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Economic Benefit Evaluation of Listed Companies in the New Energy Vehicle Industry based on Factor Analysis and Cluster Analysis

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Abstract

The implementation of the "dual carbon" goal requires the traditional vehicle industry to accelerate the transformation to new energy vehicle business, and economic benefits are the key to its transformation progress. Based on factor analysis and cluster analysis, this paper uses the financial report data of representative listed companies in the new energy vehicle industry to comprehensively evaluate the economic benefits of listed companies in the new energy vehicle industry. The profitability factor, solvency factor, operational capacity factor and growth capacity factor are extracted through factor analysis, and the comprehensive score and comprehensive ranking are calculated. Then, through K-means clustering, it is divided into four types: profit growth type, operation-driven type, balanced development type and conservative and steady type, and the characteristics of each type are summarized in a targeted analysis. It is found that in the process of transformation to new energy vehicle business, different transformation paths lead to the differentiation of the economic benefits of enterprises. The transformation effect of profit growth type and operation-driven type transformation is better, and some enterprises have the potential to be industry benchmarks. To this end, it is recommended that four types of enterprises adjust their enterprise transformation strategies according to the principle of strong advantages and disadvantages. It is recommended that the government guide the healthy development of the industry and introduce relevant policies from the perspective of promoting the transformation of enterprise classification, escorting the development of the industry, and managing involution competition.

Keywords

New Energy Vehicles; Economic Benefits; Factor Analysis; Cluster Analysis.

1. Introduction

With the increasingly severe pressure on resources and the environment, China has proposed to accelerate the transformation to green development and high-quality development, and clearly put forward the goals of "carbon peaking" by 2030 and "carbon neutrality" by 2060. Under the dual pressure of global climate change and energy crisis, new energy vehicles (NEVs), as an alternative to traditional fuel vehicles, have become one of the core paths for countries to achieve carbon neutrality. According to the International Energy Agency (IEA), the transportation sector accounts for more than 60% of global oil consumption, and the development of new energy vehicles has risen to the national strategy of all countries in the world, and has also become an inevitable choice to adjust the structure of our country's Vehicle industry, and the transformation of new energy vehicles is a necessary way to solve environmental and energy problems [1]. To this end, in 2009, the National Development and Reform Commission and the Ministry of Finance launched the "Energy Saving Products

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Benefiting the People Project" and began to guide the transformation of the Vehicle industry. In 2010, new energy vehicles were listed as a strategic emerging industry, and then for many years, the development of new energy vehicle-related industrial chains was promoted through top-level design (such as industrial development planning) and fiscal and financial policies (such as car purchase subsidies and tax exemptions), and policy subsidies were gradually reduced after the industry entered a stage of rapid development [2]. So far, our country's new energy vehicle industry has formed a relatively complete policy support system covering R&D, industrialization, promotion and application, tax incentives, infrastructure construction and international cooperation.

According to the latest statistics from the China association of vehicle manufacturers, from January to May 2025, the production and sales of new energy vehicles will increase by 45.2% and 44% year-on-year respectively, and the development of the industry will still maintain a rapid growth trend. However, while the scale of the industry is growing rapidly, competition between enterprises is also intensifying. As the technical route of the new energy vehicle industry enters a relatively certain stage, the design schemes of its core technologies begin to converge, and homogeneous product design forces enterprises to enter the "involution" price competition [3]. At the same time, the rapid expansion of upstream enterprises specializing in power batteries has compressed the market share of new energy vehicle manufacturers in the entire industry chain, causing some companies to start joint research and development, from pure competition to competitive cooperation [4]. Under the influence of competition patterns and environmental changes, the profit growth rate of most new energy vehicle industry enterprises has slowed down significantly, and some enterprises have even experienced a decline in profitability. Some scholars try to find solutions from the consumer market and enterprise production. For example, through the establishment of structural equation models, it is found that consumers' willingness to purchase new energy vehicles is mainly affected by three major factors: basic vehicle demand, new energy demand, and consumer subjective perception [5]. Some scholars have found that OEM production can improve profitability and reduce costs by constructing the Gounod game model, and although this behavior intensifies competition, the overall profit of the industry is still increasing [6]. Another part of the scholar tries to explore the breaking point from the perspective of the supply chain. For example, the ranking method is used to dismantle the new energy vehicle industry chain, and put forward the industrial nodes and key research strategies that different types of enterprises should prioritize [7]. In general, there are few existing studies that analyze the factors and types that affect the costs and benefits of enterprises from the perspective of financial factors and their intrinsic connections. In fact, as an emerging industry, the development of new energy vehicle companies is increasingly closely related to financial dimensions such as profitability, operation, debt repayment, and growth. Therefore, it is of great practical value for the development of the industry and enterprises to scientifically judge the main factors and types affecting the economic benefits of new energy vehicle enterprises, and to distinguish the development mode of energy vehicle enterprises according to the types of driving factors.

