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The Influence of New Energy Vehicle Enterprises' Strategy on Government Subsidy Acquisition: A Configurational Analysis Based on Dynamic QCA

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Abstract: *Against the backdrop of the global economic transition to sustainable energy, the new energy automobile industry is rapidly emerging as a key area of government support in various countries. Based on complexity theory and focusing on listed companies in China's new energy vehicle industry, this paper employs dynamic Qualitative Comparative Analysis to examine the complex causal combinations and asymmetric relationships between companies' implemented political strategies, social responsibility strategies, media strategies, and other non-market strategies, as well as marketing strategies, R&D strategies, financial strategies, and other market strategies with government subsidies. The research findings not only broaden the complexity perspective of government subsidy research from a theoretical standpoint but also provide a basis for the government to optimize subsidy policies and improve resource allocation efficiency. They reveal the impact of different strategic combinations on government subsidies, offering theoretical guidance and practical reference for enterprises to formulate effective strategies.*

Keywords: *Government Subsidies; Corporate Strategy; Integration of Market and Non-Market Strategies; Dynamic QCA*

1. Introduction

Driven by the global economic transformation and the concept of sustainability, the new energy vehicle industry has risen rapidly and become the focus of government support in various countries. In the industry's start-up stage, government subsidies play a crucial role in enterprise development and technological innovation[1], but as the market matures and technology advances, government subsidies continue to be rolled back and the distribution mechanism continues to shift, and its distribution faces the challenges of fierce competition and information asymmetry[2]. If enterprises want to stand out, they must rely on precise strategic layouts and significant competitive advantages[3], such as Ningde Times' innovative breakthroughs in technologies such as all-solid-state batteries, in order to obtain government subsidies. Therefore, an in-depth discussion on how enterprises can attract government subsidies through strategic planning has far-reaching practical significance and strategic value for enterprises to optimize their current resource allocation, for the government to achieve its policy goals, and for promoting the healthy development of the industry[4-5].

2. Literature review and theoretical framework

2.1 Complexity theory

Complexity theory focuses on patterns of combinations of elements that can deeply analyze the causal relationships between combinations of antecedents and outcomes, and can be used to demonstrate interactions between variables in complex systems that cannot be resolved by simple linear approaches [6-7]. This theoretical framework has been applied in several disciplinary fields, especially in economics and management studies, where it provides new perspectives for understanding nonlinear, heterogeneous, and dynamic social phenomena[8]. Government subsidies, as an important policy tool, have a complex causal relationship with firms' own factors. Therefore, this study adopts the QCA method to investigate the complex effects of each antecedent variable and its combination on firms' access to government grants.

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2.2 Theoretical framework

This study applies a refined "strategy-phase-structure" framework, an advancement of Raymond et al. (1978) "strategy-environment-structure" model[9], to scrutinize how new energy vehicle companies secure government subsidies across development stages. By defining "environment" as "stage," it pinpoints the influence of industry development phases on corporate strategies and structures. The study identifies seven key factors to determine which strategic combinations are most effective in garnering government support at various industry stages, as depicted in Figure 1.

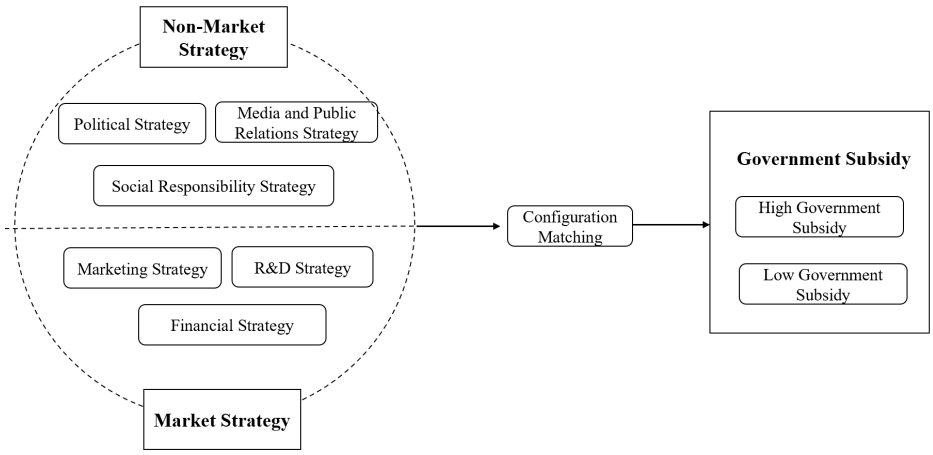

Figure 1 Research Model

3. Research method and data construction

3.1 Research method

QCA, proposed by Ragin, is a non-linear method that uses Boolean algebra to analyze complex causality through configurational comparison and set theory. Unlike traditional regression, it measures coverage and consistency to identify causal combinations leading to outcomes [7]. This study applies QCA to investigate the intricate causal relationships between strategic configurations and government subsidies, focusing on which combinations result in higher subsidies.

