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Research on Performance Evaluation Model Based On Eva-Bsc

-- Taking New Energy Vehicle Manufacturing Enterprises as An Example

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Abstract: The new energy vehicle industry is now developing at a high speed, with fierce competition among enterprises. Enterprise performance evaluation system is an important guarantee for the realization of enterprise strategic objectives. A reasonable performance evaluation system is vital to the development of enterprises. The article builds an eva-bsc performance evaluation model with EVA value as the core and BSC as the framework, determines the weight by using the method of combining AHP and entropy method, and empirically analyzes the performance of 11 new energy vehicle manufacturing enterprises with a market value of more than 10 billion yuan from 2018 to 2020. The evaluation results show that the comprehensive and scientific performance evaluation of new energy vehicle manufacturing enterprises has been basically realized.

Keywords: New energy vehicle, Economic added value balanced scorecard, Analytic hierarchy process, Entropy weight method.

1. Introduction

Nowadays, society is facing the profound contradiction between material demand and environmental pollution brought by economic growth. In the automotive field, oil consumption and exhaust pollution have begun to seriously overdraw the environmental carrying capacity, and it is urgent for mankind to carry out a green travel reform. According to the current technology, the product of this change should be the new energy vehicle industry. Although new energy vehicles are still in the growth stage, they will eventually replace traditional fuel vehicles and become a means of travel for people in the future. On October 9, 2020, the executive meeting of the State Council adopted the new energy vehicle industry development plan, which further defined the development goals for new energy vehicles in the next 5 and 15 years: by 2025, the proportion of new energy vehicle sales should reach about 25%, and by 2035, domestic public domain vehicles should be fully electrified. As a key supporting field of the national industrial policy, the new energy vehicle industry has good development prospects. It is of great value and significance to study the performance evaluation methods of new energy vehicle enterprises. EVA is a performance management method that considers the owner's interests, while BSC is a performance management system that combines non-financial indicators from the perspective of stakeholders. If the two are integrated, a more comprehensive performance management system that can overcome many shortcomings of the traditional single financial indicator system can be obtained, providing a new idea for the performance evaluation of new energy automobile enterprises. We hope to build this model to calculate the performance score so that enterprises can understand the gap between themselves and other enterprises, so as to improve the competitiveness of enterprises.

The research object of this paper is the vehicle manufacturing industry in the new energy vehicle industry. The reasons are; 1. In 2021, the state put forward the "14th five year plan", which made it clear that new energy vehicles will be regarded as the core competitiveness of the manufacturing industry, focus on new energy vehicles, accelerate the innovation and application of key core technologies, enhance the ability to guarantee factors, and cultivate and expand new drivers of industrial development. Therefore, new energy vehicles will become the focus of competition among major enterprises, which has research significance; 2. The new energy automobile industry chain involves upstream key raw materials and core components, midstream vehicle manufacturing, downstream charging services and post market services. The vehicle manufacturing industry is selected because it is a more intuitive perspective for consumers to understand the brand of new energy automobile enterprises; 3. Under the epidemic situation, all walks of life have been affected to varying degrees, and the new energy vehicle industry has also borne the brunt. In 2020, there was almost no growth or even negative growth. Studying the performance of enterprises in the past three years is conducive to planning the trend and development of enterprises after the epidemic.

2. Construction of Enterprise Performance Evaluation Model

2.1. EVA and BSC performance evaluation model theory

2.1.1. Economic value added (EVA)

Economic added value refers to the income after deducting all capital costs including equity and debt from the after tax net operating profit. Its core is that capital investment has a cost, and only when the profit of an enterprise is higher than its capital cost can it create value for shareholders. Economic added value is the best index to evaluate the profitability of enterprises, and its formula is

$$EVA = \text{Adjusted net operating profit after tax} - \text{Capital}$$

investment × Weighted average cost of capital ratio among

Net operating profit after tax = Net profit + (Interest expense + Adjustment items of R&D expenses) × (1 − Corporate income tax rate)

Capital investment = Average owner′s equity + Total average liabilities − Average interest free current liabilities − Average construction in progress

The weighted average capital cost rate is 5.5%.