2. Research and Design of the Economic Benefit Evaluation System

2.1. Construction of Indicator System

Based on the evaluation criteria of enterprise financial performance, this paper intends to analyze economic benefits from multiple aspects such as profitability, solvency repayment, operational capacity, and growth capacity. According to the provisions of China's General Principles of Enterprise Finance, the four major competency-related indicators involve multiple indicators such as index current ratio, inventory turnover rate, operating profit margin, operating income growth rate, etc., combined with the research results of other scholars [8] and

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the provisions of the four major competency-related indicators of financial performance, the following 12 indicators are selected as the original indicators, as shown in Table 1 evaluation index system.

Table 1. Evaluation index system

Financial performance	Specific indicators	Nature of the indicator	Calculation formula
solvency	Current Ratio	moderation	Current assets / current liabilities
	Quick Ratio	moderation	(Current Assets - Inventories) / Current Liabilities
	Asset-liability ratio	moderation	Total liabilities / total assets
Operational capabilities	Accounts receivable turnover ratio.	Positive	Operating income / average accounts receivable
	Inventory turnover ratio.	Positive	Operating costs / average inventory
	Total asset turnover ratio	Positive	Operating income / average total assets
Profitability	Return on assets	Positive	(Net Profit + Interest Expense) / Average Total Assets
	Return on Total Assets	Positive	Net profit / average total assets
	Return on Equity	Positive	Net profit / average owner's equity
	Operating Margin	Positive	Operating profit / operating income
growth capabilities	Operating Profit Growth Rate)	Positive	(Current operating profit - Previous operating profit) / Previous operating profit
	Revenue growth rate	Positive	(Current Operating Income - Previous Operating Income) / Previous Operating Income

2.2. Data Sources

This paper focuses on enterprises mainly engaged in the manufacturing of new energy vehicles, using the annual reports of Shanghai and Shenzhen A-share listed companies from 2022 to 2024 as research samples, and at the same time, considering that the interference of external environmental factors such as the impact of the epidemic is difficult to completely remove, the average value is used for research to reduce interference.

2.3. Research Methods

Factor analysis reduces the bias caused by overlapping information in the original indicators by extracting the common information in multiple indicators to form new independent factors. Cluster analysis classifies samples by measuring their proximity to each other. It is worth mentioning that most of the indicators of factor analysis are forward indicators, so if you want to perform factor analysis, you need to carry out positive processing of moderate indicators and reverse indicators, and the reverse indicators are generally treated by the reciprocal method, and the moderate indicators often use the following formula:

$$x'_{ij} = -\left|x_{ij} - \overline{x}_j\right| \tag{1}$$

where x_{ij} is the value of the indicator, $\overline{x}_j$ is the average number of indicators. If there is a recognized industry optimum value, it can be substituted. Among the indicators selected in this paper, the current ratio, quick ratio and asset-liability ratio are all moderate indicators, and the industry optimal value of current ratio is generally 2, and the industry optimal value of quick

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ratio is generally 1, so the optimal value is used instead of the mean value in the formula, and there are significant differences in the optimal value of asset-liability ratio in different industries, and there is no recognized optimal value with a high degree of recognition [9], so the formula is directly used to calculate.

3. Empirical Analysis and Interpretation

3.1. Factor Analysis

3.1.1. Feasibility Analysis

Factor analysis requires a KMO value greater than 0.5 and Bartlett sphericity less than 0.05. The feasibility analysis table in Table 2 was obtained using SPSS.

Table 2. Feasibility analysis table

KMO and Bartlett test		
KMO sampling suitability quantity.		0.628
Bartlett sphericity test	Approximation of chi-square	227.595
	degree of freedom	66
	Significance	0

The KMO value of the index selected this time is 0.628, which is greater than 0.6, and the Bartlett sphericity is far less than the required 0.05, so factor analysis can be used for the index selected this time.