3.2 Research design

This study systematically selected 271 A-share listed new energy automobile companies from 2017 to 2022, following the principles of maximum similarity and heterogeneity. We began with a pool of 776 companies from Flush ifind, refined it to 406 through industry categorization and annual report reviews, and further narrowed it down to 356 by analyzing supplier-customer relationships and subsidiary business scales. Excluding post-2017 listings, shell listings, ST/*ST companies, and those with incomplete financial data, we ensured the sample's relevance and data integrity for reliable empirical analysis.

3.3 Variable measurement and calibration

3.3.1 Variable measurement

Government subsidies (Sub) are detailed in annual reports. Non-market strategies comprise Media Attention (Med) from CNRDS and Political Connection (PCLevel) scored 1-4. Social responsibility is assessed by ESG scores across nine levels. The sales expense ratio (Sal) reflects marketing strategy, calculated from sales expenses to operating income. The R&D expense ratio (R&D) indicates the company's R&D focus, derived from R&D expenses to operating income. ROA measures profitability, with net profit over operating income. For detailed measurements, as depicted in Table 1.

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Table 1 Variable Names and Measurement Methods

Variable Type	Variable	Variable code	Variable Calculation
Outcome variable	Government Subsidies	Sub	The total amount of various types of government subsidies received by the company in each year, in million yuan.
Condition variable	Media Attention	Med	The total number of news titles mentioning the company in a day
	Political Connection	PCLevel	If the company's chairman or general manager has served or is currently serving in the government, party committee, etc.
	Social Responsibility	ESG	Adopt the Huazheng Social Responsibility Rating Score
	Sales Expense Ratio	Sal	The percentage ratio of a company's sales expenses to its operating income.
	Research and Development Expense Ratio	R&D	The percentage ratio of a company's research and development expenses to its operating income.
	Return on Assets	ROA	The percentage ratio of a company's net profit to its average total assets.

3.3.2 Variable calibration

Before necessity and sufficiency analyses, data must be calibrated for software compatibility. Following Ragin (2008)[7], this study uses fuzzy set values from 0 to 1 for variables like media attention, political connection, social responsibility, sales expense ratio, R&D expense ratio, ROA, and government subsidies. Calibration points are set at 75%, 50%, and 25% of descriptive statistics for full membership, crossover, and no membership [8-10], as depicted in Table 2.

Table 2 Calibration of Condition Variables and Result Variables

Variable	2017-2019			2020-2022		
	75%	50%	25%	75%	50%	25%
Sub	73.15	20.31	6.76	119.60	29.46	10.66
Med	124.20	60.50	23.00	145.40	83.00	47.00
PCLevel	3.00	0.00	0.00	3.00	0.00	0.00
ESG	5.00	4.25	3.25	5.00	4.25	3.25
Sal	7.02	4.44	2.48	5.36	2.65	1.16
R&D	6.76	4.51	3.27	7.17	4.82	3.44
ROA	9.63	5.58	2.00	8.93	4.45	1.10

4. Data analysis and empirical results

Prior to sufficiency analysis in QCA, we assess the necessity of individual conditions to determine their impact on government subsidies for new energy vehicle. A condition is necessary if its consistency exceeds 0.9 [11], as depicted in Table 3.