2.1.2. Balanced Scorecard (BSC)

The advantage of EVA index is that it takes into account the cost of all capital and more truly reflects the value creation ability of enterprises. However, EVA calculation is mainly based on financial indicators, which can not comprehensively evaluate the operating efficiency and effect of enterprises. Therefore, a more comprehensive performance evaluation is carried out in combination with BSC.

Balanced scorecard is a method based on enterprise strategy, which decomposes the strategic objectives of an enterprise into specific and mutually balanced performance indicator systems from the four dimensions of finance, customers, internal business processes, learning and growth, and carries out performance management accordingly.

The four dimensions of Balanced Scorecard objectively evaluate enterprises from different angles, and the financial dimension solves such problems as how shareholders view enterprises; The customer dimension solves the problem of how customers view the enterprise; The internal process dimension focuses on the core competitiveness and solves the problem of what the enterprise's advantages are; The dimension of learning and growth solves the problem of whether an enterprise can improve and continue to create value.

2.2. Eva-bsc model evaluation index system

There are many factors affecting the performance evaluation of the new energy vehicle manufacturing industry. This paper selects 18 indicators for performance evaluation according to the Balanced Scorecard theory (see Figure 1).

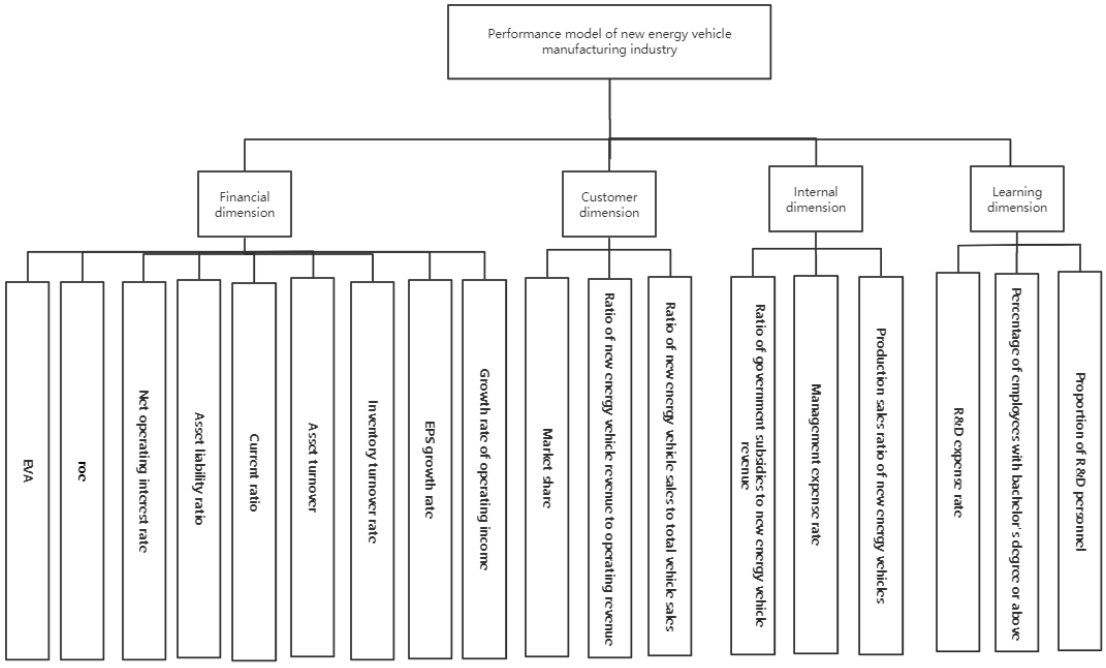

Figure 1. Performance evaluation system of new energy vehicle manufacturing industry

2.2.1. Financial dimension

Profitability is an enterprise's ability to earn profits. Profitability is very important no matter from which perspective. EVA, return on net assets and operating net interest rate are selected as profitability indicators. A positive EVA value indicates that the after tax net operating profit of an enterprise is higher than the capital expenditure invested. The higher the value, the stronger the profitability of the enterprise; The return on net assets reflects the profitability of the capital invested by the owner; Operating net profit rate is the ratio of net profit to operating income, which reflects the ability of enterprises to make profits through operating activities.