3.1.2. Extract the Main Components

In this paper, the factors of feature root > 1 are extracted, and if the cumulative variance contribution rate of these factors reaches more than 80%, it means that they can interpret the information of the original data and achieve better dimensionality reduction. The variance of maximizing the square of the factor load is obtained by orthogonal rotation, and the total variance table explained in Table 3 is obtained.

Table 3. Total variance table of interpretation

ingredients	Initial eigenvalue			Extract the sum of the squares of the loads			Rotational load sum of squares		
	total	Percentage of variance	Cumulative %	total	Percentage of variance	Cumulative %	total	Percentage of variance	Cumulative %
1	4.659	38.823	38.823	4.659	38.823	38.823	4.211	35.095	35.095
2	2.408	20.067	58.89	2.408	20.067	58.89	2.511	20.928	56.022
3	1.552	12.934	71.824	1.552	12.934	71.824	1.552	12.931	68.954
4	1.183	9.855	81.679	1.183	9.855	81.679	1.527	12.725	81.679
5	0.742	6.183	87.862						
6	0.584	4.864	92.726						
7	0.312	2.6	95.326						
8	0.264	2.203	97.529						
9	0.193	1.611	99.14						
10	0.072	0.601	99.741						
11	0.031	0.256	99.997						
12	0	0.003	100						
Extraction method: principal component analysis method.									

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There are four partial principal components with eigenvalues greater than 1, and their cumulative contribution value is 81.679%. Thus, the results of the analysis are available, and four principal components are extracted. Subsequently, the rotated component matrix table in Table 4 was obtained according to SPSS.

Table 4. Rotated component matrix table

index	ingredients			
	F_1	F_2	F_3	F_4
Total net return on assets	0.976	0.123	0.071	0.052
Return on assets	0.972	0.125	0.069	0.046
Return on equity	0.967	0.023	0.044	0.073
Operating margin	0.837	0.245	-0.049	-0.092
Inventory turnover	0.147	0.859	-0.018	0.158
Operating income growth rate	-0.055	0.773	-0.355	-0.385
Accounts receivable turnover ratio	0.239	0.717	0.178	0.093
Total asset turnover	0.598	0.626	-0.272	0.293
Quick ratio	-0.16	0.1	0.901	0.121
liquidity ratio	0.411	-0.261	0.682	-0.16
Asset-liability ratio	0.172	-0.128	0.132	0.841
Operating profit growth rate	-0.117	0.29	-0.11	0.703
Extraction method: principal component analysis method.				
Rotation method: Caesars normalized maximum variance method. a				
A rotation converges after 6 iterations.				

The four common factors extracted are recorded as follows, F_1, F_2, F_3, F_4, Among them, the factor F_1 have a high load in the net profit margin of total assets, return on assets, return on net assets and operating profit margin, and most of the indicators are profitability-related indicators, F_1 is named profitability factor. The factor F_2 have a high load in inventory turnover, operating income growth rate, accounts receivable turnover rate, and total asset turnover rate, most of which are related indicators of operational capacity, F_2 is named operational capacity factor; The factor F_3 has a high load in the quick ratio and current ratio, and most of the indicators are solvency related indicators, F_3 is named solvency factor. The factor F_4 have a high load in the asset-liability ratio and operating profit growth rate, and most of the indicators are growth capacity-related indicators, F_4 is named growth capacity factor.

It is worth noting that although there are four factors extracted, they are not completely consistent with the four dimensions of financial performance, for two main reasons, on the one hand, because the classification principles of the two are different, financial performance needs to reflect the same problem from different angles, and strive to cover comprehensive information, the four dimensions are related to each other, and each dimension has repeated expressions of the same information; Factor analysis needs to grasp the key points and pursue the capture of core elements, the four major factors are independent of each other, and each factor corresponds to the information one by one. On the other hand, it is affected by the characteristics of the industry, for example, according to the classification of traditional financial performance, the operating income growth rate belongs to the growth capacity, but in the results of factor analysis, the operating income growth rate is more similar to the structure of the operational capacity indicator. For example, Xiaomi Auto launched the Xiaomi SU7 car in 2024, successfully achieving rapid brand promotion with the help of Xiaomi Group, but failed to coordinate business docking, resulting in the factory not adjusting production capacity in

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time, and its sales were constrained by the supply chain The growth rate of operating income is directly affected by it. In general, this adjustment does not negate the logic of traditional classification, but rather changes in the correlation between indicators and dimensions due to industry characteristics, reflecting the flexibility of financial analysis to combine specific industry backgrounds.