Table 3 Single Antecedent Variable Necessity Analysis

Condition variable	High Government Subsidy				Low Government Subsidy			
	2017-2019		2020-2022		2017-2019		2020-2022	
	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage
Med	0.644	0.624	0.675	0.647	0.485	0.522	0.466	0.504
~Med	0.506	0.469	0.484	0.446	0.651	0.671	0.674	0.700
PCLevel	0.359	0.556	0.351	0.556	0.330	0.568	0.306	0.545
~PCLevel	0.721	0.492	0.713	0.477	0.743	0.563	0.751	0.566
ESG	0.593	0.571	0.652	0.607	0.528	0.565	0.498	0.522
~ESG	0.548	0.511	0.487	0.462	0.600	0.621	0.625	0.700
Sal	0.587	0.558	0.585	0.566	0.546	0.577	0.521	0.568
~Sal	0.554	0.523	0.553	0.506	0.581	0.610	0.602	0.621
R&D	0.633	0.604	0.612	0.589	0.497	0.528	0.511	0.555
~R&D	0.505	0.475	0.538	0.494	0.627	0.655	0.622	0.644
ROA	0.535	0.501	0.557	0.534	0.600	0.624	0.557	0.603
~ROA	0.599	0.573	0.586	0.540	0.521	0.555	0.569	0.591

However, as shown in Table 3, none of the conditions meet this threshold, indicating that no single factor is solely responsible for high government subsidies. The analysis suggests that high subsidies are the result of multiple factors working together, highlighting the need for a configurational approach to understand the influence on government support[12].

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4.1 Condition Configuration Analysis of High Government Subsidies

For groupwise analysis in this study, a consistency level of 0.8, PRI of 0.7, and frequency of 3 were set as thresholds. Core and edge conditions are identified, with graphical representations using "●" for presence, "⊗" for absence, and blanks for ambiguous states. Core conditions are denoted by large circles and edge conditions by small circles[13-15], as depicted in Table 4 and Table 5.

Table 4 High Government Subsidies Configuration Analysis Results

Condition variable	2017-2019						2020-2022			
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4
Med			●	●	●	●	●	●	●	●
PCLevel	●	●	●	⊗	●			●		●
ESG	⊗		●	●		●	●	●	●	
Sal		●	●	⊗		⊗	●			⊗
R&D	●	●		●	●	●	⊗	●	●	●
ROA	⊗	⊗			⊗	⊗			●	●
Consistency	0.872	0.836	0.831	0.839	0.827	0.883	0.849	0.896	0.833	0.870
Coverage	0.138	0.152	0.140	0.148	0.149	0.129	0.176	0.147	0.215	0.091
Unique Coverage	0.011	0.009	0.040	0.045	0.003	0.003	0.072	0.034	0.080	0.009
Solution Consistency	0.814						0.840			
Solution Coverage	0.334						0.343			

(1) High Government Subsidies - Growth Phase (2017-2019):

The new energy vehicle industry showcases diverse strategic paths:Path A1: Political Connection and R&D Focus, with companies leveraging political ties for subsidy and R&D opportunities, aiming for long-term market leadership.Path A2: Market Expansion and R&D Investment, where firms with strong political connections expand market share and invest in R&D for sustained growth.Path A3: Social Responsibility and Brand Influence, featuring companies that build a positive brand through social actions and media presence.Path A4: R&D Focus and Social Responsibility, with firms prioritizing R&D and social image over political ties.Path A5: Political and Media Dual Drive, combining political ties with media attention to enhance brand influence and R&D.Path A6: Social Responsibility and R&D Investment, focusing on social commitment and R&D as core strategies for long-term development.

(2) High Government Subsidies - Adjustment Phase (2020-2022):

Companies in the new energy vehicle industry strategically position themselves: Path B1: Brand Maintenance and Market Cultivation, with a focus on brand image and market presence through marketing, with a conservative R&D approach. Path B2: Political Alliance and R&D Investment, gaining policy support and investing in R&D and social responsibility to boost brand reputation. Path B3: Social Responsibility and Innovative Profitability, highlighting high R&D and social investment, with strong media presence. Path B4: Political Synergy and Technology Leadership, maintaining competitiveness with political ties and R&D focus, excelling in profitability and sustainable development.

4.2 Condition Configuration Analysis of Non-High Government Subsidies

Table 5 Non-High Government Subsidies Configuration Analysis Results

Condition variable	2017-2019			2020-2022			
	C1	C2	C3	D1	D2	D3	D4
~Med	●		●	●	●	●	●
~PCLevel		●	⊗	●		●	
~ESG	●	●	⊗	●	●	●	⊗
~Sal	●	⊗			●	●	●
~R&D	●	●	●	●	●		●
~ROA		⊗	⊗		●	●	⊗
Consistency	0.815	0.832	0.893	0.818	0.850	0.830	0.846
Coverage	0.215	0.142	0.101	0.219	0.169	0.146	0.161
Unique Coverage	0.120	0.069	0.042	0.083	0.034	0.030	0.072
Solution Consistency	0.821			0.822			
Solution Coverage	0.328			0.376			