The Solvency Index selects the asset liability ratio and the current ratio. The asset liability ratio is the ratio determined by comparing the total liabilities and total assets of the enterprise. It reflects how much of the total funds of the enterprise are raised through borrowing. This ratio can reflect the guarantee degree of assets to liabilities, and is an important index to measure the long-term solvency; The current ratio reflects the degree to which the assets converted into cash in the short term of an enterprise guarantee the liabilities that need to be repaid in the short term, and can better reflect the short-term solvency of an enterprise.

The operating capacity index selects the asset turnover rate and the inventory turnover rate. The asset turnover rate is the key index reflecting the quality and efficiency of the enterprise's asset operation; Inventory turnover rate evaluates the performance level of purchasing department and production department.

Growth capacity selects the growth rate of earnings per share and operating income. Both indicators mainly reflect the development of enterprises.

2.2.2. Customer dimension

This dimension selects the market share, the proportion of new energy vehicle revenue to operating revenue (hereinafter referred to as the proportion of new energy vehicle revenue) and the proportion of new energy vehicle sales to total vehicle sales (hereinafter referred to as the proportion of new energy vehicles). The market share is an important indicator reflecting the strategic environment of an enterprise; The revenue proportion of new energy vehicles and the proportion of new energy vehicles reflect customers' recognition of the new energy vehicles and traditional energy vehicles of the enterprise.

2.2.3. Internal process dimension

This dimension selects the proportion of government subsidies in the income of new energy vehicles (hereinafter referred to as the proportion of subsidies), the rate of administrative expenses and the ratio of production and sales of new energy vehicles. The proportion of subsidies reflects the understanding of enterprises to government policies, the rate of administrative expenses reflects the level of operation and management of enterprises, and the ratio of production and sales of new energy vehicles reflects the understanding of enterprises to their own new energy vehicle product market.

2.2.4. Learning and growth dimension

This dimension selects the R & D expenditure rate, the proportion of employees with bachelor's degree or above (hereinafter referred to as the proportion of employees with high education) and the proportion of R & D personnel. The R & D expenditure rate and the proportion of R & D personnel reflect the R & D and innovation strength of enterprises' products, and the proportion of employees with high education reflects the overall quality and scientific research and innovation ability of enterprises' employees.

2.3. Establishment of performance evaluation model

The performance evaluation model of new energy vehicle manufacturing enterprises is:

$$\text{Comprehensive performance} = \sum_j W_j X_j \qquad (1)$$

$W_j X_j$In formula (1), is the weight of the jth index and is the score of the jth index.

3. Index Quantification Method

Since the contents and dimensions of the indicators are different and are not comparable, the indicators are normalized to eliminate the influence of dimensions. This paper involves five interval indicators. First, interval indicators are transformed into very large indicators. For the asset liability ratio, current ratio, the ratio of government subsidies to new energy vehicle income, management expense ratio and new energy vehicle production and sales ratio, experts first scored the index performance to determine the full score range of the index, as shown in Table 1,

Table 1. Interval type indicators (full partition table)

Interval index	Interval lower limit	Interval upper limit
Asset liability ratio	65.00%	70.00%
Current ratio	160.00%	170.00%
Ratio of government subsidies to new energy vehicle income	15.00%	18.00%
Overhead rate	2.80%	3.20%
Production sales ratio of new energy vehicles	100.00%	100.00%

