formula (9) to calculate the time weight vector of each year from 2017 to 2021 as (0.04, 0.12, 0.20, 0.28, 0.36) by using MATLAB. Therefore, combining the time weight of each year with the data in Table 6, the second formula in formula (8) above is used to obtain the total dynamic evaluation value $Z_i(i = 1, 2, \cdots, 20)$ of the operating performance of each

Table 6. Comprehensive evaluation value and ranking of textile manufacturing listed companies considering rewards and punishments in different years from 2017 to 2021

Company name	2017	Rank	2018	Rank	2019	Rank	2020	Rank	2021	Rank
Yanjiangshares	0.0810	3	0.0680	5	0.0522	10	0.0462	11	0.0485	9
Jianshenggroup	0.0519	10	0.0537	10	0.0494	12	0.0415	14	0.0320	14
Xingyetechnology	0.0540	8	0.0558	8	0.0562	7	0.0611	6	0.0521	6
Lianfa shares	0.0604	6	0.0622	6	0.0655	4	0.0773	2	0.0665	4
Ruyi Group	0.0293	17	0.0311	17	0.0305	20	0.0193	20	0.0228	20
Xinye textile	0.0377	15	0.0395	15	0.0347	19	0.0243	18	0.0254	19
Huafu fashion	0.0434	12	0.0452	12	0.0393	14	0.0291	15	0.0260	18
Vosges shares	0.0387	14	0.0405	14	0.0373	16	0.0279	17	0.0316	15
Weixing shares	0.0791	4	0.0761	3	0.0608	6	0.0504	8	0.0546	5
HuaMao shares	0.0191	19	0.0209	19	0.0354	18	0.0460	12	0.0498	8
ShanhaiSanMao	0.0312	16	0.0330	16	0.0522	10	0.0491	9	0.0379	13
XinlongHoldings	0.0408	13	0.0426	13	0.0534	8	0.0661	4	0.0919	2
Kairun shares	0.0745	5	0.0763	2	0.0610	5	0.0472	10	0.0401	11
Huafang shares	0.0212	18	0.0240	18	0.0392	15	0.0279	16	0.0316	15
Jiaxin silk	0.0448	11	0.0466	11	0.0656	3	0.0595	7	0.0505	7
BOC Cashmere	0.0071	20	0.0089	20	0.0420	13	0.1335	1	0.1461	1
Nuobang shares	0.0520	9	0.0538	9	0.0534	8	0.0432	13	0.0470	10
Hangmin shares	0.0886	2	0.0835	1	0.0719	2	0.0747	3	0.0723	3
Jinhong group	0.0903	1	0.0734	4	0.0357	17	0.0197	19	0.0394	12
ST Bailong	0.0549	7	0.0567	7	0.0741	1	0.0626	5	0.0274	17

listed company from 2017 to 2021 and the corresponding ranking results are shown in Table 7.

From Table 7, the total dynamic evaluation data of operating performance of textile manufacturing listed companies from 2017 to 2021, it can be seen that the ranking of operating performance of listed companies in recent five years is from high to low: BOC Cashmere > Hangmin shares > Xinlong Holdings > Lianfa shares > Weixing shares > Xingye Technology > Jiaxin Silk > Yanjiang shares > Kairun shares > ST Bailong > Nuobang shares > Shanghai Sanmao > Jiansheng Group > HuaMao shares > Jinhong Group > Vosges shares > Huafu Fashion > Huafang shares > Xinye Textile > Ruyi Group, It can be seen that the operating performance of six companies including BOC Cashmere, Hangmin and Xinlong Holdings is located in the first group of the industry, showing a good development situation in the near future; The operating performance of 8 companies including Jiaxin Silk, Yanjiang and Kairun is located in the middle reaches of the industry; However, the operating performance of six companies, including Jinhong Group, Vosges and Huafu Fashion, is at the bottom of the industry, and their operating performance needs further promotion and improvement.