3.1.3. Calculate the Factor Score

The regression method was performed using SPSS software to obtain the component scoring coefficient matrix in Table 5.

Table 5. Component scoring coefficient matrix

Component score coefficient matrix				
	ingredients			
	1	2	3	4
liquidity ratio	0.098	-0.048	0.424	-0.15
Quick ratio	-0.115	0.2	0.654	0.022
Asset-liability ratio	0.023	-0.11	0.006	0.562
Accounts receivable turnover ratio	-0.027	0.336	0.218	-0.001
Inventory turnover	-0.056	0.377	0.105	0.05
Total asset turnover	0.101	0.17	-0.15	0.157
Return on assets	0.24	-0.036	0.003	-0.013
Total net return on assets	0.241	-0.038	0.003	-0.009
Return on equity	0.25	-0.09	-0.033	0.014
Operating margin	0.203	0.025	-0.043	-0.102
Operating profit growth rate	-0.078	0.089	-0.07	0.468
Operating income growth rate	-0.061	0.338	-0.098	-0.283
Extraction method: principal component analysis method.				
Rotation method: Caesars normalized maximum variance method.				
Component score.				

By multiplying and summing the selected original variables with the extracted factor loads, the scores of the observed variables on the four common factors are calculated. The weighted calculation of the factor analysis method is as follows:

$$F_1 = 0.098X_1 - 0.115X_2 + 0.023X_3 - 0.027X_4 - 0.056X_5 + 0.101X_6 + 0.240X_7 + 0.241X_8 + 0.250X_9 + 0.203X_{10} - 0.078X_{11} - 0.061X_{12} \quad (2)$$

$$F_2 = -0.048X_1 + 0.200X_2 - 0.110X_3 + 0.336X_4 + 0.377X_5 + 0.170X_6 - 0.036X_7 - 0.038X_8 - 0.090X_9 + 0.025X_{10} + 0.089X_{11} + 0.338X_{12} \quad (3)$$

$$F_3 = 0.424X_1 + 0.654X_2 + 0.006X_3 + 0.218X_4 + 0.105X_5 - 0.150X_6 + 0.003X_7 + 0.003X_8 - 0.033X_9 - 0.043X_{10} - 0.070X_{11} - 0.098X_{12} \quad (4)$$

$$F_4 = -0.150X_1 + 0.022X_2 + 0.562X_3 - 0.001X_4 + 0.050X_5 + 0.157X_6 - 0.013X_7 - 0.009X_8 + 0.014X_9 - 0.102X_{10} + 0.468X_{11} - 0.283X_{12} \quad (5)$$

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SPSS is automatically normalized when calculating the factor score. The factor score is calculated according to the above formula and the comprehensive score is obtained by weighting the variance contribution rate, which is as follows:

$$F = \frac{35.095F_1 + 20.927F_2 + 12.932F_3 + 12.725F_4}{81.679} \quad (6)$$

According to the above formula, the factor score and comprehensive score in Table 6 are obtained, and they are sorted according to the comprehensive score.