And then unifying these indexes according to the formula of the interval type index unifying processing method,

$$x^* = \begin{cases} 1 - \frac{a-x}{max\{a-x_{min}, x_{max}-b\}}, & \text{if } x < a \\ 1, & \text{if } x \in [a,b] \\ 1 - \frac{x-b}{max\{a-x_{min}, x_{max}-b\}}, & \text{if } x > b \end{cases} \qquad (2)$$

$[a, b] x_{max} x_{min}$In formula (2), is the best stable interval of index x, and is the maximum and minimum value of X respectively. The indicators obtained after the consistency processing are all level large indicators, and then all indicators are dimensionless standardized according to the formula;

$$X_{ij} = \frac{x_{ij} - \bar{x}_j}{s_j} \qquad (3)$$

$\bar{x}_j s_j X_{ij}$ In formula (3), is the average value of the j-th index, is the mean square deviation of the j-th index, is the standard observation value, and the average value of the standardized index is 0 and the variance is 1. In this way, the influence of the different dimensions of the original index is eliminated through mathematical changes.

4. Weight Determination Method

The weighting method based on AHP mainly reflects the preference of decision-makers, i.e. experts, according to the importance of each indicator. It has a certain logic and high reliability, but it is subjective to judge the relative importance of each indicator; The entropy weight rule does not reflect the subjective color at all, which can reduce the subjective color of the AHP weight and improve the reliability of the model. Therefore, this paper will comprehensively use AHP and entropy weight method to determine the weight.

4.1. Determination of index weight based on AHP

Analytic hierarchy process (AHP) decomposes the decision-making problem into different hierarchies according to the order of the general objective, sub objectives of each level, evaluation criteria and specific alternative investment plans. Then, by solving the eigenvector of the judgment matrix, the corresponding weight of each indicator of each level to the indicators of the previous level is obtained. Finally, the final weight of each indicator to the general objective is merged hierarchically by using the method of weighted sum. The specific steps are as follows:

4.1.1. Establish hierarchical structure model

Establish a hierarchical structure model, which is divided into target layer, index layer and scheme layer. According to the selection of indicators in this paper, the hierarchical structure model of the performance evaluation system combining EVA and BSC is shown in the figure below.

4.1.2. Construct judgment matrix

The subjective scoring method is used to assign the importance of the index, and finally the integer of the arithmetic mean is taken as the importance. By comparing the indicators in pairs, the scoring value ranges from 1 to 9, which corresponds to the degree of importance. 1 represents that the two are equally important, 9 represents that the former is extremely important to the latter, and the higher the score, the more important the former is. According to the scoring results, the judgment matrix K is obtained.

4.1.3. Calculate weight and check consistency

Using the judgment basis of matrix elements, we can establish judgment matrices at various levels, and calculate the eigenvalues and eigenvectors of each matrix, so as to obtain the weight of each index.

$$KA = \lambda_{max} A \tag{4}$$

λ_{max} In formula (4), K is the judgment matrix; Is the maximum eigenvalue of K; A is its corresponding feature vector.

The index weights obtained by rooting out the feature vectors corresponding to the maximum feature values need to be checked for consistency,

$$CI = \frac{\lambda_{max} - n}{n-1} \tag{5}$$

In formula (5), CI is the consistency indicator, and N is the number of indicators.

The consistency test discriminant Cr is calculated as follows:

$$CR = \frac{CI}{RI} \tag{6}$$

In formula (6), Cr is the consistency test discriminant, RI is the average random consistency index, and generally RI is related to the order n. When CR < 0.1, the consistency check of judgment matrix K is qualified; If Cr ≥ 0.1, the judgment matrix K needs to be adjusted until the consistency is qualified. When the inspection is qualified, the maximum feature vector a is the weight vector corresponding to the index.

4.2. Determination of index weight based on entropy method

Entropy method is a method to determine the index weight according to the information provided by each index value.