Table 7. Information of total dynamic evaluation results of textile manufacturing listed companies

Listed company	Stock code	Z_i	Rank
Yanjiang shares	300658	0.0522	8
Jiansheng group	603558	0.0415	13
Xingyetechnology	002674	0.0560	6
Lianfa shares	002394	0.0685	4
Ruyi Group	002193	0.0246	20
Xinye textile	002087	0.0291	19
Huafu fashion	002042	0.0325	17
Vosges shares	002083	0.0330	16
Weixing shares	002003	0.0582	5
Hua Mao shares	000850	0.0411	14
ShanghaiSan Mao	600689	0.0430	12
Xinlong Holdings	000955	0.0690	3
Kairun shares	300577	0.0520	9
Huafang shares	600448	0.0307	18
Jiaxin silk	002404	0.0553	7
BOCCashmere	000982	0.0997	1
Nuobang shares	603238	0.0482	11
Hangmin shares	600987	0.0748	2
Jinhong group	603518	0.0392	15
ST Bailong	002776	0.0512	10

5 Conclusion

This paper chooses the textile industry, which plays an important role in China's national economy, as the research background, 20 representative textile manufacturing companies or listed companies with related concepts are selected as research objects, By establishing the profitability of listed companies, The evaluation index system including development ability, operation ability and solvency ability is used to evaluate and analyze the operating performance of the selected 20 textile manufacturing listed companies. Considering that the current research on the operating performance evaluation of textile manufacturing listed companies mostly focuses on the static evaluation at a fixed time point, In fact, the operating performance of listed companies changes dynamically and discrete with time and has certain volatility, This makes the static evaluation at a fixed time point unable to objectively reflect the real changes in the operating performance of listed companies. In view of this, It is very valuable to adopt the dynamic evaluation considering time dimension and introducing the idea of merits and demerits incentive

management to evaluate the operating performance of textile manufacturing listed companies. Using this dynamic evaluation model combined with the original index data of 20 selected textile manufacturing listed companies in recent five years from 2017 to 2021, Firstly, the static evaluation values and rankings of listed companies in different years are obtained by entropy method (Table 3), Then, the comprehensive evaluation value and ranking with incentives are obtained by integrating the thought of reward and punishment management (Table 6), Finally, the time weights of different years are obtained by using the strategy of "thick present and thin ancient", Using this time weight vector, the evaluation values for different years are aggregated to obtain the final overall dynamic comprehensive evaluation value and ranking of listed companies considering changes in operating performance during the period 2017–2021 (Table 7). Through the calculation results of the model, it can be found that the static evaluation values of companies over the years obtained by entropy method from 2017 to 2021 are different and the rankings of most companies in the industry also change. Some changes are relatively large, For example, Jinhong Group's operating performance evaluation value ranked first in the industry in 2017, but it declined seriously in the following years and even ranked the bottom in 2018. Although BOC Cashmere ranked the bottom in the first two years, it directly ranked first in the industry in the last three years, Also, Hua Mao shares has been on the rise since the beginning of the industry, These changes once again show that the operating performance of listed companies is a dynamic process, Therefore, it is one-sided and not objective to describe the operating performance of listed companies by choosing a static evaluation in a certain year. Through the calculation results in Table 6, we can see that after introducing the benign guiding effect of "rewards and punishments" of advantages and disadvantages incentives, Since 2018 (2017 without incentives), the evaluation value and ranking of listed companies have further changed, At this time, the result is closer to the actual situation than when there is no incentive, The calculation result in Table 7 is the final evaluation value aggregated by using the time weight of each year, It is also a general dynamic evaluation of the operating performance of the selected 20 textile manufacturing companies in the past five years from 2017 to 2021, This comprehensive evaluation results due to the consideration of time factors and "good and bad incentive" management thought, which makes the evaluation results more real, objective and convincing, can provide a reference for listed companies to understand their own operating performance in the overall situation of the industry.

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