Table 6. Factor score and comprehensive score

Name of the business	Profitability factor	Operational capacity factor	Solvency factor	Growth capacity factor	Composite score
Changan Auto	0.5420	1.4105	1.2773	0.4306	0.8636
Jiangling Motor	0.4503	0.8144	0.4893	1.3780	0.6943
Great Wall Motor	0.7003	0.1056	0.3204	0.8651	0.5135
Yutong Bus	1.0915	-0.3862	0.5060	-0.1226	0.4310
Sinotruk	0.7610	-0.2331	0.2674	0.4701	0.3828
FAW Jiefang	0.2624	-0.1282	1.1449	0.6726	0.3660
SAIC Motor	0.2893	-0.2304	0.8188	0.9353	0.3406
SERES	-0.5794	3.3257	-0.8678	-1.2316	0.2739
JAC Motor	-0.2414	0.3386	-0.0557	0.9640	0.1244
GAC Group	0.3154	0.2111	0.7672	-1.2765	0.1122
Zhongtong Bus	0.5326	-0.7695	0.5694	-0.4600	0.0502
King Long	0.0327	0.1138	0.3804	-0.6668	-0.0004
BYD	0.9909	-0.2504	-2.7125	0.2192	-0.0337
Dongfeng Motor	0.6313	-1.0190	-0.1701	-0.4416	-0.0856
Foton Motor	0.4964	-0.5519	-2.1298	0.8022	-0.1403
Ankai Auto	-0.6238	0.1493	-0.7365	-0.3363	-0.3988
Lifan Technology	0.3252	-1.0501	0.2681	-2.9289	-0.5432
Haima Auto	-1.0714	-0.8485	-0.3491	0.2061	-0.7009
BAIC BluePark	-2.3760	-0.0081	-0.2274	0.0193	-1.0560
Zotye Auto	-2.5292	-0.9939	0.4399	0.5018	-1.1935

Most of the enterprises with high comprehensive scores are traditional vehicle manufacturers transforming into the new energy field, such enterprises are well-funded, have low debt ratios, and basically stable traditional businesses, which provides a stable and sustainable financial foundation for the development of new energy vehicle business and helps to open up new energy vehicle business. For example, according to the production and sales report of Changan Auto's official website, from 2022 to 2024, Changan Auto's new energy vehicle sales accounted for 11.56%, 18.57% and 27.37% of its total sales respectively.

The major factors of enterprises with medium comprehensive scores are at a moderate level as a whole, and a very high or very low score of a single factor will directly affect the comprehensive score ranking of such enterprises. The comprehensive score is an overall evaluation of economic benefits, but market performance is usually only analyzed from the perspective of market share or revenue and profit, while ignoring potential risks such as high debt and insufficient technical independence. For example, GAC Group' M9 orders reached

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40,000 units in the first month, but it mostly uses Huawei technology, has a low technology ownership rate, mainly relies on the Wenjie series, and has a single product structure, which restricts its growth capacity and solvency. In order to establish a technical moat and quickly seize the market, BYD needs to expand rapidly, although this has achieved rapid growth in revenue and profit, but also generated a large amount of liabilities, so despite BYD's outstanding profitability, the lack of solvency is still a risk that cannot be ignored. In general, some companies with excellent market performance but average overall scores may have higher debt risks or operational shortcomings.

For example, BAIC BluePark will still invest a lot of money in the research and development of key technologies such as battery technology in 2024 despite continued serious losses, resulting in its failure to form a positive feedback on technology-driven profitability, resulting in poor market performance. Zotye Auto quickly occupied the market by imitation in the early days, but lacked brand recognition, and at the same time, safety issues such as steering wheel locking also reflected its poor operating level, and the superposition of a variety of problems led to a significant reduction in its sales and a collapse in profitability. It can be seen that enterprises with low economic efficiency generally have serious shortcomings, and this problem has caused a chain collapse.

3.2. Cluster Analysis

The final clustering center in Table 7 and the cluster member table in Table 9 are obtained by K-means clustering.

Table 7. Final clustering centers

	clustering			
	1	2	3	4
Profitability factor	0.4649	-0.0187	-0.7452	0.4881
Operational capacity factor	-0.1561	2.3681	-0.1509	-0.4833
Solvency factor	-0.9982	0.2047	0.3229	0.3868
Developmental ability factor	0.4041	-0.4005	0.6682	-0.9827

The first category is profit growth type. The profitability factor scored high, and the growth capacity factor performed outstandingly. The operational capacity factor score was relatively average among all clusters, and the solvency factor score was significantly lower than that of other clusters. This type of enterprise has both profitability and growth potential, average operational capacity, relatively poor solvency, and good growth, so it is necessary to focus on debt risk.

The second category is operation-driven type. The operating factor score is extremely high, the profitability factor score is close to the average, the solvency factor is average, and the growth capacity is poor. The overall performance of this type of enterprise is average, but the operational capacity is particularly outstanding, the supply chain management and asset turnover efficiency are outstanding, but the growth is weak. Therefore, how to transform operational capabilities into growth capabilities and profitability may be an important breakthrough.