$X_{ij}(i = 1,2,\cdots,n; j = 1,2,\cdots,m) X_{ij}$ Let it be the jth index in the ith object. For a given J, the greater the difference, the greater the comparison effect of this index on the evaluation object. That is, the more information this index contains and transmits, and the increase of information means the decrease of entropy. The specific steps are as follows:

4.2.1. Calculate the characteristic proportion of the ith object under the j-th index

$$P_{ij} = \frac{x_{ij}}{\sum_{i-1}^{n} x_{ij}} \tag{7}$$

P_{ij} In formula (7), it is the proportion of the ith evaluation object under the jth index.

4.2.2. Calculate the entropy of the j-th index

$$E_j = -\frac{1}{\ln n} \sum_{i=1}^{n} P_{ij} \ln P_{ij} \tag{8}$$

e_j In formula (8), is the entropy value of the jth evaluation index; N is the number of evaluation objects.

4.2.3. Calculate index entropy weight and determine weight

$$B_J = \frac{1-e_j}{\sum_{i=1}^{m} 1-e_i} \tag{9}$$

B_J Where (9) is the normalized weight coefficient.

4.3. Determination of index weight based on combination of AHP and entropy method

According to the idea of "multiplication" integration method, the index weights obtained by AHP and entropy method are comprehensively calculated to obtain the comprehensive weights, as shown in the formula:

$$W_j = {A_j B_j} \Big/ {\sum_{j=1}^{n} A_j B_j} \tag{10}$$

$W_j A_j B_j$ In formula (10), is the comprehensive weight of the jth index, and is the weight of the jth index calculated by AHP and entropy weight method respectively.

5. An Empirical Study On the Performance of New Energy Vehicle Manufacturing Enterprises

5.1. Sample selection, data source and weight determination

5.1.1. Sample selection

This paper selects the data from 2018 to 2020 of 11 of the 14 listed companies with a market value of more than 10 billion belonging to the two sectors of new energy vehicles and vehicle manufacturing on the flush website for performance research and analysis (excluding SINOTRUK, which only produces trucks and trucks, Haima automobile, which became the St share, and Lifan shares, which were reorganized in 2020). The financial index data in this paper mainly comes from the data statistics published on the almond data website. The non-financial index data are collected manually by reading the financial and accounting annual reports of enterprises and the new energy government subsidy data published by the Ministry of industry and information technology.

5.1.2. Weight of AHP

In this paper, for 18 evaluation indicators, experts are invited to get the importance scores of the four dimensions of the evaluation system after careful consideration and comparison one by one. The scores of each expert are mathematically averaged as the final score of each indicator. According to the judgment matrix of the four dimensions constructed by the expert scoring table, the judgment matrix

is normalized, and the weight coefficients of the four dimensions are calculated. Finally, the consistency test is carried out, and table 2 is obtained.

Table 2. Relative weights of four dimensions

index	Financial dimension	Customer dimension	Internal dimension	Learning dimension	weight
Financial dimension	1	5	3	4	0.5087
Customer dimension	1/5	1	1	2	0.2470
Internal dimension	1/3	1	1	1	0.1327
Learning dimension	1/4	1/2	2	1	0.1116
Consistency test	The maximum characteristic root is 4.0875 and the corresponding RI value is 0.89 according to the RI table, Therefore, Cr = CI / ri = 0.0328 < 0.1, which passed the consistency test.				

Similarly, after expert scoring for the nine indicators in the financial dimension, the weight coefficient determined by AHP is {0.3622 0.1495 0.1277 0.1059 0.0793 0.0536 0.0431 0.0384 0.0402}. After scoring the three indicators in the customer dimension by experts, the weight coefficient determined by AHP is {0.5278 0.3325 0.1396}. After scoring the three indicators in the internal dimension by experts, the weight coefficient determined by AHP is {0.6483 0.2297 0.1220}. After scoring the three indicators in the learning dimension, the weight coefficient determined by AHP is {0.4263 0.3225 0.2483}.