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In the mature new energy vehicle sector, facing subsidy reductions, some firms may receive lower government support. Companies on Path C1 may lack media presence, social responsibility, and R&D, reducing their competitive edge for subsidies. Those on Path C2, despite profitability, could be hindered by low political ties and social responsibility. Path C3 firms, with good political connections but low R&D and social efforts, might also struggle in subsidy assessments. From 2020-2022, Path D1 companies falter in key strategic areas, with inadequate media exposure, social responsibility, and R&D, putting them at a disadvantage. Paths D2 and D3 suffer from a weak strategic profile, making government support less likely. Path D4 companies, though strong in social responsibility, may be less competitive for subsidies due to low media attention and political influence.

4.3 Robustness Test

Using the QCA method, robustness tests were conducted on the configurations for high government subsidies in the new energy vehicle sector. Adjusting the consistency threshold to 0.83 and the case frequency to 2 did not change the configurations, indicating the results are robust.

5. Discussion

5.1 New energy vehicle industry growth stage (2017-2019)

During 2017 to 2019, new energy vehicle companies shared several traits in securing government subsidies. They commonly leveraged strong political connections to gain policy support, crucial during the initial subsidy reduction phase, highlighting the pivotal role of such ties. Additionally, companies prioritized R&D investment as essential for innovation and maintaining competitive edge. High investment in media attention was also widespread, reflecting the industry's maturity and the importance of media for brand image and public perception. However, strategic differences were evident. Some companies invested less in social responsibility, indicating varied choices and priorities, while others invested more. Marketing strategies also diverged, with some focusing on cost-effective growth or R&D and others aggressively promoting products and brands to capture market share. Profitability levels varied across companies, likely linked to their development stages, market strategies, and cost management. These differences showcase the diversity and adaptability of corporate strategies in response to policy and market shifts.

5.2 New energy vehicle industry adjustment stage (2020-2022)

From 2020 to 2022, new energy vehicle firms enhanced social responsibility to meet rising environmental and social standards. R&D remained essential for innovation, while media engagement was key for brand transparency. As subsidies waned, companies reduced reliance on political ties, focusing instead on market demand and profitability. This shift showed adaptability to policy changes and a move towards market-driven growth. Diverse marketing and profitability strategies emerged, with some companies boosting marketing for quick market expansion, and others prioritizing R&D and social responsibility for sustained competitive edge. These variations underscore the industry's strategic flexibility in the face of evolving policies and markets.

Analyzing the strategic paths of new energy vehicle companies from 2017 to 2019 and 2020 to 2022, it's clear that R&D and media engagement have been pivotal. Initially, political ties were key for government support, but as subsidies decreased, companies shifted towards social responsibility and market-driven strategies. This transition highlights the industry's adaptability, balancing innovation, branding, and social duties with economic goals. The shift reflects a move from policy reliance to internal growth, showing strategic flexibility and foresight. Companies are aligning with policy, meeting market needs, and enhancing brand image through communication and innovation, driving product and industry advancement. They also bolster their social standing and competitive edge through social responsibility. These integrated strategies are vital for current success and future leadership, ensuring sustainable development and market presence.

6. Conclusion

Leveraging QCA, this study reveals that the acquisition of government subsidies by new energy vehicle companies is a complex interplay of market and non-market strategic factors, including

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marketing, R&D, profitability, political connections, media attention, and social responsibility, with no single element being the sole determinant of high subsidies. It underscores a trend towards a more balanced and integrated approach to these strategies and identifies various paths leading to high subsidies, reflecting the industry's adaptability. The research also indicates a clear shift towards market orientation, innovation, and a focus on social responsibility and R&D, suggesting a move away from reliance on government subsidies towards enhancing competitiveness and ensuring sustainable growth. The study's theoretical significance lies in its integration of strategies and dynamic stage analysis, capturing the evolution of corporate strategy and its impact on subsidy acquisition. Practically, it guides enterprises on securing government subsidies and informs the creation of more equitable and efficient government subsidy policies. Its insights are also applicable to other emerging sectors, promoting innovation and economic progress. Despite its insights, the study has limitations, and future research should include non-listed companies, extend the research period, consider additional factors like internal management, culture, and leadership, and possibly incorporate qualitative methods and an international perspective for a more comprehensive understanding of corporate strategy.

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