The third category is balanced development type. The profitability factor score is much lower than that of other clusters. The operational capacity factor score is moderate, the solvency factor score is high, and the growth factor score is significantly higher than that of other clusters. On the whole, the profitability of such enterprises is weak, but the performance of other aspects is generally higher than average, and better solvency and growth capacity may be the key to improving their profitability.

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the fourth category is conservative and steady. The profitability factor score is the highest. The operational capacity factor performed poorly. The solvency factor score performs best in all categories. The growth capacity factor score performed the worst in all categories. Profitability and debt repayment are better, but operations and growth are poor, and the emphasis on existing risks is higher than the emphasis on future development, and the overall strategy is conservative. The financial structure of such enterprises is stable, focusing on risk control, but the investment in innovation is insufficient.

According to the integration of the factor structure features of the above clustering naming results, Table 8 clustering feature table can be obtained.

Table 8. Clustering characteristics

	Profit growth type	Operation-driven type	Balanced development type	Conservative and steady type
Profitability factor	high	middle	low	high
Operational capacity factor	middle	high	middle	low
Solvency factor	low	middle	high	high
Growth capacity factor	high	low	high	low

3.3. Result Collation

Combined with the cluster member table in Table 9, the sample data can be further analyzed, and then extended to the economic benefit research of the whole industry.

Table 9. Cluster member table

type	Name of the business
Profit growth type	BYD,Great Wall Motor, Ankai Auto, Sinotruk, Foton Motor
Operation-driven type	Changan Auto, SERES
Balanced development type	SAIC Motor, BAIC BluePark, JAC Motor, Haima Auto, FAW Jiefang, Jiangling Motor, Zotye Auto
Conservative and steady type	GAC Group, Lifan Technology, Dongfeng Motor, Yutong Bus, Zhongtong Bus, King Long

Combined with the comprehensive score of clustering results and factor analysis results, it is not difficult to see that profit growth type and operation-driven type enterprises perform strongly in the market, and most of these enterprises have good overall economic benefits, but individual enterprises may have potential crises such as debt problems and insufficient development drivers, resulting in average overall economic benefits, which is also in line with the development law of rapid expansion of emerging industries. For example, BYD's rapid expansion has led to greater debt repayment pressure, and GAC Group has made concessions in terms of technological independence to improve operational efficiency. Most of these enterprises have deficiencies in technology, products and markets, resulting in average overall economic benefits, but individual enterprises may achieve economic benefits through strategic trade-offs and other measures. For example, Yutong Bus has increased brand awareness by reducing R&D investment and releasing funds for brand promotion, and SAIC Motor can achieve a smooth transformation by improving operational efficiency.

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4. Conclusion

4.1. Conclusion

Combined with the results of factor analysis and cluster analysis, the following conclusions can be drawn from the overall economic benefit level and enterprise classification.

1) Transformation feasibility: Through factor analysis, it is found that traditional automakers in the transformation of the new energy vehicle industry generally have good capabilities in all aspects, and their comprehensive scores are generally greater than 0. It is worth mentioning that a considerable number of enterprises that have transformed from traditional vehicle business have relatively average operational capacity factors. As an emerging industry, the core technology of the new energy vehicle industry is different from the core technology of non-traditional vehicles, and it is necessary to transform the existing industry in a timely manner and reintegrate the supply chain, but the uncertainty brought about by integration may prompt enterprises to adopt more conservative operating strategies.

2) Differentiation path: Due to the differentiation strategy adopted by enterprises in actual business activities, the level of economic benefits of enterprises is clearly differentiated. Specifically, in the new energy vehicle industry, profit growth type companies such as BYD have invested a lot of money and continuously accumulated technology to rapidly increase their market share; Operation-driven type enterprises such as Changan Auto improve brand awareness and technical competitiveness through strategic cooperation with other advantageous enterprises, and use operational advantages to drive sales and revenue growth. Balanced development type enterprises such as JAC Motors attach too much importance to all-round development, slowing down the development of new markets, resulting in severe profit pressure; Conservative and steady type enterprises such as SERES adopt a more conservative strategy, and the risk of enterprise operation is low, but the overall income is also relatively average.