Thus, the weights of all 18 evaluation indexes are obtained as follows:

A = {20.44% 8.43% 7.20% 5.97% 4.47% 3.02% 2.43% 2.17% 2.27% 8.51% 5.36% 2.25% 9.98% 3.54% 1.88% 5.14% 3.92% 2.99%}

From the weight proportion of the above four dimensions, we can see that the financial dimension is still the focus of the whole evaluation system. In the financial dimension, we should pay attention to EVA and net interest rate, which represent the core ability of enterprise profitability and value creation.

The weight proportion of the customer dimension ranks second. Under this dimension, we should pay attention to the market share and the income proportion of new energy vehicles. Expanding the market share and improving the income proportion of new energy are also the focus of the whole new energy vehicle industry. It is also a guarantee for the new energy vehicle industry to continue to generate income and increase profits.

In the internal process dimension, the proportion of government subsidies accounts for a higher weight, followed by the administrative expense rate. The weight distribution of the dimension shows that controlling the proportion of government subsidies within a certain range is of great significance to the development of new energy vehicle enterprises.

The weights of the three indicators in the dimension of learning and growth are not much different, which all reflect the ability and potential of enterprises to innovate and develop.

5.1.3. Entropy weight method

For the sample data, the weight of each indicator is calculated by the entropy weight method as follows:

B_j = {2.57% 1.76% 3.20% 2.60% 4.09% 2.90% 5.58% 2.27% 2.09% 12.70% 12.11% 21.10% 4.15% 2.03% 2.30% 4.64% 5.49% 8.44% }

5.1.4. Comprehensive weight

Finally, the comprehensive weight calculated by formula (10) is:

W_j = {10.50% 2.96% 4.60% 3.11% 3.66% 1.75% 2.71% 0.98% 0.95% 21.60% 12.97% 9.49% 8.29% 1.44% 0.86% 4.77% 4.31% 5.05% }

5.2. Performance score

According to the data obtained after dimensionless indicators and the specific weights of indicators, the performance scores and rankings of 11 companies from 2018 to 2020 are obtained according to formula (1), as shown in Table 3.

Table 3. Performance score of new energy vehicle manufacturing enterprises from 2018 to 2020

time	2020		2019		2018	
ranking	company	score	company	score	company	score
1	SAIC Group	0.5790	BAIC bluevalley	0.7812	BAIC bluevalley	0.9114
2	BYD	0.3451	SAIC Group	0.7058	BYD	0.5289
3	BAIC bluevalley	0.2988	BYD	0.4583	SAIC Group	0.4177
4	Yutong Bus	0.1344	Yutong Bus	0.2718	Yutong Bus	0.2171
5	GAC group	-0.0521	Great Wall Automobile	-0.0443	Jianghuai Automobile	-0.0115
6	Great Wall Automobile	-0.0929	Jianghuai Automobile	-0.0505	dongfeng motor	-0.0596
7	Chang'an Automobile	-0.1353	GAC group	-0.1941	Chang'an Automobile	-0.1623
8	Jianghuai Automobile	-0.1445	dongfeng motor	-0.3148	GAC group	-0.2041
9	dongfeng motor	-0.1884	Chang'an Automobile	-0.4650	Great Wall Automobile	-0.2449
10	Foton Motor	-0.2321	Foton Motor	-0.5223	Xiaokang shares	-0.4835
11	Xiaokang shares	-0.5119	Xiaokang shares	-0.6262	Foton Motor	-0.9093

5.3. Analysis of evaluation results

Judging from the performance scores of 11 companies in the past three years, the overall scores show a downward trend. Among them, SAIC Group, BYD, BAIC Blue Valley and Yutong Bus have relatively stable and top performance scores, and they are the four companies with above average scores among the 11 companies. GAC group is a company with a steadily rising ranking in performance evaluation in the past three years. BAIC Blue Valley has won the first score in 18 and 19 years, but its score has dropped significantly in 2020. These companies with abnormal scores deserve attention.

BAIC Blue Valley ranked first in 18 and 19 years, and reached the third place in 20 years. See Table 4 for the specific scores of its three-year performance evaluation

Table 4. Performance score of BAIC bluevalley from 2018 to 2020

time	2020		2019		2018	
index	Standard queen data	score	Standard queen data	score	Standard queen data	score
EVA	-2.269	-0.238	-0.383	-0.040	-0.386	-0.041
Net profit margin	-2.974	-0.088	-0.649	-0.019	-0.345	-0.010
Return on equity (ROE)	-2.283	-0.105	-0.773	-0.036	-0.247	-0.011
Asset liability ratio	0.811	0.025	0.590	0.018	0.283	0.009
Current ratio	1.218	0.045	1.005	0.037	0.822	0.030
Asset turnover	-2.178	-0.038	-1.461	-0.026	-0.347	-0.006
Inventory turnover	-1.465	-0.040	-0.646	-0.018	2.418	0.066
Growth rate of earnings per share	-2.867	-0.028	0.003	0.000	0.363	0.004
Growth rate of operating revenue	-2.541	-0.024	2.604	0.025	2.262	0.021
Market share	-0.482	-0.104	1.179	0.255	1.172	0.253
Proportion of new energy vehicle revenue	2.208	0.286	2.615	0.339	2.154	0.279
Proportion of new energy vehicles	2.650	0.252	2.608	0.248	2.584	0.245
Subsidy proportion	0.811	0.067	-1.003	-0.083	0.455	0.038
Overhead rate	0.481	0.007	-0.682	-0.010	-2.856	-0.041
Production and sales rate of new energy vehicles	-3.007	-0.026	-2.801	-0.024	-2.970	-0.026
R & D expense rate	2.825	0.135	-1.070	-0.051	-1.605	-0.076
Proportion of highly educated employees	1.349	0.058	1.256	0.054	1.570	0.068
Proportion of R & D personnel	2.46	0.073	2.34	0.070	2.09	0.062
ranking	4		1		1	

It can be seen that all the financial indicators of BAIC Blue Valley in 2020 decreased significantly, indicating that there was a great crisis in the company's finance. Many financial data indicators were outside the normal distribution range. On the surface, the enterprise had no profit in 2020 and was losing money all the time. In terms of non-financial indicators, the market share also shrank significantly. Looking up relevant data, it was found that BAIC Blue Valley's sales in 2020 were greatly affected, In 2019, 70% of the company's sales came from corporate sales. Under the impact of the epidemic, corporate sales were almost zero, and the output was also greatly affected. The evaluation results are consistent with the actual situation.

Among the 11 enterprises, Great Wall Motors has made significant progress, and the specific scores in its three-year performance evaluation are shown in Table 5.

Table 5. Performance score of GAC group from 2018 to 2020

time	2020		2019		2018	
index	Standard queen data	score	Standard queen data	score	Standard queen data	score
EVA	0.862	0.090	0.860	0.090	0.730	0.077
Net profit margin	0.501	0.015	2.164	0.064	2.028	0.060
Return on equity (ROE)	0.493	0.023	0.755	0.035	0.890	0.041
Asset liability ratio	-2.298	-0.071	-2.285	-0.071	-2.555	-0.079
Current ratio	0.761	0.028	1.563	0.057	0.732	0.027
Asset turnover	-0.899	-0.016	-1.550	-0.027	-1.295	-0.023
Inventory turnover	0.007	0.000	-0.350	-0.009	-0.237	-0.006
Growth rate of earnings per share	0.365	0.004	-2.821	-0.028	0.299	0.003
Growth rate of operating revenue	0.227	0.002	-1.102	-0.010	0.038	0.000
Market share	0.069	0.015	-0.369	-0.080	-0.690	-0.149
Proportion of new energy vehicle revenue	-0.463	-0.060	-0.538	-0.070	-0.876	-0.114
Proportion of new energy vehicles	-0.540	-0.051	-0.602	-0.057	-0.658	-0.062
Subsidy proportion	0.811	0.067	0.151	0.013	1.305	0.108
Overhead rate	-1.790	-0.026	-0.935	-0.013	-0.102	-0.001
Production and sales rate of new energy vehicles	0.360	0.003	0.600	0.005	0.454	0.004
R & D expense rate	-0.752	-0.036	-1.198	-0.057	-1.068	-0.051
Proportion of highly educated employees	-0.653	-0.028	-0.614	-0.026	-0.742	-0.032
Proportion of R & D personnel	-0.215	-0.011	-0.169	-0.009	-0.118	-0.006
ranking	5		7		8	