3) Characteristics of benchmarking enterprises: The classification of enterprises in the new energy vehicle industry is realized through cluster analysis. Among them, profit growth type enterprises and operation-driven type enterprises lead the development direction of the industry from two different ways: technology-driven expansion and operation-driven type development, which is in line with the development trend of the new energy vehicle industry, and some enterprises have the characteristics of high-quality development benchmarks in the industry. Considering the key role of operational capacity and profitability in the development of emerging industries, the two types of enterprises can learn from each other, such as profit growth type enterprises use capital advantages to strengthen supply chain management and production efficiency to strengthen operational advantages, and operation-driven type enterprises can transform operational advantages into market advantages and profitability through strategic cooperation.

4.2. Suggestions

4.2.1. Corporate Strategy

1) Profit growth type. Alleviate debt pressure: focus on reducing production costs to reduce debt ratios; Improve operational capabilities: Open up the entire industry chain and improve operational efficiency. For example, BYD acquires upstream and downstream enterprises to obtain lower quotations in the negotiation of procurement materials, while integrating the industrial chain, optimizing the production and procurement process, improving asset turnover, and enabling the company to develop in a healthier and more comprehensive direction.

2) Operation-driven type. Introduce foreign technology: Utilize cooperation with other companies to improve the level of technology. Expand the market: open up the international

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market and expand the scale of sales. For example, SERES has introduced Huawei's digital technology and increased its own visibility by leveraging Huawei Group's brand appeal, opening up a certain scale of overseas markets and transforming operational advantages into growth advantages and profitability.

3) Balanced development type. Reform system: Establish independent management for new businesses, so that new businesses have greater autonomy in operation and decision-making. Focus on core business: shrink non-core assets and concentrate advantageous resources to improve operational efficiency. For example, SAIC Motor's Zhiji Vehicle independently develops and operates, while divesting inefficient assets and focusing resources on the new energy field, strengthening operational capabilities, and then achieving profit growth type.

4) Conservative and steady type. Improve growth capabilities: Transform idle resources and increase R&D investment. Improve operational capabilities: further segment the market and find new development opportunities. For example, Yutong Bus transformed its Zhengzhou plant, focusing on the research and development of new energy buses, improving the efficiency of technology research and development, in addition, the company specializes in the field of commercial vehicles, long-term brand promotion in this field, and achieves rapid expansion in market segments.

4.2.2. Policy Recommendations

Starting from the existing national policies, combined with the comprehensive economic benefit level and the type of enterprise, the following policy suggestions are put forward:

1) Promote the classification and transformation of car companies: guide enterprises to transform into profit growth type and operation-driven type enterprises according to the idea of making up for shortcomings with strong advantages, reduce direct subsidies, and turn to supporting technology research and development, infrastructure construction, and improving the industrial ecologyPromote the high-quality development of the industry. It is recommended to provide innovation support: more tax breaks and exemptions have been provided to enterprises with a high proportion of R&D expenses, and targeted subsidies have been given to encourage them to increase R&D investment. Improve infrastructure: Provide preferential treatment in terms of venue, electricity and other aspects for enterprises to build transit warehouses and other facilities, and lay out regional supply chain hubs.

2) Escort the development of the industry: From the results of empirical analysis, the four types of enterprises have the problem of high debt pressure or insufficient capital flow to varying degrees, resulting in enterprises having to slow down the speed of market expansion and technology iteration, affecting the healthy development of the industry. Suggested optimization of debt structure: Local governments can introduce policies to allow companies with good market performance but debt pressure to optimize their debt structure by issuing new energy industry bonds. Broaden financing channels: Allow enterprises to list technologies or businesses such as intelligent driving and battery swap business separately to expand financing channels. Strengthen fund supervision: Enterprises are required to regularly disclose the use of funds after obtaining financial subsidies and special loans.

3) Governance involution competition: Due to the convergence and development of technical routes, homogeneous new energy vehicles have fallen into involution price competition. Continuously compressed profits will reduce the overall economic benefits and long-term development of the new energy vehicle industry. Therefore, it is necessary to strengthen industry supervision, establish industry self-discipline mechanisms, maintain the order of fair competition, crack down on false propaganda and unfair competition, avoid low-price competition, especially vicious competition, and promote the healthy development of the industry. Moderately improve industry concentration: The government supports leading enterprises in the industry to integrate upstream and downstream enterprises, promote

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industrial chain coordination, and encourage them to carry out mergers and acquisitions. Promote differentiated competition: Encourage enterprises to strengthen technological innovation, improve product performance and intelligence, guide enterprises to focus on subdivided scenarios to enhance core competitiveness, and avoid competition in all categories.

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