It can be seen that the performance score of GAC group in the past three years has steadily increased in many indicators, especially the market share, which has increased from 1.5% in 18 years to nearly 5.7% in 20 years, and has increased nearly four times in two years. It can be predicted that great wall motor will take the lead in the next new energy vehicle war. In terms of profitability, Great Wall Motor has always been at the middle level, but under the influence of the

epidemic, it still has not experienced much volatility, A number of financial indicators have been improved, and the company has been advancing steadily in accordance with its strategy.

The performance scores of SAIC Group and BYD, which have always been in the upstream group, also have their own characteristics. Among them, SAIC Group's profitability is very outstanding and its EVA score is very high. However, SAIC Group's score in the indicator of the proportion of new energy vehicles to total vehicles is at the end of the whole industry, which indicates that SAIC Group's main profit direction is still fuel vehicles, and SAIC Group's R & D expense rate is also significantly lower than the average, Therefore, SAIC Group still has a huge space for development. It should shift its strategic objectives to the new energy vehicle industry and gradually increase the proportion of new energy vehicles. In terms of financial indicators, BYD is near the average, but its score of new energy vehicle sales in total vehicle sales is far ahead of all enterprises (except BAIC Blue Valley, which only produces new energy vehicles). However, in terms of employee structure, only about 12% of BYD employees have a bachelor's degree or above, which is the lowest in the industry. BYD should focus on long-term development, increase highly educated employees, and invest more in R & D and innovation of new products.

6. Summary and Deficiency

To sum up, the model has basically realized the performance evaluation of the new energy vehicle manufacturing industry. From the data, it can be seen that different enterprises have different scores in indicators. In the selection of indicators, this paper creatively uses indicators unique to the new energy vehicle manufacturing industry, such as the ratio of new energy subsidies to new energy income, which makes the model more targeted to the new energy vehicle manufacturing industry, but this selection has strong subjectivity and is not universal to other industries, making it difficult to popularize other industries; In terms of enterprise selection, this paper selects 11 listed companies on the flush website that belong to both new energy vehicles and vehicle manufacturing. Although the new energy vehicle industry has developed vigorously, the industry division is not clear enough. Some companies only manufacture new energy batteries and others are only responsible for assembling vehicles. There are subjectivity and limitations in company selection. In terms of methods, this paper uses the Balanced Scorecard of comprehensive economic added value as the model, and the weight determination method of AHP and entropy weight method to calculate the weight of performance indicators objectively. The evaluation results are relatively consistent with the actual situation.

By building a BSC performance evaluation model with EVA as the core, this paper analyzes the performance of 11 companies with a market value of more than 10 billion yuan in the new energy vehicle manufacturing industry in the three years from 2018 to 2020. It can be seen that under the influence of the epidemic and policies, some companies can not withstand the pressure, and their performance has declined. Companies also have crises, but some companies have also developed under the epidemic. These enterprises should receive more attention. Midstream and downstream enterprises should start from their own weak points, seek the gap with upstream enterprises, strive to narrow the gap, and occupy more of the new energy vehicle market. This model basically realizes the construction of performance scoring for the new energy vehicle manufacturing industry, and enterprises can score their own performance through this model.

With the change of policies and consumers becoming accustomed to new energy vehicles, the new energy vehicle industry has changed from policy oriented to market driven. The domestic new energy vehicle market will become larger and larger. Tesla, a new energy giant, will be outside. Many large cross industry companies such as Huawei and Xiaomi will also enter the new energy vehicle industry, and the competition will become increasingly fierce. How to make enterprises grow and develop better in the competition will become an important research direction in the future.

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